MEMORANDUM OF CALL

TO: Bud Taylor

☐ YOU WERE CALLED BY— ☐ YOU WERE VISITED BY—

OF (*Organization*)

☐ PLEASE CALL → PHONE NO. CODE/EXT.

☐ WILL CALL AGAIN ☐ IS WAITING TO SEE YOU

☐ RETURNED YOUR CALL ☐ WISHES AN APPOINTMENT

MESSAGE

Please distribute these to people in Denver who would be interested at least in the Memory Book - Thanks

RECEIVED BY	DATE	TIME

STANDARD FORM 63
REVISED AUGUST 1967
GSA FPMR (41 CFR) 101-11.6

GPO : 1969—o48—16—60341-1 332-389

63-108

Meridian, Montana. The vein crops out at an altitude of 8,175 feet; the 500 level is at an elevation of 7,636 feet above sea level.

Access from Basin, a station on the Great Northern Railway, is via 8 miles of improved dirt road. Most mine supplies are obtainable in Butte, Montana, which is 27 miles southwesterly from Basin via surfaced highway.

Ownership

Mr. Chester Bullock of Basin, Montana, owns 2/3 interest in 12 patented claims which comprise the Crystal group and Mr. Howard Johnson of Butte, Montana, owns 1/3 interest. An abstract of title is available for examination. E. H. Lewis, Inc., has a 5 year renewable lease with option to purchase the property. Terms include average minimum monthly payments of $1,250 advance royalty or 10 per cent of net smelter returns, if greater than $1,250, until total payments attain $200,000. Net smelter, for purposes of royalty, include payment for metals shipped less truck haulage, railway freight, and smelter charges. The lessee receives 90 per cent of the credit for depletion for income tax purposes.

General Geology

The Crystal vein system is associated with an aplite dike which cuts granitic rocks of the Boulder batholith of late Cretaceous age. The structure has been prospected for 3-1/2 miles from the Eva May mine to the Bullion mine and beyond and

is exposed in Crystal mine workings for 1,200 feet. The ore which has been mined at the St. Lawrence shaft is on the same vein; this ore shoot extends about 1/2 mile west of the easterly workings of the Crystal mine.

The vein consists of several leases or parallel bands of ore separated by pyritized aplite or granite. There is a rather well-defined lead-zinc zone in the hanging wall or north portion of the mineralized structure and a copper-bearing zone toward the south or footwall side. The vein system strikes east-west to N 70° W and dips from 45 to 60 degrees north. The average dip is about 66 degrees north.

Ore minerals are, in order of abundance, sphalerite, galena, chalcopyrite, bornite, tetrahedrite, and chalcocite together with lesser amounts of oxidized lead and copper minerals. Gangue minerals are quartz, pyrite, and arsenopyrite. Wall rock alteration has resulted in much clay and sericite while barren fine-grained silica and iron oxide characterize the hanging wall of the ore zone.

History

The Crystal mine has recorded production of 22,586 tons of ore between 1908 and 1960 which contained 3,579 oz. gold; 343,591 oz. silver; 536,915 lb. copper; 2,060,623 lb. lead; and 939,190 lb. zinc. This averages about 0.16 oz. gold, 15.2 oz. silver, 1.2 per cent copper, 4.8 per cent lead, and 2.1 per cent zinc. During 1911 through 1919 the production from the Crystal was

included with that shown for the Comet so that production may well have exceeded 30,000 tons. Operations have been intermittent and principally by small lessees. No appreciable amount of copper was shipped because during these years the copper market was severely depressed.

The Crystal claim was located in 1885 and earliest production (Corry report, 1915) was made in 1899. Corry also reports that the St. Lawrence produced $50,000 in gold, silver, and copper between 1900 and 1915. A sample from the dump (which Corry took) assayed 0.12 oz. gold, 20.1 oz. silver, and 3.0 per cent copper. The shaft has been filled with water since then but the dump has been shipped.

A good deal of metallurgical test work was done by the U.S. Bureau of Mines in 1943 and 1944. Fairly good results were obtained but additional testing is in progress to achieve greater selectivity than that which was obtained by this early testing.

Because previous operations were conducted by various lessees for high-grade ore, much of the older area of the mine is now caved. Accurate records of geology, production, and mine excavations of these workings are not available.

Development

The enclosed plans and sections show several miles of mine workings. Today, only the 500 level and Intermediate levels between the 500 and 300 level are readily accessible.

Since there are three fairly well-defined mineral zones

within the Crystal vein structure, older workings have followed either foot- or hanging-wall zones and neglected the parallel zones. Hence the present operators are conducting an extensive long-hole drilling program to explore the walls of older workings. This exploration has disclosed a mineralized structure 25 to 30 feet wide which has a lead-zinc zone 3 to 12 feet wide in the north wall and a copper-lead-zinc zone 1 to 6 feet wide in the south or footwall side.

The longitudinal section shows three ore shoots have been developed in the older workings. However, the footwall copper zone has not been extensively developed between the 500 level and the 300 levels. Thus the older workings, where accessible, offer good development possibilities.

Mining

Mining has been by open stulled stoping with minor filling. This method has been continued by the present operators because of the distinct cleavage between ore and waste and the fact that the hanging wall stands well if it is not broken.

Drilling is by jackleg or stoper using chisel bits with tungsten-carbide inserts. Costs for steel and bits are not available at this time as considerable experimenting is being done to determine the most economical combination.

Because of its blocky nature, the ground breaks with little powder; it is estimated powder consumption will average 2 lb. per ton.

Montana

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
So. 157 Howard Street
Spokane 4, Washington
March 16, 1962

Memorandum

To: Chief, Division of Field Operations

From: Acting Field Officer, Region I

Subject: Examination Report, OME-6178 (Copper-Lead-Zinc)
E. E. Lewis, Inc., Crystal Mine, Jefferson County
Montana

INTRODUCTION

E. E. Lewis, Inc., Box 1481, Grand Junction, Colorado, applied for OME assistance to explore for copper, lead, and zinc ore in the Crystal mine, Jefferson County, Montana. This property was the subject of a prior DMEA contract, Idm-E62, Docket DMA-821X, Golden Messenger Corporation. There is no copy of either the prior application or the prior contract in the Spokane Office files. However, from correspondence in the local files, it appears that the contract was dated July 18, 1951, and was rescinded October 13, 1951, before any Government funds were expended. The reason given by the company for requesting the rescission, as given in a letter dated September 29, 1951, was a desire to use the company funds to explore ground east of the Crystal mine.

The applicant proposes to explore two areas from the 500 (lowest) level of the Crystal mine. The first area is below known ore bodies on the Crystal vein. The second area, which contains the St. Lawrence ore shoot, starts about 200 feet beyond the west end of the 500 level.

The applicant proposes to explore the first area by deepening a 38-foot deep winze 220 feet down the dip of the vein, or 215 feet vertically below the 500 level, drifting and crosscutting on the 700 level a total of 830 feet. To explore the second area, he proposes to rehabilitate the final 107 feet of the 500 level drift west, extend the drift and crosscut the mineralized zone by driving a total of 470 feet of drift and crosscut, and raise 200 feet on the vein in the St. Lawrence ore zone. He also proposes to long hole drill a total of 500 feet on each level. His estimated cost of the project is $206,388.65.

The property was visited December 9, 1961, in the company of Suk Koo Yoon, a Korean Trainee, and Dudley L. Davis, chief geologist for E. E. Lewis, Inc. At the mine there was between 3 and 4 feet of snow so that the examination was limited to an inspection of the 500 level. About 2 hours were spent on the property. Costs were discussed with Mr. Davis the evening of December 8 at Boulder, and the evening of December 9 at Butte.

It is concluded that the chance of discovering significant amounts of ore at the Crystal mine are good and it is recommended that the applicant's proposed program with modifications be approved. The estimated cost of the recommended project is $114,573.95, of which the Government's share would be $57,286.97.

LOCATION AND ACCESSIBILITY

The Crystal mine is located in secs. 17, 18, 19, and 20, T. 7 N., R. 5 W. at the head of Uncle Sam Gulch, Cataract Mining District, Jefferson County, Montana. The property may be reached from Basin by turning northerly from U. S. Highway 91 at the east end of town and following a graded road about 3 miles up Cataract Creek thence turn left and follow Uncle Sam Gulch about 5 miles to the mine.

PROPERTY

The property comprises 12 patented mining claims which the applicant holds under a lease with option to purchase. The claims with their respective patent numbers as listed in the lease are:

Claim	Patent Number
St. Lawrence	6035
Jack	6036
Crystal	6037
Commerce	6038
Mammoth	10216
Alpine	10438
Holland	10438
Snowbird	10438
Lincon (Lincoln)	10438
Sparkling Water	5693
Vermillion	7986
Macasin	5692

The claims that will be directly involved are St. Lawrence, Jack, and Crystal; Lincoln and Snowbird may be involved in the drifting on the 700 level particularly if the dip of the vein should flatten; Mammoth includes the 500 level portal and crosscut. Therefore, these six claims at least should be included in the land subject to the contract.

The 500 level has been explored from about coordinate 4610E to about 5910E. The east limit of exploration on the upper level is about coordinate 6100E. Although the applicant does not request the exclusion of any portion of the 16 claims comprising the property, exclusion of the Crystal vein above the 500 level between coordinates 4610E and 6100E could be considered.

A report dated May 31, 1951, by Elton A. Youngberg and Willard P. Puffett of the U. S. Geological Survey and Eric G. Erickson of the U. S. Bureau of Mines, Docket DMA-821K, describes in some detail the workings as they were at that time. Of the 500 level they say:

> "The lower main level is a 1,300-foot drift which is reached by a 900-foot adit at an elevation of 7,636 feet. At places on the lower level there are exploratory crosscuts for short distances from the drift, and in two place, pillars have been left where parallel drifting has followed veins in the footwall and hanging wall. The west 100 feet of the lower level is now caved. A winze, 660 feet west of the intersection of the adit and the main lower drift has been sunk 38 feet down the dip of the vein."

This was the status of work on the 500 level at the time the DMEA contract was signed.

Upon checking the location of the winze, it was found to be about 550 feet from the drift-adit intersection. It was filled with water so the depth could not be checked. The ground in the vicinity of the shaft is timbered, but the timbers do not appear to be taking any weight. The question of sinking vertically in the footwall was raised, but the applicant prefers to sink an inclined winze in the vein. He does not foresee any difficulty because of heavy or bad ground.

GEOLOGY

The geology of the area and of the Crystal mine is described by Edward T. Ruppel, Geology of the Basin Quadrangle, Montana, U. S. Geological Survey Open File, January 10, 1958, and is briefly summarized in Bulletin 16, State of Montana, Bureau of Mines and Geology, Mines and mineral deposits (except fuels), Jefferson County, Montana, by R. N. Roby, W. C. Ackerman, F. B. Fulkerson, and E. A. Crowley (1960).

According to Ruppel, the Crystal vein is in a fault zone trending N. 70° to 80° W. and dipping 60° to 75° N. On the Crystal claim coarse-grained quartz monzonite in the footwall is faulted against alaskite in the hanging wall. On the St. Lawrence claim the footwall is medium-grained quartz monzonite, and the hanging wall is coarse-grained monzonite. The vein has a maximum thickness of 30 feet, but in most places it is much thinner.

Most of the known ore is localized in three shoots, one each in the footwall, the central part, and the hanging wall of the vein. The footwall shoot contains pyrite, copper minerals, minor amounts of lead and zinc minerals commonly in small, high-grade pods, gold and silver. The central and hanging-wall shoots contain galena, sphalerite, and silver. According to Ruppel, the footwall and central shoots have been most productive and persistent; however, according to Mr. Davis, the footwall zone has not been extensively developed between the 500 and 300 levels. Individual ore shoots pinch and swell over short distances both vertically and laterally as does the vein; stope length and height both range from 20 to 100 feet. The shoots have been partially mined from the surface to the 500 level, a vertical distance of about 400 feet. No progressive change in mineralogy with increasing depth is apparent in the ore shoots; oxidation extends from the surface to depths of 25 to 175 feet. Secondary copper sulfides are present in the deepest mine workings.

Vein minerals include pyrite, sphalerite, arsenopyrite, galena, chalcopyrite, tetrahedrite, covellite, and earthy chalcocite in a gangue of quartz and altered country rock. Ruppel believes that the gold occurs with arsenopyrite and pyrite and the silver with galena and tetrahedrite.

According to Ruppel, assays and smelter returns indicated the following average tenor of ore above the 200 level:

Zone	Oz/ton Au	Oz/ton Ag	Percent Pb	Percent Zn	Percent Cu
Footwall	1.23	12.8	NA	NA	2.8
Central and hanging wall	0.09	19.97	10.9	11.3	0.61
Arithmetical average	0.66	16.38	10.9	11.3	1.65

Accompanying the application is an assay map of the lower level. Assays are from samples that have been grouped in five zones as follows:

Zone	Between coordinates	Length	Width (feet)	Oz/ton Au	Oz/ton Ag	Percent Pb	Percent Zn	Percent Cu	No of assays
Footwall									
3	4940 - 4950	10	2.0	0.02	5.2	5.9	16.0	3.35	1
4	5145 - 5175	30	2.75	0.168	9.77	3.28	2.67	2.29	4
5	5300 - 5420	120	4.0	0.015	12.2	3.95	0.70	2.17	2
Central and hanging wall									
1	4615 - 4685	70	3.3	0.035	8.22	8.93	6.70	0.27	10
2	4785 - 4820	35	4.5	0.034	6.15	4.55	2.61	0.17	5
3	4940 - 4950	10	1.25	0.073	11.75	9.92	15.42	Tr	2
5	5300 - 5420	120	3.25	0.036	21.29	2.65	1.83	2.64	2

The average grade of 7 samples from 3 areas in the footwall zone and 19 samples from 4 areas in the central and hanging-wall zones, respectively, are:

Zone	Oz/ton Au	Oz/ton Ag	Percent Pb	Percent Zn	Percent Cu
Footwall	0.095	14.55	3.78	3.19	2.35
Central and hanging wall	0.038	9.31	6.93	5.10	0.46
Arithmetical average	0.067	11.93	5.35	4.14	1.40

Comparing the arithmetical averages of the ore mined from above the 500 level to those of the ore sampled on the 500 level it appears that the grade is falling off. However, this is not necessarily a valid conclusion as the ore was probably mined somewhat selectively, the number of samples cut on the 500 level is small, and over short distances the level samples are considerably higher than the average.

The applicant has drilled 36 long holes, 20 into the footwall and 16 into the hanging wall, with results as shown on plate 1. Of the 36 holes cuttings from 13 apparently were not sampled, and only 9 of the remaining holes are of much interest. Near the 5300-5420 zone mentioned above, long holes 1, 16, 13, 3, and 15 were drilled into the footwall and holes 2, 17, 14, and 4 were drilled into the hanging wall. The average width and grade of the mineralization in the two walls respectively are:

		Oz/ton		Percent		
Wall	Width	Au	Ag	Pb	Zn	Cu
Footwall	7.0	0.025	4.2	--	--	1.13
Hanging wall	10.5	0.064	3.8	2.17	4.84	0.32

The various bits of assay data given above tend to confirm Ruppel's statement that the vein pinches and swells, in places attaining a maximum width of about 30 feet and that within the vein there are individual ore shoots ranging in width from 1.25 to 4.5 feet and in length from 10 to more than 120 feet. In grade the ore shoots range from 0.015 to 0.168 ounce gold and 5.2 to 21.29 ounces silver per ton, 2.65 to 9.92 percent lead, 0.7 to 16.0 percent zinc, and trace to 3.35 percent copper.

On the basis of the limited number of samples available on the 500 level an estimate of the tonnage of ore that might be found below the 500 level is of limited value, however, the following estimate is a probable minimum tonnage that could be expected to be discovered by the proposed program:

Between coordinates	Length	x	width	x	height	÷	12 ft^3/ton		Tons
4615 - 4685	70	x	3.3	x	200	÷	12	=	3,850
4785 - 4820	35	x	4.5	x	200	÷	12	=	2,625
4940 - 4950	10	x	3.25	x	200	÷	12	=	542
5145 - 5175	30	x	2.75	x	200	÷	12	=	1,374
5300 - 5420	120	x	7.25	x	200	÷	12	=	14,500
Total									22,891

This does not take into account additional ore that may be found in the footwall and hanging wall as indicated by the long holes or of 13,600 tons of possible ore in the St. Lawrence area and 5,000 tons in stopes and intermediate levels above the 500. At the arithmetical average grade of the footwall, central, and hanging-wall samples, the estimated minimum tonnage would contain about 1,534 ounces gold, 273,090 ounces silver, 2,449,336 pounds lead, 1,895,374 pounds zinc, and 640,948 pounds copper and would be worth between $900,000 and $1,000,000.

Due to deep snow and because the shaft is flooded the St. Lawrence workings were not visited. It is reported that $50,000 of shipping-grade ore has been mined from these workings.

RECOMMENDATIONS

It is recommended that a hoisting station be cut and a hoist installed and that the existing 1½-compartment winze at coordinates 5475N and 5355E be deepened 220 feet down the dip of the vein. At 200 feet vertically below the 500 level a 700-level shaft station should be cut and drifts driven 200 feet easterly and 750 feet westerly. Long holes should be drilled at 50-foot intervals into each wall of the drift to the hanging wall and footwall of the vein. This will require 20 long holes in each wall or a total of 40 long holes. Based on the average depth of the long holes drilled on the 500 level and in a stope above the level, the average depth of hole will be 23 feet and the total depth will be 920 feet of long hole drilling.

It is also recommended that the applicant at his own expense clean up the 500 level and make minor timber repairs to the start of the badly caved portion near the west end of the drift. As it will

probably cost as much and possibly more to rehabilitate the final 107 feet of drift than it will to drive a new drift around the caved area, it is recommended that 110 feet of drift in the footwall be authorized for this purpose and that an additional 350 feet of drift be driven westerly along the vein on the 500 level. The total of 460 feet of drift will explore the Crystal vein to and 170 feet below the St. Lawrence ore zone. Long holes should be drilled into each wall of the drift to the hanging wall and footwall of the vein. This will require 8 long holes in each wall or a total of 16 long holes. The average depth of hole will be 23 feet and the total depth will be 368 feet of long hole drilling.

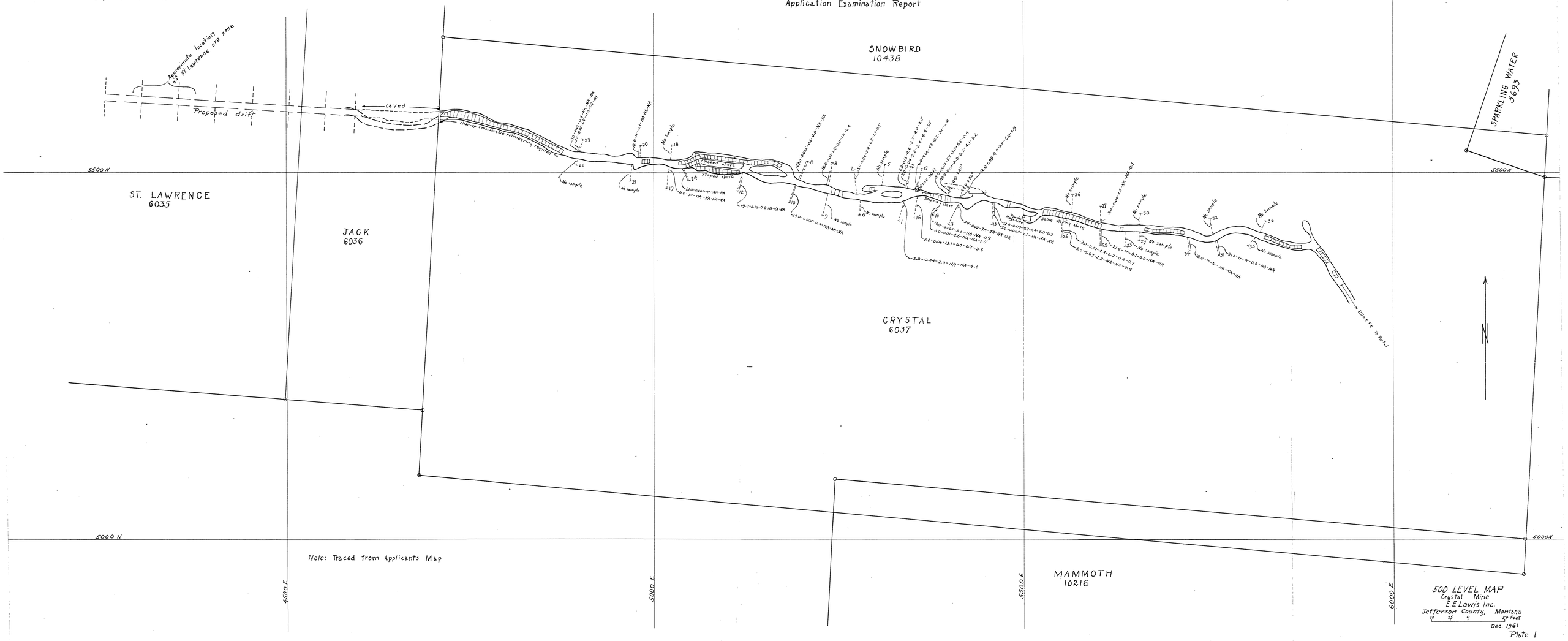
The 200-foot, 6' x 12' raise proposed in the St. Lawrence area would explore the vertical extent and continuity of any ore found on the 500 level and would be valuable for ventilation and possibly for mining. However, a 150-foot raise, 6' x 9' in rock section, would be sufficient to indicate the vertical extent of the ore. If the ore is continuous to that height, projection for purposes of reserve calculation would be justified. The additional 50 feet of raising or a raise of larger section for ventilation or mining purposes should be at the Operator's expense. If a 6' x 10' winze is of ample size, it would appear that a raise 6' x 9' rock section or 4' x 8' inside timber should suffice.

The winze should be not less than 6' x 10' in horizontal section and shall be timbered with 10' x 10' posts, caps, and girts. About 55 percent of the 500 level is timbered and the ground appears to be progressively heavy towards the west end. It is therefore estimated that 75 percent of the by-pass and main drift west on the 500 level and 75 percent of the 700 level drifts will require timber.

In the winze, the drifts, and the raise samples should be cut at not less than 10-foot intervals where sulfide mineralization is encountered and samples should be assayed for gold, silver, lead, zinc, and copper, as indicated.

COSTS

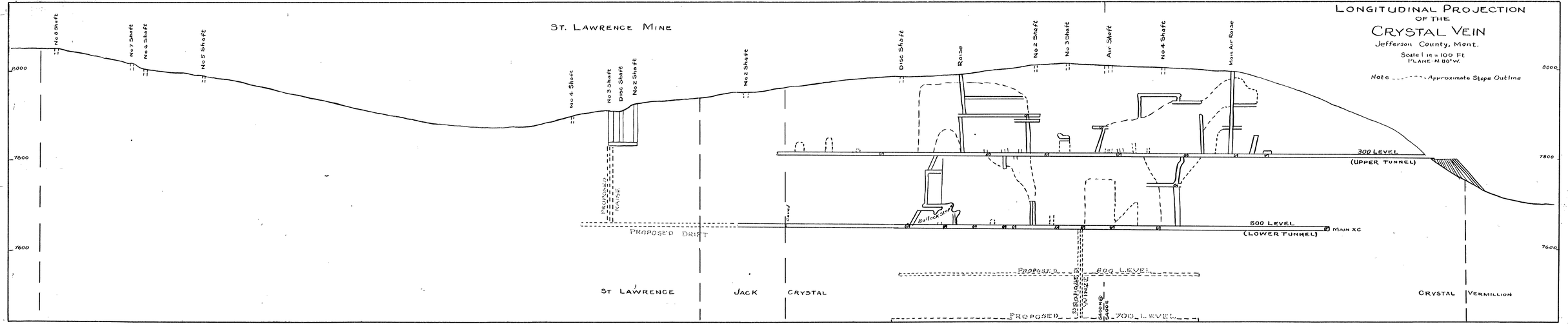
It is possible that the applicant could pick up a crew of capable contract miners in the Butte area and this was suggested to Mr. Davis. He pointed out that currently the Butte mines are encouraging an influx of miners from the Minnesota area due to labor shortage and that therefore they might have some difficulty in getting together a good crew. That Minnesota miners are coming into Butte and are being hired is also the current rumor in Spokane. I would expect that the applicant would be able to find such a crew.



Note: Traced from Applicants Map

500 LEVEL MAP
Crystal Mine
E.E. Lewis Inc.
Jefferson County, Montana
50 25 0 50 Feet
Dec. 1961

Plate 1


LONGITUDINAL PROJECTION
OF THE
CRYSTAL VEIN
Jefferson County, Mont.
Scale 1 in = 100 Ft
PLANE - N 80° W.
Note - - - - - Approximate Stope Outline
ST. LAWRENCE MINE
No 8 Shaft
No 7 Shaft
No 6 Shaft
No 5 Shaft
No 4 Shaft
No 3 Shaft
Disc Shaft
No 2 Shaft
No 2 Shaft
Disc Shaft
Raise
No 2 Shaft
No 3 Shaft
Air Shaft
No 4 Shaft
Main Air Raise
8000
7800
7600
300 LEVEL
(UPPER TUNNEL)
500 LEVEL
(LOWER TUNNEL)
MAIN XC
Bullock Shaft
PROPOSED DRIFT
PROPOSED 600 LEVEL
PROPOSED 700 LEVEL
PROPOSED WINZE
Sump
ST LAWRENCE
JACK
CRYSTAL
CRYSTAL
VERMILLION