So. 157 Howard Street
Spokane 4, Washington
December 7, 1962

Memorandum

To: Chief, Division of Field Operations

From: Acting Field Officer, Region I

Subject: Examination report
OME-6248 (Gold-Silver)
Helena Minerals Company
Franklin and Sam Gaty Mines
Lewis and Clark County, Montana

INTRODUCTION

Helena Minerals Company, 1900 - 11th Avenue, Helena, Montana, applied for OME aid to explore the Franklin and Sam Gaty veins in Lewis and Clark County, Montana. The applicant proposes to explore by drifting 500 feet southwesterly on the 400 level and 500 feet northeasterly on the 425 level of the Sam Gaty mine, raising about 180 feet from the 400 level to connect with a new shaft, and diamond drilling 4,030 feet of AX size hole from the surface, 3,720 feet on the Sam Gaty vein and 310 feet on the Franklin vein. Originally, the applicant's estimated cost per foot for drifting was $57.50, and his estimated total cost of the project was $92,735.00. With a letter dated June 26, 1962, the applicant submitted a new estimate reducing his estimated drifting cost to $54.33 per foot, and his estimated total cost of the project to $90,565.00.

In an interview with Chester Leirness the evening of October 10, 1962, the need for the company to furnish documentary evidence of its right to enter Lots 44C and 44D and the S½ sec. 11 easterly of the Sam Gaty claims was explained. He said he would submit leases to Lots 44C and 44D and would withdraw the proposed drill holes easterly of the Sam Gaty claims. When it was pointed out that the proposed southwest drift would be in land which the company did not hold, he insisted that extralateral rights made such drifting permissible. In a letter dated November 26, 1962, Leirness was advised that the documents giving the company control of Lots 44C and 44D had not yet been received and, after telling him of the advisability of drilling before extending the drift southwesterly, he was asked if he could acquire control of the necessary land east of the Sam Gaty claims in the S½ sec. 11.

The property was inspected October 10, 1962, accompanied by Robert A. Miller, mine superintendent, and part of the time by Mr. Leirness. About six hours were spent on the property. The matter of property

See map in envelope

rights was reviewed for Mr. Leirness and Mr. Miller. It is concluded that the proposed drilling on the Franklin vein is so remote from any evidence of that vein's existence as to be more in the nature of wild cat prospecting but that the proposed drifting on the Sam Gaty vein, if preceded by six or seven surface diamond drill holes, could result in a significant discovery of gold-silver-lead-copper ore. The values of gold and silver in 530 tons of ore shipped during 1961 total $27.90 per ton. Based on gold at $35.00 per ounce and silver at $1.13 per ounce, a sample of the vein taken on the 200 level and another taken on the 400 level indicated gold and silver values of $13.04 and $26.72, respectively.

LOCATION AND ACCESSIBILITY

The Franklin-Sam Gaty property is in sec. 11, T. 10 N., R. 4 W., about three miles from the city limits of Helena, Montana. From the intersection of Main Street and U. S. Highway 12, proceed west two miles; turn right at sign directing to "Odd Fellows Home" and follow signs for 1.5 miles; turn right and follow graveled road for 0.3 mile; turn right on unimproved mine road for 0.5 mile to Sam Gaty No. 1 shaft and mine superintendent's cabin.

PROPERTY

Helena Minerals Company controls by lease the N½ sec. 11, T. 10 N., R. 4 W., except for Doc Steele Lode (Survey No. 354), Lot 39A, Lot 39B, Doc Steele mill site, Lot 44C, and Lot 44D. The company also controls by lease the Sam Gaty Lode (Survey No. 414), part of which lies in the S½ sec. 11 (plate 1). The Sam Gaty Lode comprises six patented claims, Discovery and Sam Gaty Nos. 1-6 southwest, which are described in section 79 of Mineral Survey 414.

GEOLOGY

The property is in the Grass Valley area to the west and southwest of the Scratch Gravel Hills. The geology of the region is described in "Metalliferous Deposits of the Greater Helena Mining Region," U. S. Geol. Survey Bull. 842, pp 35-43, by J. T. Pardee and F. C. Schrader (1933).

Rocks in the vicinity of the mine are Empire shale and Helena limestone of Algonkian (Belt) age, which have been intruded and metamorphosed by several small stocks of quartz monzonite. On the property there are two veins. The outcrop of the older, called the Franklin vein, strikes N. 45° W. and dips 10°-20° NE, and is essentially a gold-bearing quartz vein with some pyrite and minor amounts of lead and silver minerals. The outcrop of the other vein, called the Sam Gaty, strikes N. 50°-55° E. and dips 40°-65° SE. It is a filled fissure and is believed to have offset the Franklin vein. The Sam Gaty vein contains pyrite and galena with lesser amounts of sphalerite and copper in a gangue of quartz and crushed quartz monzonite and hornfels. Based on 530 dry tons of ore produced during 1961, the ore contains gold and silver values of about $28.00 per ton.

The Sam Gaty and the Franklin veins have each been developed and mined from inclined shafts, but only the workings on the former vein are now partially accessible. Along the strike of the Sam Gaty vein, trenches that were dug by the "old timers" are now badly caved and appear as little more than shallow depressions surrounded by low mounds of excavated material.

From near the east edge of Lot 1 and at intervals to the southwest are three trenches bulldozed by the applicant; a fourth trench was dug by "old timers" (plate 1). Trench 1 is barely through the overburden and does not expose any vein material, although there is a zone of thin-bedded laminations that might represent shearing on or near a vein. Trench 2 was excavated by "old timers." It is caved and filled with debris, but some of the material on the dump looked like vein matter and was sampled; the assay indicated 0.02 ounce gold and 0.1 ounce silver per ton. Between trenches 2 and 3 there is a band of quartz float about 10 feet wide and 35 or 40 feet long that appears to be abruptly cut off at the southwest end by a shallow gully in which the applicant bulldozed trench 3. The trench is within 10 feet of the float and is down to highly altered bedrock, but no quartz in place is exposed. According to Miller, quartz is common above the ore-bearing portions of the vein. However, only unmineralized shearing, possibly indicating vein structure, was exposed in the trench.

On Lot 44D, the "old timers" put down a vertical winze to an unknown depth. The winze is full of water, but the material on the dump suggests that it is not very deep and is entirely in quartz monzonite, which contains enough hornblende and biotite to give the rock a color much darker than normal. There is no vein material on the dump. On Lot 44C is an inclined winze, said to have been put down by former operators to a depth of 60 feet. The collar of the winze is caved and inaccessible, but exposed in the caved walls is a vein three to four feet wide that strikes N. 55° E. and dips 35° to 40° SE. To the southeast of Lot 44C is a vertical drill hole, also put down by former operators, that is said to be about 90 feet deep and to have cut a vein approximately three feet wide that assayed $80.00 per ton. Other than this statement by Miller, the applicant has no data on the hole.

Between Lots 44B and 44C is trench 4. Although it is shallow, the trench exposes a vein about three feet wide that strikes N. 55° E.; the dip is to the southeast but the degree could not be determined. The vein is in highly weathered quartz monzonite and contains some vuggy quartz and heavily iron-stained material. A grab sample assayed 0.02 ounce gold and 0.1 ounce silver per ton.

Near the south end of the Doc Steele claim, trench 5 exposes a vein about three feet wide that strikes N. 50° E. and dips 71° SE. The vein is a sheared zone in hornfels and contains some quartz; it is highly oxidized and shows no signs of sulfide minerals. The applicant believes that the northwesterly continuation of the Franklin vein passes to the southwest of the Doc Steele claim, but there is no

evidence to support this belief. It is to "explore" for this continuation of the Franklin vein that the applicant has proposed drill holes 21, 22, and 23 (see map accompanying application).

Underground, the Sam Gaty vein has been developed and partially mined from five levels, two of which are partly accessible. The levels were turned from an inclined shaft said to be 405 feet deep along the incline and 320 feet deep vertically. The 100, 300, and 500 levels, as well as the 400 level to the north, are inaccessible. The level designations are misleading in that, according to the altitudes shown on the applicant's office map, the vertical distance from the shaft collar to the 200 level is 112.6 feet, that from the 200 level to the 300 is only 32.3 feet, and from the 300 to the 400 is 24.1 feet. From the surface to the 200 level, the shaft is inclined 38°, from the 200 to the 300 level the inclination steepens to 50°, and from the 300 to the 400 level it further steepens to 54°. At the 200 level, the shaft is about 12 feet in the hanging wall of the vein, but on the other levels it is on the vein.

On the 200 level, near the shaft, the Sam Gaty vein strikes N. 35° E. and dips 40° SE. Here the hanging wall of the vein consists of about two feet of quartz and small scattered nodules of crushed quartz and quartz monzonite, all containing some sulfides, mostly pyrite. Beneath the quartz and crushed material, there is about 2.5 feet of gouge and siliceous vein material containing blebs and nodules of galena and pyrite. A chip sample of the latter zone assayed 0.14 ounce gold and 7.2 ounces silver per ton, 17.8 percent lead, 5.0 percent zinc, and 0.56 percent copper. North of the shaft, the 200 level is tightly lagged for about 60 feet, beyond which it is caved. One small exposure of the vein seen between the lagging appeared to be a more opaline quartz than that just described and is said to contain better values. Wall rock from the northeasterly end of the level to about 180 feet southwesterly of the shaft is quartz monzonite which has been somewhat kaolinized adjacent to the vein. At 180 feet southwesterly from the shaft, the contact between the quartz monzonite and the intruded sedimentary rocks strikes about N. 10° E. and dips vertically. The sedimentary rocks are highly metamorphosed to a hard, brittle hornfels, somewhat shattered and sheared along the vein. The southwesterly drift is timbered and the back tightly lagged, so that the vein can be seen only where it swings slightly and is exposed in the hanging wall side of the drift. Just beyond the contact, the 200 level drift ends and is connected to a level about 8 feet higher, driven from a vertical shaft (plate 1). The connection is made by a short crosscut into the footwall and a raise. The opening was small and partly caved, as was the "upper" level near the connection, according to Miller. The vertical shaft was not accessible.

During the years 1954 and 1955, a Mr. Brophy is said to have stoped 60 to 65 feet above the 200 southwesterly drift and sold ore estimated to be worth about $53,000. No settlement sheets to support this estimate are available. The stopes are inaccessible, and no stope maps and sections are available upon which to base an estimate of the tonnage that might have been produced.

The 300 level and the 400 level northeasterly drifts are caved. It is reported that the vein north of the shaft has been stoped from the 400 level to 30 feet above the level, or nearly to the 300 level, by prior operators; however, there is no record of the tonnage and grade of this production. The stope is said to be partly filled and partly opened, suggesting that the ground stands reasonably well. At the present time, there is a considerable flow of water from this area through the 400 north drift. As the water flow is much greater on the 400 level than it is on any of the above levels, Miller's contention that the increase comes from the Franklin vein where it intersects the Sam Gaty 300 level and flows through the stopes to the 400 level is probably correct. The present level of water in the shaft is about 30 feet below the 400 level.

When the applicant acquired the property, the Sam Gaty 400 level had already been driven about 100 feet southwesterly from the shaft and had been stoped for that length to the 300 level. He has since extended the drift 267 feet to a total distance of 367 feet from the shaft. The drift is timbered and back-lagged throughout so that, as on the 200 level, the vein can be seen only where it swings enough to show in the drift wall. One such place is about 150 feet from the shaft, where a 12-inch chip sample of quartz and gouge vein material assayed 0.15 ounce gold and 19.0 ounces silver per ton, 5.7 percent lead, nil zinc, and 0.2 percent copper. A raise at this location is said to be 70 feet high and an unstated amount of ore worth $18.00 per ton to have been mined. About 300 feet southwesterly from the shaft, the 400 level drift crosses the quartz monzonite-sedimentary contact, which strikes S. 60° E. and dips vertically. Beyond the contact, the ground had to be spiled and is now tightly lagged. Near the face of the drift, a long-hole was drilled southeasterly and is said to have cut the hanging wall of the vein at a depth of about 11 feet. According to Miller, no sulfides were seen in the drill cuttings.

CONCLUSIONS

Based on a smelter price of $31.82 per ounce for gold and $0.91375 per ounce for silver, a 530-ton shipment of ore had an indicated gold-silver value of $27.90. Based on the same price per ounce for gold and $1.13 per ounce for silver, the average of two chip samples, one from the 200 level and one from the 400 level, indicates a gold-silver value of $19.41. It is, therefore, concluded that this property might possibly qualify for a silver-gold project.

There is no known surface exposure of the Franklin vein, which was discovered during development and mining of the Sam Gaty vein. It is generally believed that the Franklin vein has been offset to the northeast by, and westerly of, the Sam Gaty, but the amount of offset has not been established. The applicant proposes to look for the northwesterly continuation of the Franklin vein by diamond drilling three vertical holes near the southwest end of the Doc Steele claims, some

1,400 feet northwest of its last known occurrence. A line through the collar of the Franklin No. 3 shaft bearing N. 45° W. passes about 900 feet northeast of the proposed holes. There is no surface evidence of any vein near the proposed drill holes except the Doc Steele, which dips away from them. It is concluded that not only are the proposed holes badly located but that drilling for the Franklin vein, so far from its last known location across an offsetting structure, is more in the nature of prospecting than exploration.

The low grade of the two surface samples may be the result of leaching but more probably is due to the material sampled coming from near vein wall rock. Considering the small tonnage shipped, of which there is any sort of record, and the relatively small areas stoped, it is concluded that ore bodies on the Sam Gaty vein are probably small but high grade and that other bodies may be found that collectively might constitute a significant discovery.

However, it is not known whether development of the Sam Gaty vein by former operators was stopped because further work was not justified or because the discovery of the Franklin vein offered a better chance of financial success. It is also possible that the better values mined from the Sam Gaty vein are in part due to drag from the offset Franklin vein.

Finally, it is concluded that the chance of discovering a significant amount of silver-gold ore along the Sam Gaty vein is at least fair, but in view of the factors just mentioned diamond drilling from the surface to the northeast and southwest of the workings should be done before drifting can be recommended. The proposed raise from the 400 level southwest drift to connect with the new vertical is considered as development and will not be recommended.

RECOMMENDATIONS

A two-stage program is recommended as follows, Stage II to depend upon the results of Stage I.

Stage I: Diamond drill from the surface approximately at the locations shown on plate 1 seven AX bit size diamond drill holes; each hole, bearing approximately N. 35° W. and inclined about 65°, should be drilled to a depth of 200 feet. DDH No. 1 should be located approximately 560 feet S. 2° W. from the SE corner of Sam Gaty No. 1 shaft and DDH No. 5 approximately 390 feet N. 84° E. from the NE corner of the same shaft. The interval between holes southwest of DDH No. 1 and northeast of DDH No. 5 should be approximately 200 feet. These holes will explore the Sam Gaty vein at about the 400 level for distances of 600 feet southwest and 400 feet northeast of the present workings.

Stage II: Extend the southwest 400 level drift a maximum of 500 feet to a point about 865 feet from the Sam Gaty No. 1 shaft. On the 425 level, drive a drift northeasterly for a maximum distance of 500 feet.

There is no ore pocket on any level, the ore being dumped directly into the skip. The heavy water flow from the northeast drift and the present poor condition of that drift complicate dumping from that side of the northeast drift. To avoid the rehabilitation that would be necessary to correct this situation, the operator proposes to drift northeasterly from the 425 level. This is reasonable and recommended.

COSTS

Drifting

1,000 ft. 5'8"x7'8" rock section (5x7 in clear of timber)--estimated rate of advance 4 ft./shift with hand tramming, 8 ft./day, 175 ft./mo., 6.1--say 6--22-day months, 13 5-ft. holes/round, 5 sticks 40% powder/hole.

1. Independent Contracts — None

2. Labor and Supervision

1 miner at $20.20/shift	$20.20
1 trammer at $20.00/shift	20.00
1 hoist man at $20.80/shift	20.80
	$61.00
FICA and other insurance, 15.1%	9.21
	$70.21
At 4 ft./shift	$17.555, or $17.56

3. Operating Materials

The following operating materials and supplies are already installed or available at the mine.

1 30-ft.^{3} muck skip--used several years--no allowance	
5/8" hoisting cable--allow ½ cost for 350 ft. at $0.25/ft.	$43.75
12" ventline in shaft--allow ½ of 260 ft. at $85/100 ft.	110.50
3" air line to 400 level--allow ½ of 260 ft. at $0.89/ft.	115.70
2" air line on 400 level--allow ½ of 300 ft. at $0.48/ft.	72.00
1" water line to and on 400 level--allow ½ of 560 ft. at $0.22/ft.	61.60
4" water pumping column to 400 level--allow ½ of 260 ft. at $1.32/ft.	171.60
	$575.15
Allowed monthly depreciation	$ 9.58
At 175 ft./mo. allowance	$ 0.05/ft.

Cost per 5-ft. Round

Operating materials installed	$ 0.25
Powder, 45 lbs. at $25/100 lbs.	11.25
Caps, 13 at $0.03 ea.	.39
Fuse, 130 ft. at $0.02/ft.	2.60
2" air line w/fittings, 925 ft. at $0.48/ft. (less 50%--no salvage)	1.10
1" water line w/fittings, 925 ft. at $0.22/ft. (less 50%--no salvage)	.50
1" air hose w/fittings, 150 ft. at $0.73/ft.	.55
1" water hose w/fittings, 150 ft. at $0.59/ft.	.45
3" suction hose w/screen head, 30 ft. at $1.10/ft.	.15
Gasoline (compressor and truck), 30 gal./day at $0.30/gal.	11.25
Oil and grease, 5% of fuel	.56
Ventube, 8", 800 ft. at $102/100 ft. (less 50%--no salvage)	2.05*
Rail, 20-lb., plus fish plates, spikes, bolts, etc., at $1/ft. (less 50%--no salvage)	2.50
Ties, 3-3/4 at $0.40	1.50
Steel, 1 steel replaced/300 ft. at $16, 65 ft./round	3.47
Bits, 300 ft./bit at $20--65 ft./round	4.33
Repair parts, $0.50/ft.	2.50
Total/5-ft. round	$45.40, or 9.08/ft.

*Ventube price quoted by Rowand Machinery Co., Spokane, 12/12/62.

4. Operating Equipment

Owned by applicant*	Value	Monthly deprec.
Schramm 115, gas-driven compressor	$2,700	$ 45.00
Single-drum hoist, 50 h.p.	1,200	20.00
2 Gardner-Denver jackleg drills at $300 ea.	600	10.00
5 mine cars at $50 ea.	250	4.17
450 gpm submersible pump, 50 h.p.	3,800	63.33
Gardner-Denver mucking machine	1,200	20.00
		$162.50
At 175 ft./mo., $0.93 + $2.00**		2.93/ft.

*Compressor is connected to standard steam boiler which serves as a receiver tank; cost $4,500 two years ago. At 5-year depreciation rate, present value $2,700 is assumed.

**Hoist and pump are each geared to 50 h.p. electric motors, for which no separate costs were given. Possibly some allowance should be made for these and for electric power; $2.00 per foot is probably ample.

5 and 6. None

7. Miscellaneous

1 engineer-supervisor, 6 mos. at $750/mo.	$4,500.00	
FICA and other insurance at 15.1%	679.50	
	$5,179.50	
At 1,000 ft. of drift		5.18/ft.

Assaying

100 determinations for gold and silver at $2.50 each	$ 250.00	
100 determinations for lead at $1.50 each	150.00	
	$ 400.00	
Total cost for drifting		$34.75/ft.

Timbering

It is estimated that the drifts will have to be completely timbered. 1,000 feet of drift will require 200 standard 8x8 sets at 5-ft. centers. It is estimated that one shift will stand, block, and lag three sets, or 15 feet. Time required, 66.6--say 67--shifts, or 3.0 22-day months.

1. Independent Contracts None

2. Labor and supervision

1 miner at $20.20/shift	$20.20	
1 helper at $20.00/shift	20.00	
1 hoistman-mechanic at $20.80/shift	20.80	
	$61.00	
FICA and other insurance at 15.1%	9.21	
	$70.21	
At 15 ft. timber/shift		4.68/ft.

3. Operating Materials and Supplies

400 posts, 10"x10"x7'	23,333 b.f.		
200 caps, 10"x10"x6'6"	10,833 b.f.		
400 collar braces, 4"x6"x4'2"	3,332 b.f.		
3,000 lagging, 2"x12"x3'	30,000 b.f.		
At $65/M	67,498 b.f.	$4,387.37	
Plus 10% for blocks, wedges, etc.		438.74	
		$4,826.11	
At 1,000 ft. of timber			4.83/ft.

4. Operating Equipment

	Monthly deprec.	
Same as for drifting--less jacklegs, mine cars, and mucking machine	$128.33	
At 320 ft. timbering/22-day mo., $0.40 + $2.00		2.40/ft.

5 and 6. None

7. Miscellaneous

½ engineer-supervisor, 3 mo. at $750/mo.	$1,125.00	
FICA and other insurance at 15.1%	169.88	
	$1,294.88	
At 1,000 ft. of timber		1.29/ft.
Total cost of timber		$13.20/ft.

Total cost, drifting and timbering $47.93.

Applicant's amended estimate $54.33.

D. R. MacLaren

Attachment

Distribution:
OMK(3)
Docket
MacLaren
SRO

CRUSE DEVELOPMENT COMPANY FRANKLIN MINE

LOCATION:

This property comprises the greater portion of the North half (N½) of Section Eleven (11) Township Ten (10) North Range Four (4) West, and is situated about three miles North of the city limits of Helena, Montana.

FORMATION:

The country rock in the vicinity of Mine is mainly monzonite granite, but there is also some sedimentary material, hornstone or hard slate, on a portion of the ground. Geologically the granite is thought to be a portion of the large Butte granite uplift and the conditions are good as far as the possibilities of mineral are concerned in such a formation. The hornstone is a sedimentary rock altered and hardened by contact with the granite. So far as the hornstone and granite are concerned the conditions are quite similiar to the conditions of Marysville, Montana, where the best ore bearing veins are found near the contact and the hornstone and granite.

TOPOGRAPHY:

This entire half section of land upon which this property is located lies at the south end of the Scratch Gravel Hills and in a comparatively flat section. The ground slopes from north to south at a grade of about 150 feet to the mile and from east to west even less than that. There are, however, four small hills or mounds on the property, one just west of the workings and the shafts, one at the northwest corner of the section and two along the line of the half section. The property lies in a flat or basin below the Scratch Gravel Gold diggings where some placer work was done in the early days of the State.

DEVELOPMENT:

The development consists generally and collectively of 2,000 to 3,000 feet of shafts, drifts, crosscuts, winzes raises and stopes. The "Lead" or "Sam Gaty" vein is opened by a Shaft No. 1,405 feet deep approximately and by 600 to 800' feet of levels and crosscuts, besides more or less stoping. The "Gold" vein has been opened by two shafts; shaft No. 2 two hundred feet deep and shaft No. 3 five hundred and fifty feet deep with 2,000 feet of levels, raises, crosscuts, stopes and other neces-

sary openings. The longitudinal extent of the development covers a distance of 2,000 feet from the face of the 100 foot level northwest to the face of the 550 foot level southeast.

ORE:

The ore in the Gold vein from the surface down to an approximate distance of 200 feet from the apex was an oxidized iron stained quartz of good shipping grade, as shown by the records of the company. It had a depth of approximately 200 feet or more and was continuously rich for a distance of 1,000 feet.

ORE RESERVES:

The ore was extracted and shipped to the East Helena Smelter which method of treatment required an ore of a grade at least $25.00 per ton or more.

There are a large number of tons of fillings in the old stopes and by measuring the stopes on a stope map and going into the stopes underground before the shafts were filled with water, it was estimated there were stored in the old stopes 27,000 tons or more of broken material. This material if extracted and sorted, would yield 10,000 tons or more which would be of fair grade, such as to be called milling ore.

There was also found 1,000 tons of ore of a similar character on the dump at Shaft No. 2 or a total of 11,000 tons.

This estimate was made as carefully as possible, after a full inspection of the conditions in the stopes. These fillings are the oxidized fillings from the upper works.

Ore reserves estimated in January 1917 by the late C. E. Fryberger, E.M, were $944, 509 in ore blocked out and $1,939,311 probable above 500' and down to 600' depth. In August 1917, very rich ore was being sent to the East Helena Smelter.

The oxidized fillings could be taken out, screened and milled at a profit of $2.00 per ton or more, if there were a mill on the ground. As to the milling of this ore, assays and tests indicated that there might be saved on plates 60% of the assay value, and 50 cents per ton additional in concentrates by tabling. A good saving of the balance could be made by concentration and cyaniding as previous tests have shown. These concentrates would run high in value. The reason it might be possible to treat the oxide fillings in the old stopes is because they are already mined

and would only have to be drawn and screened before milling. The dumps at shaft No. 2 and shaft No. 3 were assayed and want $5.00 to $6.00 per ton.

COST OF MINING:

The cost of mining could be decreased by some changes in methods and equipment. A vertical shaft could be raised at the bottom level at some place suitable for opening both the "Gold" vein and the "Lead" vein in depth. Such a place would be northeast of the bottom of No. 3 shaft, which bottom is only 135 feet below the surface. Then by installing electricity and electric pumping, all the water could be raised at one lift, making considerable reduction in cost.

WATER:

When operating the mine, the mine pumps were lifting from the two veins as nearly as could be estimated fifty gallons per minute perhaps more. This water was pumped from the bottom of the No. 2 shaft up to the 200 foot level to a point 50 feet vertically below the surface, then run across north toward No. 2 shaft and down a winze in the "Lead" vein and finally pumped to the surface from the "Lead" vein shaft No. 1, from a point 150 feet vertically below the surface. This method was probably economical enough at the time, all things considered, when it was a prospecting proposition, but could now be improved by one shaft, one lift and one pump.

In hoisting machinery too, there is a notable element of safety on the right side in having machinery more than strong enough to do the work.

EXPENSE OF DEVELOPMENT:

The mine has been well handled in the way of timbering and careful mining. By increasing capacity of hoist and pumps at No. 3 shaft, this No. 3 shaft could be sunk on down on the vein and more ground opened in that way, but a vertical shaft would be better; cost would be about the same either way.

As far as the geological conditions are concerned there is no reason why the "Gold" vein cannot be expected to continue down to greater depth at least within the limits of the ground owned by the Company.

In case a decision is reached to build a mill, a new 10 stamp mill with tables and cyanide tanks could probably be erected on the ground complete for about $25,000,

and it should be placed in the flat so that the tailings could be kept and handled on the Company's property without trespassing upon the rights of other people and at the same time without allowing the water to return into the workings. This could be easily done on the eastern portion of the land where there is a small coulee. Ample space for impounding tailings may be had for years to come, and by storing the tailings and pumping the water back to the mill sufficient water may be had from the mine, for milling purposes.

The most likely place for development with prospect of finding a large body of good ore is in the flat, 500' to 600' east of bottom of No. 3 shaft and 500' to 600' north of the south side line.

EQUIPMENT:

The equipment on the Franklin Mine consisted of two gasoline air compressors, three gasoline stationary pump engines, three pump jacks and three Knowles pumps. Such a gasoline equipment is not flexible and is not adapted to meeting changes in water flow and sudden demands of power. It is good enough at first perhaps for prospecting, but when deeper mining is undertaken it should be changed for a better and more flexible equipment. This gasoline equipment furnishes from 55 to 60 H.P. as nearly as could be estimated. Gasoline for the same costs from $6,000 to $7,000 per annum, putting it conservatively. Electric H.P. may be obtained for not to exceed $50.00 per H. P. per annum so that in comparing it with 50 to 60 H. P. gasoline, the cost per annum would be from $2,500 to $3,500 per annum, which would show great saving in favor of electricity, and $6,000 or $7,000 per annum would furnish from 100 to 150 Electric H. P.

These figures for electricity were obtained from the Helena, Light and Railway Company's office and were qualified by the statement that if power were taken for a definite time rates could be lowered somewhat, by consent of Public Service Commission. It is possible 75 H.P. continuously used would prove ample.

Butte, Montana,

May 31, 1928

Mr. Richard Cruse, President,
The Thomas Cruse Mining and Development Company,
Helena, Montana

Dear Sir:

Pursuant to your request, I have written this report on the Franklin Mine. My investigation was made wholly with a view to presenting my views as to the possibilities for ore in undeveloped parts of the Franklin vein.

The Franklin Mine, as you know, is now under water, and of course, the underground workings are inaccessible. I have, therefore, confined my investigation to an examination of the surface workings, records of shipments, review of numerous reports, some parts of them being specific in their description of details, plan maps of all workings and general surface geology, assay plan maps, and to interviews with owners and former employees--clear in their knowledge of the underground workings and ore occurrence.

It will not be necessary in this report to follow the conventional plan of mining reports wherein proximity to railroad and to smelter, topography, climate, labor supply, power, etc., are set forth. Suffice it to say that the mine is ideally situated for mining; that all economic features are most favorable. The point I shall emphasize is that extensive undeveloped areas of the Franklin vein will pay to develop.

I believe my interpretation of facts, gathered from the above mentioned reliable sources, to be correct. I also believe, as an engineer and mine operator, that the Franklin mine has very definite possibilities for pay ore beyond the area already mined out.

There are three veins in the Cruse tract of land, one, of very great importance, a gold vein called the Franklin, a fissure vein of great proven lateral extent and value; the second, a lead vein, having a course at right angles to the course of the Franklin and intersecting it, known as the Sam Gaty vein, a fault vein. The third is a promising prospect exposed in a 15 foot shaft located about 200 feet west of the Doc. Steele mining claim.

The Franklin gold vein is without outcrop, its apex being under alluvium. It was first discovered by Thomas Cruse while he was mining the Sam Gaty lead vein. The discovery of this gold vein was a notable event in the history of gold mining in the Helena district. It prompted a group of men, prominent in mining to search for the southeast extension of the same vein beyond the south boundary of the Cruse tract. These men were successful in their search and opened the southeasterly extension of the Franklin vein, in their own ground, about twenty-five hundred feet southeast of the point where Mr. Cruse had first discovered it. These two widely separated points on the Franklin indicated the great lateral extent of the vein later proved to contain a deposit of gold ore of unusual value and of unusual length. The ore shoot was continuous for more than one thousand feet in length and extended downward to the 200 foot level. As a matter of fact stoping was continuous for more than 1000 feet. The total returns from the smelter amounted to $490,000.00. In mining parlance, it was a bonanza ore shoot.

The question naturally arises--what became of the downward extension of this extraordinary ore shoot; why didn't the ore go below the 200 foot level?

In my study of the plan and stope maps of the workings I noted that the ore body terminated at the 200 foot level, apparently abruptly, along a line roughly parallel to the line of apex. I also noted, from a review of mining reports, that there was no zone or shoot of pay sulphide ore underlying the rich oxidized ore--a most unusual condition in a vein of the type of the Franklin. I had a feeling, after reading the mining reports that the abrupt downward ending of the ore shoot was structural and not mineralogical.

I gather, from a report on the mine made by W. F. Word, the following:

> "The best ore from shaft No. 3 was from a foot to two feet in width, and supported on both sides between the walls with parallel streaks of quartz and vein material carrying some values until in places its total width between walls was 10 feet or more. In depth, however, the gold vein changed its character and size, became narrower, harder and less persistent."

I was convinced then that the change at the 200 foot level was a structural change--in other words that deep development, development below the 200, might not have been done on the Franklin vein. This suspicion became stronger as I proceeded with my investigation.

The plan map of the workings, I noted, showed an abnormal spreading of the lower

levels, sprawling and meandering through the country apparently with no objective. That groping sort of mining indicated to me that the vein on which the lower levels were driven was flat, in fact almost horizontal, and much unlike the Franklin vein to the southeast, in Scratch Gravel Mining Company's ground adjoining, where the vein was considerably steeper. Mr. Word, in his report comments on this very point. He states:

> "It is my opinion that it is possible from the outcrop and surface exposures that the two mines, the Franklin and the Scratch Gravel Gold Mine, may not be exactly on the same vein plating."

That was a very good thought. It should have been followed up while the mine was open.

With the foregoing observation in mind I interviewed Mr. Malben, a former shift boss at the Franklin, who made the following statement to me:

> "I was employed at the Franklin mine as shift boss during the time the No. 3 shaft was being sunk in 1915. When we had reached the point about 30 feet below the 300 foot level we began to realize that the vein we were sinking on was not the same vein as we had above in the shaft, so we drilled a hole in the foot wall 2½ or 3 feet deep and the drillings showed by panning that it was ore. We intended to run the shaft steeper to pick up the vein in the foot wall, but this was never done so far as I know."

Mr. Malben's statement throws much light on the subject. The maps show plainly that the shaft was not sunk steeper to pick up the vein indicated in the drill hole. The shaft was then on a hanging wall stringer or feeder seam, and was continued to the bottom on the same flat stringer, the Franklin vein itself being in the foot wall undeveloped. Thus the failure to find pay sulphide ore bodies in the lower workings is accounted for.

The sulphide zone of the Franklin will be found intact and the downward extension of the extraordinary ore shoot, mined above the 200 foot level, will also be found. Pay values will extend downward in keeping with that type of vein, in keeping with the nature of the ore deposit, its great length as a single shoot of ore, and its mineral content.

As to possibilities for pay ore in the Franklin vein to the northwest of the Gaty fault vein I am sure, in fact I know, that well directed development in that

area will recover the faulted extension of the Franklin and its accompanying ore shoot. The evidence is clear that the rich ore shoot of the Franklin was cut off by the later or younger Gaty fault vein dipping to the southeast. The Franklin vein was pre-existent to the Gaty. Its faulted extension is therefore to the west of the Gaty fault and to the north of the westerly projected course of the Franklin vein. The amount of displacement and the length of the faulted ore shoot can only be determined by development.

The narrow vein or seam, immediately to the west of the Gaty shaft in juxtaposition with the Franklin, is not the Franklin vein. It was developed here and there along its course in the belief that it might be the west end of the Franklin. In my examination of the surface, west of the Gaty, I observed a depression in the surface, a dry bog had formed there. This depression has the same general course as the Franklin vein and may have been caused by the erosion of the Franklin vein apex. It is well worth investigating. The Franklin northwest faulted extension will be found in that neighborhood.

Far to the northwest, just beyond the Doc. Steele lode, but still in the Cruse tract, a strong vein, but a small one, is exposed in a shaft about 15 feet deep. The vein stands nearly vertical. The quartz is 12 to 15 inches wide and is a most likely looking prospect. This vein strikes N 50° W, practically the same course as the Franklin. I have tried to trace it on the surface but found no holes on it anywhere along its course except the shaft above referred to.

If you should find that I can further your interest in this property in any way please feel at liberty to call upon me.

Respectfully submitted,

(Signed) William L. Creden,
Mining Engineer

DATA ON FRANKLIN MINE

From Geological Survey Bulletin 842

The Franklin mine is at the extreme south end of the Scratchgravel Hills. Except for a few low rounded knobs the surrounding area is nearly flat and less than 100 feet higher than Sevenmile Creek, which is about a quarter of a mile farther south. The mine is only a short drive across the valley from Helena, and its hoist and waste dumps appear somewhat incongruous among the surrounding fields of hay and grain. Quartz mining was first done on the Franklin ground about 1870, on the Sam Gaty and Doctor Steel claims. The extent and production of this early work are not known. Afterward these claims and the land surrounding them became the property of the late Thomas Cruse. In 1914, while the Same Gaty vein was being developed, the "gold vein" was discovered, and for about three years afterward that deposit was mined rather extensively by Cruse and his heirs. In 1919 the mine was closed and its workings allowed to fill with water. According to data supplied by T. B. Miller, the smelter net returns on 17,250 tons of ore produced by the Franklin mine in the years 1914-1918 amounted to $490,333.73. The freight and treatment charges ranged from $10 to $12 a ton, and the average gross or assay value of the ore was about $42 a ton. About 90 er cent of the returns is to be accredited to gold and the remainder to silver. The ore was treated at the East Helena plant of the American Smelting & Refining Co.

A map of the underground workings of the Franklin mine made by the late William F. Word (pl. 4) shows the Sam Gaty or lead vein to be developed to a depth of 405 feet by an inclined shaft known as shaft 1. There are also more than 800 feet of drifts on the vein at different levels. The Gold vein is developed by shafts 2 and 3, which are respectively 200 and 550 feet deep. In this vein are about 5,000 feet of drifts, 1,000 feet of raises and winzes, and a large area of stopes. The workings described explore the Sam Gaty vein for a length of about 300 feet and the Gold vein for about 2,000 feet. The Sam Gaty or No. 1 shaft reaches a vertical depth of 320 feet, and shaft 3, on the Gold vein, about 135 feet. A point about 20 feet deeper is reached by a winze from the east end of the lowest level on the Gold vein.

The Sam Gaty or lead vein strikes N. 50°-55° E. and dips 40°-65° SE., the steep-

ening of the dip beginning below the third level. The Gold vein has an average strike of about N. 45° W. and a dip of 10°-20° NE. The two veins thus intersect nearly at right angles, and, according to Word, the Sam Gaty vein cuts and displaces the Gold vein 12 feet, the downthrow being on the hanging wall or southeast side. In the extreme eastern workings the Gold vein is cut and displaced a few feet by two vertical faults of easterly trend, and about 350 feet east of the main incline (shaft 3) the vein is involved in a trough or flexure 150 feet or more wide that causes the dip to increase to 20° or more. Beyond this flexure the dip decreases to about 10°.

From the report by Word referred to, it is learned that the Sam Gaty vein as exposed in the first two levels is from 2 to 4 feet wide and bounded by well-defined walls of granite and hornstone. Ore shoots 6 to 8 inches wide carry lead, gold, silver, and a little copper. Samples of them assayed from $2.80 to $29 a ton. The remainder of the vein is crushed granite, quartz, and gouge. The vein is oxidized near the surface, and sulphides appear below.

The Gold vein in its northwesternmost exposures is 1 foot or less wide. Near the intersection with the Sam Gaty vein and for a considerable distance to the southeast it is wider, in places reaching 10 feet or more. Near the main or No. 3 shaft high-grade ore formed a streak from 1 to 2 feet wide that was inclosed by layers of quartz and vein matter of less value. From the surface down to the 200-foot level (50 feet vertically below the surface) the ore consisted of iron oxides and quartz. The main ore body of shipping grade extended along the strike for 1,000 feet or more. Below the 200-foot level the vein filling is a vitreous white quartz containing pyrite and a few grains of galena. Very little free gold is present. Samples representing this material contained from $2 to $44 in gold and 0.09 to 3 ounces of silver to the ton. In a few samples lead ranged from 0.6 to 11.5 per cent. Fragments on the dump of the main shaft on the Gold vein consist of white quartz with scattered grains of iron oxides that were evidently derived from the oxidation of pyrite. Seams in the quartz are scantily coated with iron and manganese oxides. Another variety that probably came from the unoxidized part of the vein consists of dense white quartz, with scattered grains of pyrite and here and there a grain of galena. The wall rock is granite that contains masses of quartz-mica schist, hornstone, and other products

of contact metamorphism. Apparantly these bodies are included fragments of the sedimentary rocks (Belt series) which the granite has intruded. Near the vein, as shown by surface exposures, the feldspars of the granite are partly altered to sericite. In the eastern part of the Gold vein workings there is a parallel vein in the footwall from which a little ore has been stoped.

The horizontal persistence of both the Sam Gaty and the Gold veins suggests that they extend much deeper than the present workings. The comparatively diminished value of the ore below the oxidized zone may be due to the fact that it has not been reduced in bulk by the leaching out of valueless material. There is apparently no reason to think that a further decrease in value will occur within a moderate additional depth.

HELENA MINERALS Co.
SAM GATY MINE

PRODUCTION RECORD — 1960

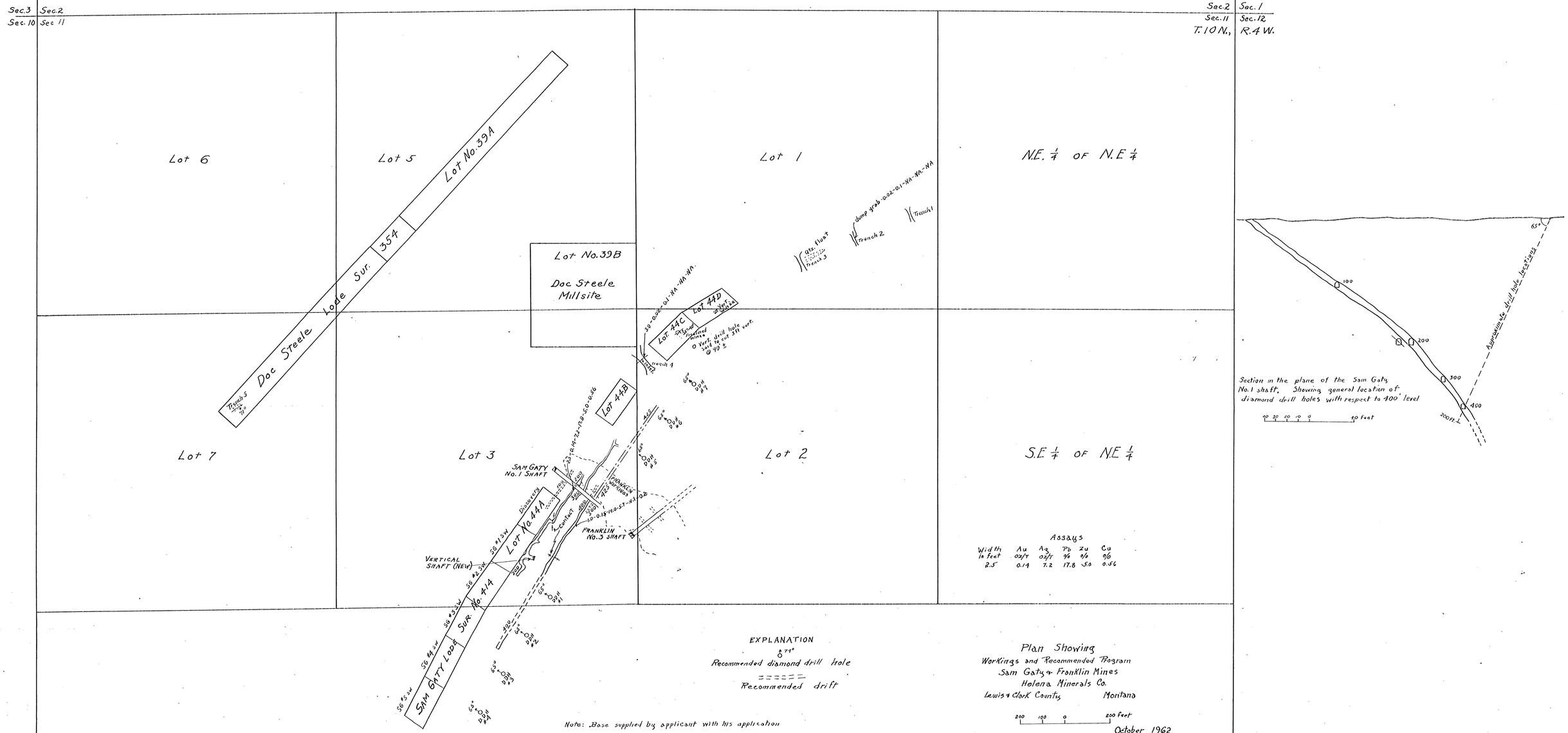
Date	Mine Lot No.	Smelter Lot No.		Dry Tons	Assays Au. oz/t.	Assays Ag. oz/t.	Assays Pb. %	Assays Cu. %	Assays Zn %	Total Content Au - Oz.	Total Content Ag. - Oz.	Total Content Pb - lbs.	Total Content Cu - lbs.
3-13-61	2	164		8.62	0.38	51.7	47.3	1.95	1.2	3.28	44921	819643	33613
3-13-61	3	272		14.17	0.20	44.6	63.0	1.10	1.2	2.90	63333	1790884	31170
4-14-61	4	440		5.76	0.43	38.3	36.2	1.80	2.2	2.48	22068	417159	20743
5-18-61	5	552	*	15.54	0.12	16.5	10.0	0.20	1.4	2.02	25949	313872	6215
5-18-61	6	570		8.16	0.23	57.5	57.6	2.05	.80	1.88	47126	943345	33866
5-24-61	7	613	*	10.67	0.14	15.7	8.5	0.30	1.2	1.49	16745	181317	6399
5-29-61	8	650		4.75	0.21	66.2	63.2	1.40	1.2	1.02	31468	600888	13290
5-25-61	9	710	*	5.91	0.17	15.5	5.8	0.40	1.7	1.00	9156	68521	4726
5-23-61	10	703		4.47	0.70	91.0	44.0	2.90	1.7	3.18	40858	395382	26836
6-16-61	11	819		12.61	0.48	41.2	18.7	1.65	3.0	6.05	51918	471296	41585
6-23-61	12	832		14.41	0.375	22.4	20.0	2.10	3.2	5.40	32283	576482	60531
6-30-61	13	862		9.70	0.30	72.0	57.2	1.45	1.8	2.96	70710	1132906	29584
7-18-61	14	940		7.42	0.225	47.8	56.2	1.50	1.6	1.72	43127	835142	22992
7-24-61	15	962		10.83	0.135	44.9	50.4	1.20	1.8	1.49	48865	1096487	27087
8-2-61	16	1011		12.56	0.18	61.7	54.8	1.10	1.7	2.26	775.26	1382149	289.00
8-9-61	17	1045		62.85	0.18	24.8	16.2	0.75	1.0	11.31	157128	2061519	97419
* 8-24-61	18	1121	*	44.41	0.13	11.3	8.8	0.40	2.0	6.00	50632	790576	39973
* 9-6-61	19	1185	*	46.53	0.11	13.0	10.1	0.30	1.2	5.12	60958	963222	279.20
9-6-61	20	1187		14.10	0.31	53.7	54.9	1.50	1.2	4.80	758.14	1573897	42309
* 9-18-61	21	1248	*	43.98	0.12	14.0	11.9	0.30	1.2	5.50	62228	1068659	35182
9-22-61	22	1255		6.82	0.28	40.8	51.1	1.30	1.4	2.25	28588	700204	18409
9-28-61	23	1282		41.18	0.175	14.7	11.6	0.50	2.7	7.52	60948	963631	45299
10-12-61	24	1335		4.95	0.37	47.2	44.4	1.40	1.70	1.83	23463	449467	14355
* 10-19-61	25	1369	*	27.47	0.09	8.6	8.4	0.20	1.40	2.61	24038	472527	16484
10-23-61	26	1385		5.97	0.35	29.2	37.7	1.10	1.2	2.21	17579	453055	14326
* 10-31-61	27	1420	*	27.91	0.135	8.3	7.3	0.40	1.6	3.98	23120	421381	22325
* 11-2-61	28	1427	*	14.41	0.195	7.3	6.2	0.10	1.8	2.92	10807	184443	7205
11-9-61	29	1457		4.02	0.30	20.2	39.3	1.40	2.70	1.22	8212	317624	12046
* 11-13-61	30	1474	*	16.94	0.14	10.0	8.8	0.40	1.2	2.46	17197	301583	15249
* 11-30-61	31	1539	*	23.01	0.13	9.3	7.0	0.20	0.7	3.11	21633	326803	13809
Totals:				530.13						101.97	12,690.58	220,740.64	7,809.49

* "Low Grade"

U.S. Department of the Interior

Office of Minerals Exploration
Application Report

O.M.E - 6248



Submitted with appl. exam. rept. 12/7/62