Docket
Noted 11/8/65 MLS

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
GEOLOGICAL SURVEY
So. 157 Howard Street
Spokane, Washington 99204
November 2, 1965

Memorandum

To: Chief, Office of Minerals Exploration

From: Frank C. Armstrong, Geological Survey

Subject: On-site examination report
OME-6442 (Gold-Silver)
Wade and Obendorf
Obie Group
Lewis and Clark County, Montana

INTRODUCTION

On September 28, 1965, some of the surface of the central and western parts of Marysville district, Montana (including part of the area to which the application applies), was visited in company with William R. Wade, the applicant, and Henry E. Welch, a friend of Mr. Wade's. The area over the Drumlummon mine was not examined. On September 27 and during the night of September 27 - 28, 13.5 inches of snow fell in Helena, Montana, 17 miles southeast of Marysville. Although it appeared that not as much snow had fallen in Marysville, examination of surface cuts and dumps was greatly hindered by snow. The surface trace of the vein shown on the applicant's map runs along the heavily wooded, northwest-facing slope of Drumlummon Hill. As would be expected, snow on this hillside does not melt as readily as it does on grass covered, south-facing hillsides. The writer and Messrs. Wade and Welch spent 7 hours looking at surface excavations and two short adits.

A narrative account of the examination and descriptions and assays of samples taken are in Appendix A to this memorandum report. Sample locations and places mentioned are shown on the accompanying map.

PURPOSE

The property was visited in order to determine whether a vein occurs on surface about where shown on the applicant's map, and particularly whether a vein is present up-dip from the proposed drift.

See Map in folder

GEOLOGY

Vein material in the 9 Hour-Drumlummon vein system occurs in a fault zone in the contact aureole of thermally metamorphosed argillaceous limestone of the Helena Limestone of the Belt Series on the south margin of a quartz diorite stock. The fault zone trends northeastward and dips southeastward. Locally within the fault zone southwestward-plunging, silver-gold ore bodies have been mined.

On the ground to be explored the vein-fault zone strikes about N. 70° E. and dips about 55° SE.; locally it may dip more steeply.

GEOLOGIC JUSTIFICATION FOR EXPLORATION

The applicant's geologic justification for the proposed exploration is based on a combination of two items: (1) vein zoning; and (2) faulting.

(1) Zoning in epithermal silver-gold veins is described by R. I. Walker and W. J. Walker in Chapter 13 of their privately published book "The origin and nature of ore deposits." Mr. W. R. Wade and Mr. W. J. Walker state that similar zoning occurs in the Drumlummond-9 Hour vein system. (See Wade's application and Walker's report.) Characteristics of the different vein zones are stated on pages 6 and 7 of the application.

The applicant believes that the surface vein exposures on the ground to be explored (Obie Group) are the southwestward continuation of the Drumlummon-9 Hour vein and are in the barren, upper epithermal zone of the zoning sequence, above the ore-bearing zones.

The characteristics of the fault zone and vein material that I examined on the Scotch, Jack Pot, and Republican claims are not inconsistent with the applicant's description of his upper epithermal zone. Assays of samples taken from the fault zone confirm its barrenness. (See Appendix A.)

(2) According to Mr. Wade, vertical movements along cross faults that are younger than the ore, have at some places raised and at other places lowered the ore-bearing parts of the Drumlummon-9 Hour vein system. In the northeastern part of the district over the Drumlummon mine, ore is exposed at the surface. To the southwest along the vein structure, Mr. Wade postulates that the 9 Hour ore body is exposed at surface as the result of about 700 feet of vertical displacement on the Transcontinental fault. On the Obie Group further southwest along the vein structure, he postulates that the ore-bearing part of the vein has been dropped down as the result of vertical movement along similar cross faults (not shown on his map) so that only the barren upper part of the vein is exposed at surface.

In the Upper and Lower Jack Pot adits I saw narrow cross faults in hornstone. On none of them could I determine the direction or amount of movement. With the full realization that I may be very wrong, I'd say that very little movement took place along these faults.

DISCUSSION OF GEOLOGIC JUSTIFICATION

Examination of the zoning-faulting justification hypothesis reveals internal discrepancies and inconsistencies.

(1) Had the 9 Hour ore body been faulted up as postulated, under the zoning hypothesis it should have been the lean or barren downward continuation of the Drumlummon ore body, not the rich ore described by Knopf (1913, p. 71).

(2) Had the 9 Hour ore body been faulted up as postulated, it should have been offset to the southeast 400 to 500 feet and should not continue uninterruptedly southwestward as shown on the applicant's map and on Goodale's (1915) Figure 1, and as implied by Knopf (1913, p. 69, 70).

(3) Had the Obie Group been faulted down as postulated, the outcrop of the southwestward continuation of the 9 Hour vein would have been shifted northward several hundred feet, and the vein would not continue uninterruptedly southwestward as shown on the applicant's map.

On the afternoon of October 16 I spent 2 hours at Helena, Montana, in discussion with Mr. Wade in an attempt to clarify the lack of offset in the surface trace of the vein. By way of clarification he later sent me an undated letter, a copy of which is Appendix B to this report.

For movement on the postulated cross faults to have been of the precise amount and direction to allow the vein trace to continue southwestward without offset, although possible, stretches credulity, and for the 9 Hour ore body ignores the zoning part of the hypothesis.

Equally unlikely is the possibility that some other vein could have been placed exactly opposite the 9 Hour vein. This latter possibility would mean exploring some vein other than the Drumlummon-9 Hour vein.

When I saw Mr. Wade in Helena, he said that the southwestward continuation of the Drumlummon-9 Hour vein as shown on the map accompanying his application is diagrammatic, and that he has not actually traced the vein continuously from the 9 Hour stope to the occurrences on the Scotch and neighboring claims. When I examined the pits and adits on September 28, I did not walk out the southwestward continuation of the Drumlummon-9 Hour vein because of snow on the ground.

So, although a vein on surface was observed on the Scotch, Jack Pot, and Republican claims, as shown by the applicant, it is not known whether these occurrences are all parts of the same vein or whether they are the southward continuation of the 9 Hour vein.

CONCLUSIONS

Despite several objections to the applicant's geologic justification for exploring the Obie Group, I look favorably upon his proposal for the following reasons:

(1) In the Obie Group a vein-fault zone is on strike between two areas from which ore has been mined: Drumlummon-9 Hour area on the northeast, $28,000,000, and Bald Butte area on the southwest, $12,000,000 (applicant's production figures; present day prices).

(2) Although it is not known whether the Drumlummon-9 Hour vein continues through the Obie Group, it seems reasonably certain that the Drumlummon-9 Hour vein-fault zone does. The surface trace of the vein was checked at only a few places. At those places the vein is essentially as shown on the applicant's map.

(3) Although cross faults were observed in the two adits visited, I doubt that within the Obie Group such faults have offset the vein zone significantly. This conclusion is supported by the fact that nowhere in published reports or on published or unpublished accurate geologic maps that I have seen has large offset on cross faults been demonstrated. Indeed, the published material suggests the opposite.

A possible exception to this statement might be found in the western part of the Obie Group where the trend of Woodchopper Gulch aligns with a sharp northward swing in the course of Ottawa Creek.

(4) The zoning pattern described by Mr. Wade is similar to that found by Darrell M. Pinckney of the U. S. Geological Survey in his study of veins in the Boulder batholith between Helena and Butte (report in preparation). Pinckney found that high silver values occur in the chalcedonic quartz part of a vein, and that this zone lies between a peripheral zone characterized by carbonate gangue minerals and a central zone characterized, in part, by glassy quartz gangue.

Whereas the zoning pattern outlined by Wade tacitly implies a more or less horizontal layering of the vein zones, Pinckney found the zoning pattern developed along strike in both directions from a central core. Moreover, he found that in the quartz monzonite of the batholith an envelope of different types of wall rock alteration characteristically accompanied, but without strict parallelism, each of the different vein zones. Because most of the deposits Pinckney examined had been mined years before and their workings were caved, his data for vein and alteration zoning along dip are scant. The

information he does have, however, suggests that both zoning patterns are present up the dip.

(5) Examination of longitudinal projections of the Drumlummon, New Castletown and North Star veins (Goodale, 1915, figs. 6, 7, 8) shows that the fault-vein zones are not completely filled with ore throughout their extent, but rather that ore bodies occur locally within the fault-vein zone. Consequently, not all ore bodies extend to surface, and not all ore bodies extend downward indefinitely. Moreover, sizable blocks of waste occur within ore bodies. This pattern of ore distribution is common within veins of this type.

Reasons for localization of ore bodies within veins of this type are always obscure. And to predict the location, number, or size of ore bodies in such a vein is all but impossible. About all that can be done is to take the empirical approach and to explore a vein system known to contain ore bodies.

RECOMMENDATIONS

As the applicant has chosen an area that in my opinion is suitable for exploration, it is recommended that the application be given favorable consideration. If the application is approved, it is suggested that D. R. MacLaren's recommendation in his report dated August 10, 1965, be accepted with the following slight modifications.

Because of the lateness of the season, it is doubtful that much surface mapping can be done before spring. Accordingly, Stage I and Stage II could be carried on simultaneously next spring. The winter would be spent in getting the underground work started. The surface map should be a topographic as well as a geologic map. Included in this work should be the geologic mapping of all accessible underground workings in the area, including the new crosscut and drift, and a thorough compilation of all pertinent old records.

TYPE OF EXPLORATION

Some question might arise as to whether it might not be better, and less costly, to explore the vein system first at an altitude higher than that suggested by the applicant.

As ore has not been found on surface at the Obie Group, it must be assumed that "blind" ore bodies are being sought. Next, if zoning within the vein is somewhat as described by the applicant, ore would not be expectable within a couple of hundred feet of the surface. Finally, "blind" ore bodies mined from the Drumlummon, New Castletown and North Star veins ranged from 400 to perhaps as much as 1,000 feet in vertical extent. It thus seems difficulty to advance cogent reasons for exploring the vein at a shallower depth, and there are reasons for not doing so.

The applicant feels that bulldozing of the vein outcrop would only confirm the presence of a fault-vein structure, a fact already adequately demonstrated to his satisfaction by existing pits and short adits. Because the vein exposed at surface is believed to be in the barren zone above ore, samples taken from bulldozer trenches would not be expected to contain significant amounts of silver and gold.

Because of irregular distribution of silver-gold values within the vein structure, the applicant believes that diamond drilling cannot adequately test the vein. If drill holes were to cut the vein and assays of core showed only low or erratic values, the applicant thinks that any operator would still be faced with the necessity of exploring the vein by underground workings.

To this can be added the facts that the slope of the hill (about 20° NW.), the dip of the vein (about 55° SE.), the position of the trace of the vein on the hillside, and the height of the hill, all combine to make for rather long drill holes to cut the vein at rather moderate depths. For a drill hole to cut the vein at an angle of 60°, the ratio of distance down dip of vein to length of drill hole is 1:1.4; to cut the vein at 90°, the ratio is 1:3.8. To cut the vein at the altitude of the proposed drift, about 700 feet vertically below the surface, drill holes would have to be more than 1,000 feet long. Under these circumstances extensive surface diamond drilling does not seem advisable.

COMMENTS

Mr. Wade said that the proposed portal site shown on the map accompanying his application may be mislocated slightly and that the portal site is actually on the Obie claim. He volunteered that if in the opinion of OME the St. Louis mill site patented claim (10898) is needed either for the portal site or for muck disposal room, he would include it in the OME contract.

Because the dip of the vein zone is not known accurately the proposed crosscut to the vein could be as much as 1,800 feet long.

Diamond drilling from surface may be of only limited usefulness in exploring this property. If drilling of long holes from surface is undertaken, consideration should be given to wedging the holes in order to cut the vein at as many places as possible with the least expense.

Frank C. Armstrong

Frank C. Armstrong

Enclosures
Distribution:
OME(2) Docket Armstrong
USGS(SRO) MacLaren

REFERENCES CITED

Goodale, Charles W., 1915, The Drumlummon mine, Maryeville, Mont.: Am. Inst. Mining Engineers Transactions, v. XLIX, p. 258-283.

Knopf, Adolph, 1913, Ore deposits of the Helena mining region, Montana: U. S. Geol. Survey Bull. 527, 143 p.

APPENDIX A

Sample descriptions and assays

"Hysel" Vein	Au oz/T	Ag oz/T
Sample No. 582B	0.18	0.2
No. 583B	Tr	Tr
No. 584B	Tr	Tr

The first trench visited was the Hysel trench near the middle of the north boundary of Silver Creek claim, a short distance south of the corner common to the Republican and Tana claims. The trench is about 80 feet long, about 20 feet wide, and as much as 12 feet deep at its deepest point. At the time of my visit the trench was badly caved and snow covered the ground. According to Mr. W. R. Wade, the trench exposed a vein 8 to 15 feet thick that strikes N. 74° E., the trend of the trench, and dips about 70° SE. Rock fragments in the spoil piles along the trench are principally quartz diorite, called granite locally, but numerous fragments of hornstone and a few of Belmont porphyry, a dike rock, were seen also. Mr. Wade reported that for the entire length of the trench both walls of the vein are "granite." He said the vein consists of tan, limonite-stained brecciated wall rock and glassy quartz without carbonate gangue minerals.

Mr. Wade said that a channel sample cut across this same vein, formerly exposed in a trench, which I did not examine, 200 feet east of the Hysel trench assayed $1.75 in silver and gold (division of values not remembered). He also said that one grab sample from the dump of a small old shaft, perhaps as much as 40 feet deep, on the vein between the two trenches assayed $60.00 in silver and gold, divided about 1/3 silver, 2/3 gold, but that other samples from the same dump returned only low values.

From large fragments in the dump on the north wall of the trench I collected two samples of vein material for assay. Sample 582B consists of glassy quartz with abundant small intricate vugs. Zoned(?) quartz crystals project into the vugs. Walls of the vugs are dusted with a light tarnish gray material. The sample did not effervesce with dilute HCl. I have the impression that some of the vugs might have been occupied formerly by material, perhaps a carbonate mineral, that has been leached from the vein. Sample 583B is slightly bleached, brecciated "granite" that locally is slightly limonite stained and contains a few small vugs, some of which are lined with quartz crystals. Black manganese(?) stain and sparse black cubes (blackened pyrite?)

are present. Plagioclase(?) in the "granite" has been altered to soft dull white porcelainous material (kaolinite?). The sample did not effervesce in dilute HCl.

A third grab sample, 384B, was dug from the bottom of the trench near its north end. It is limonite-stained vuggy altered "granite" breccia containing fragments of hornstone. The "granite" contains white punky material (kaolinite?) pseudomorphic after plagioclase(?). Along some fractures are manganese dendrites. The sample did not effervesce with dilute HCl.

The vein exposed in the Hysel trench joins the 9 Hour vein on the latter's footwall side at a point about 900 feet east of the trench. The same vein is believed to extend westward to the Emma Miller claim. (See applicant's map.) Wade believes that the vein at Hysel trench was too "hot," because it is so far within the granite, to allow deposition of silver and gold in sufficient quantities to form ore. Where the vein lies within hornstone, however, he would expect ore. He told me that a few samples taken from the Emma Miller dump assayed $8.00 in combined silver and gold (distribution of values not known). Vein material on the Emma Miller dump which Mr. Wade said is similar to that which assayed $8.00 is dark gray, chalcedonic quartz. The dark gray color appears to be due to disseminated, very fine-grained black mineral (sulfide?) grains.

Although a good ore body (Sampson) was mined at the intersection of the New Castletown and Drumlummon veins (Goodale, 1915, p. 264) and an ore body might be expected near the east end of the Hysel vein, Mr. Wade pointed out that the New Castletown vein is a hanging-wall split, and, moreover, that there was no ore at the intersection of the Drumlummon and Christmas (also a hanging-wall split) veins.

The intersection of the 9 Hour vein and Hysel vein was not examined.

9 Hour Vein, Republican Claim	Au oz/T	Ag oz/T
Sample No. 385B	Tr	Tr

Near the west boundary of the Republican claim are 5 or 6 small pits and the caved portal of an adit which judging from the size of its dump is probably short. These excavations appear to have been made many years ago.

The distribution of the pits suggests that the vein zone may be as much as 20 feet thick, and it also suggests that the vein zone strikes suitably northeastward so that it can be eye-balled to line up with old 9 Hour and Drumlummon surface workings.

The wall rock is hornstone. A few pieces of Belmont porphyry were seen on the dumps.

A grab sample, 585B, consisting of fragments of vein material and altered wall rock was collected from the dumps. Varities of vein material noted are: brecciated hornstone cemented with white calcite veinlets; porous (leached?) chalcedonic(?) quartz; limonite-stained vuggy quartz; and limonite-stained vein breccia that contains sparse small black cubes (blackened pyrite?).

9 Hour Vein, Scotch Claim	Au oz/T	Ag oz/T
Sample No. 586B	Tr	Tr

The surface trace of the 9 Hour vein-fault zone passes just south of the corner common to the Jack Pot, Fresno, Calmont, and Scotch claims, and at this point its position is correctly shown on the applicant's map. For a distance of about 200 feet southwestward from this point are several small pits and cuts (not all of which are shown on the applicant's map) along the vein. The wall rock is hornstone. A grab sample, 586B, was collected from the dumps of these excavations. It consists of: highly silicified hornstone that is cut by white calcite veinlets, a few of which contain vugs lined with calcite crystals; sugary vein quartz; and limonite-stained, chalcedonic(?) quartz that in places is stained black (manganese?) and elsewhere contains sparse small black specks some of which are cubic (blackened pyrite?).

9 Hour Vein, Jack Pot Claim Upper Adit	Au oz/T	Ag oz/T
Sample No. 587B	Tr	Tr
Sa No. 588B	Tr	Tr

Approximately located on the accompanying tracing of the applicant's map, but not shown on his original map, are the Jack Pot upper adit and its dump. A grab sample, 587B, of vein material was collected from the dump. It consists of limonite-stained, partly leached quartz-calcite vein breccia that contains a few fragments of silicified hornstone.

With a little digging I was able to enlarge a hole at the caved portal of the Jack Pot upper adit sufficiently to crawl into the adit. The entire adit is in hornstone. Exposed for about 35 feet in the drift is a fault zone about 2 to 3 feet thick. It strikes N. 70° E. and dips 57° SE. Exposed in the short crosscut that leads to the drift are a few narrow (1/4 to 1 inch thick) cross faults that strike N. 20° E. and dip vertically to 60° SW. I could not

determine direction or amount of displacement on any of the faults. A chip sample, 588B, was taken from along the fault zone exposed in the drift. It consists of limonite-stained, calcareous fault breccia. Although the walls of the fault zone are hornstone, some of the fragments in the breccia look as though they might be unmetamorphosed pieces of Helena Limestone. No quartz or calcite veins or silicified hornstone were recognized in the fault zone.

9 Hour Vein, Jack Pot Claim Lower Adit	Au oz/T	Ag oz/T
Sample No. 589B	Tr	Tr
No. 590B	Tr	Tr

At the time of my visit the lower Jack Pot Adit was caved at a point about 110 feet northeast of where the crosscut turns northeastward and becomes a drift. Both crosscut and drift are in hornstone. A fault zone about 3 feet thick is exposed in the drift. Along its southwestern 70 feet the fault strikes N. 85° E. and dips 53° SE.; along its northeastern 40 feet it strikes N. 75° E. and dips 57° SE. A chip sample, 589B, was taken from the southwestern 70 feet of the fault. It consists of limonite-stained fault breccia with a little calcite and very little silica. A second chip sample, 590B, was taken from the northeastern 35 feet of the fault. It consists of slightly limonite-stained, fault breccia that contains stringers, veins, and pods of calcite and chalcedonic quartz.

So. 157 Howard Street
Spokane, Washington 99204
August 10, 1965

Air Mail

Memorandum

To: Chief, Office of Minerals Exploration

From: Acting Field Officer, Region I

Subject: Application examination report
OMB-6442 (Gold-Silver)
Wade and Obendorf
Obie Group
Lewis and Clark County, Montana

INTRODUCTION

William R. Wade applied for assistance to explore for gold-silver ore bodies in the Maryeville Mining District, Lewis and Clark County, Montana, by 4,500 feet of crosscut and drift and 100 to 200 feet of raising at a total estimated cost of $359,800 of which the Government's share at 66⅔ percent would be $224,875. About 5 hours were spent on the property touring the surface and discussing with Wade several points brought up in your May 4 memorandum referring the application to the field.

As tactfully as possible the matter of the Applicant's age was brought up with the result that new BMM Form 40's were submitted with Herbert S. Obendorf as a partner applicant. The new Form 40 was forwarded with a copy of our letter of June 18, 1965, to Wade. Lien and Subordination Agreements, one set signed by Herbert S. Obendorf and one set signed by B. Mae Andaina, were forwarded by buck slip June 28, 1965. Wade tried to photostat Power of Attorney documents executed by Obendorf and B. Mae Andaina, making three attempts for each; in only one case was the seal picked up, that one not too clearly. Copies of each are enclosed.

One of the claims is designated "Soda" in the Applicant's narrative and Walker's report; it is shown on the Applicant's map as "And Soda", and in Mathrehy's report on page 10 "Scotch and Soda" appear as one claim. "Scotch" is one claim and Wade confirmed that "And Soda" is the name under which the other is recorded. The Annexes to the Lien and Subordination Agreements also show "And Soda" as one of the claims involved. However, the Power of Attorney lists "Soda". Wade could only explain the alternating of names as due to the customary dropping of "And" in any oral reference to the claim. Other points raised in memorandum of referral will be included in the balance of this report.

It is concluded that the chance of finding other ore bodies along the 9 Hour vein is good and a 3-Stage program is recommended. It is also recommended that the Applicant be asked again whether he will accept a limited program of geologic mapping as a first stage. If he will not, it is considered to be a policy decision whether a contract should be offered without Stage I, but this also is recommended.

GEOLOGY

The geology and economic history of the Marysville district has been described in the following papers and will not be repeated here except for an occasional reference:

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

Barrell, Joseph, 1907, Geology of the Marysville 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.

Goodale, Charles W., 1915, The Drumlummon mine, Marysville, Montana: Transactions, Am. Inst. Mining Metall. Engineers, Vol. XLIX, p. 258-279.

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.

Additional information treating with specific areas within the applicant's property is contained in a report by Woodville J. Walker and one by Robert Connell McMurchy, each of which accompanied the application, and in a Drilling Report by W. R. Wade which was submitted during the examination and is enclosed herewith. Each of these reports should be returned to W. R. Wade, Marysville, Montana, when they have served their purpose.

Some of the workings in the area of proposed exploration were accessible except for the portal site of the proposed crosscut. The northwest corner post of St. Louis Mill Site was seen near the edge of the dump at the Obie crosscut. Shifting the proposed portal site to the Obie claim would be no problem and at most would raise the altitude of the tunnel portal not more than 10 or 15 feet. The Obie crosscut was caved and could not be entered. The outcrop of the 9 Hour vein as well as the portals of the Black Diamond and Jack Pot

tunnels and the workings on the Republican claims could not be reached because of snow. However, from maps and records in Wade's files, considerable pertinent information was gathered, which, in conjunction with the published and private reports, give a pretty clear picture of the situation.

The property map accompanying the application shows the direction of dip but not the degree at several places along the 9 Hour vein. Starting on the Republican claims and following the line of vein outcrop easterly, the dips at each arrow are given by Wade are: 55°, 55° and 60°; Additional dips are: at the 9 Hour stope 55°-60° SE., at the Christmas stopes 65° SE., at the Castle Town stopes 70° SE., and at the Drumlummon stopes 70° SE.

Referring to the Applicant's longitudinal section the vertical displacement along the Transcontinental fault is said to be about 700 feet, the west side moving up relative to the east side; that of the 2 faults west of the 9 Hour stopes is about 250 feet each, in each case the west side moving down relative to the east side. Although in the Drumlummon section ore was found as deep as the 1200 level, elsewhere in the district the ore values fell off below the 700 level. The net result of the above faults would in effect move the Drumlummon 700 level to a position about 170 feet below the altitude of the proposed drift. The start of the proposed drift westerly would be about 600 feet below the outcrop in the plane of the vein and the face at 1000 feet would be at a depth of about 660 feet. Therefore, the proposed drift would theoretically be at a horizon favorable for the formation of ore bodies.

The map accompanying the Drilling Report shows some porphyry dikes and three crossfaults, but the easternmost fault, along Woodchopper Creek, is some 2,600 feet west of the start of the proposed drift. East of Woodchopper Creek the vein is said to be continuous to the faults near the 9 Hour stopes. However, as you point out, figure 6 of Walker's report indicates a dike near the SE corner of the Fresno claim, and one near the westerly side line of the Robert Emmett claim, each crossing and possibly offsetting the vein. Thus there is some 2,400 feet along the vein for which apparently no geologic mapping has been done.

In attempting to transfer points from one map to another, sufficient variations have been found to cast doubt as to the location of the vein at the surface as shown on the Applicant's plan map. Assuming for the moment that relative locations of the vein at the surface and the proposed crosscut are reasonably accurate, the stated vein dip of 60° SE. would place the vein at tunnel level about 200 feet southeasterly of the indicated location of the drift.

In the area that includes the first 1500-2000 feet of drift the ground slope rises fairly steeply southeasterly from the vein; that is, the vein dips into the slope. Any favorable sites for diamond drilling from the surface would be from 100 to 150 feet higher than the vein outcrop. The Applicant feels that this would make the amount of drilling excessive and does not think it is necessary (see his letter of May 19, 1965). In the field, when the question of preliminary detailed geologic mapping followed by diamond drilling was discussed, he stated that he was opposed to both suggestions, on the ground that the mapping would give no new information of any particular importance and that the drilling would be costly and for any positive results would have to be followed up by crosscutting and drifting in any case.

His views may be summarized as follows:

1. From his experience in the Drumlummon area some of the dikes appear to have associated mineral deposits, others do not. Therefore, any dikes that might be found by surface mapping might or might not have any control on mineral deposition and, in any case, that question could only be answered by underground exposure.

2. While there has been considerable vertical displacement along known faults in the old mine workings, lateral displacement has been small. There are no identifiable marker beds and the overburden is fairly thick. If any unknown faults in the area should be found, their vertical displacement could not be determined at the surface. Surface mapping is therefore unnecessary.

3. From the solution of the fault displacement at and near the westerly end of the old workings, the proposed crosscut and drift are within the vertical limits of a favorable ore horizon. Therefore, any preliminary geologic mapping and drilling will constitute an unnecessary expense.

The Applicant's reasoning has an element of soundness, but there are two main points that cause me some concern. First, there is a space of some 850 feet between the last of the 9 Hour faults and the approximate location of the place where the proposed crosscut will intersect the vein. An unknown fault or faults with a total vertical displacement of 250 to 700 feet, the westerly side up with respect to the east, could place the proposed work well below the favorable ore horizon; movement in the other direction would probably not be too bad. Second, the length of the proposed crosscut, on the basis of presently available maps, can be estimated only to the nearest 200 feet. This may not be too serious but the best target

areas indicated to date appear to be two branch veins, the most westerly of which could be anywhere between 1500 and 1700 feet westerly of the crosscut. Thus, to be safe a minimum of 3,400 feet of drifting and crosscutting would appear to be necessary to explore both areas. This is a lot of drifting and crosscutting without more accurate information regarding the location of the vein on the surface, the location of the tunnel portal, and the locations of the vein junctions and vein dips.

CONCLUSIONS

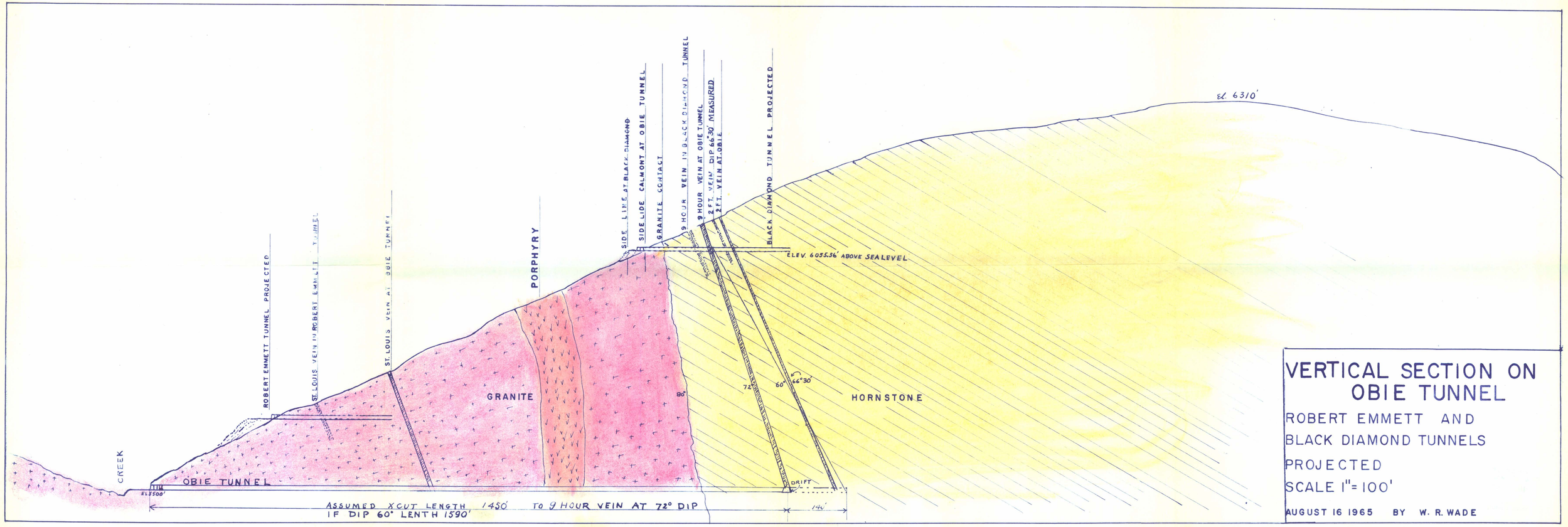
It is concluded, providing that there are no faults of appreciable vertical displacement between the old 9 Hour stopes and Woodchopper Creek, that the proposed exploration is at a favorable horizon for the formation of ore bodies along the westerly extension of the vein, and that the chance of making a significant discovery particularly near the junction of the 9 Hour vein and two footwall branch veins is good.

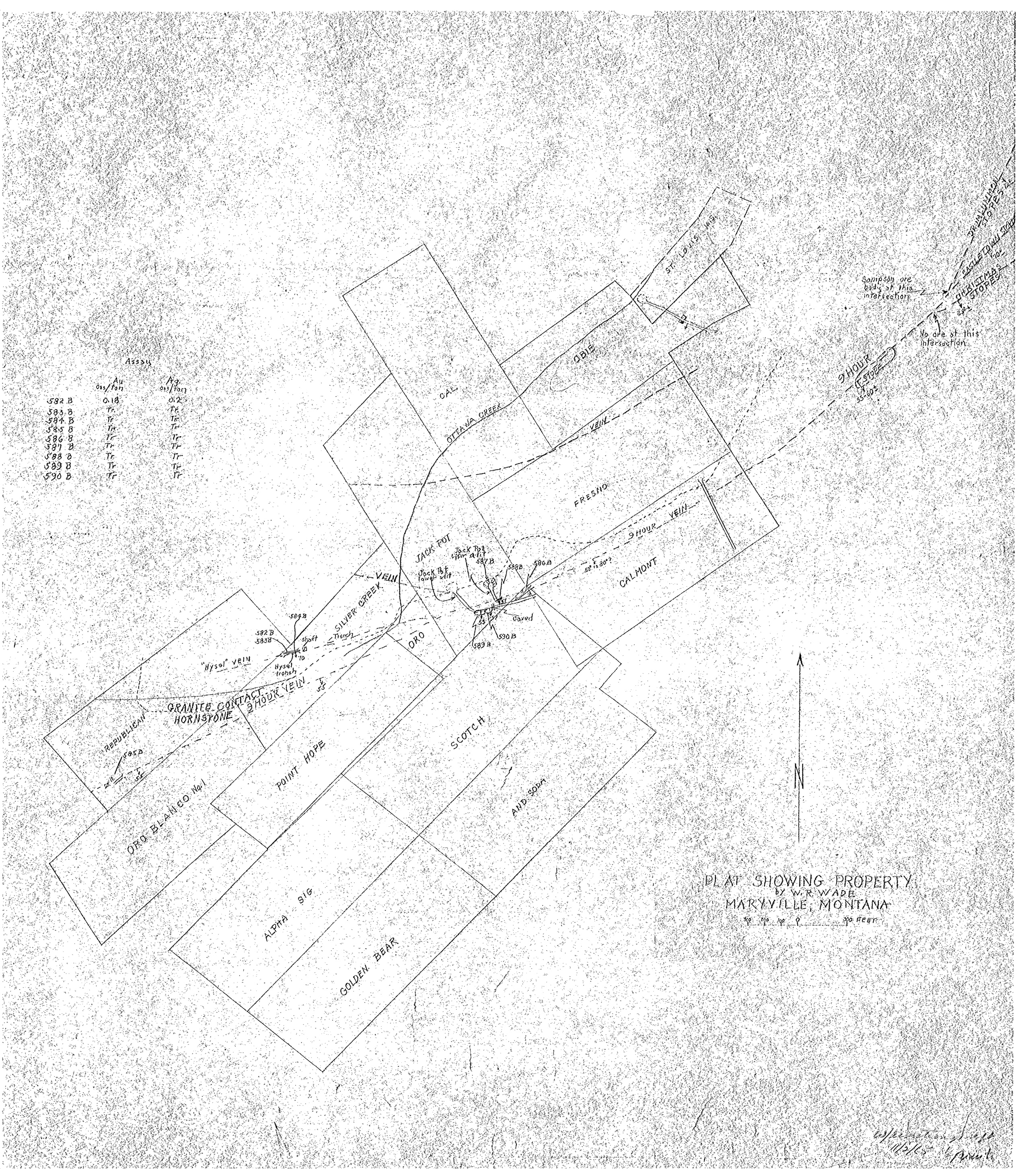
However, it is also concluded that more information relative to the proposed crosscut portal, the location of the vein and the branch veins as well as their dips either on the surface or near the horizon of exploration is advisable. It is further concluded that this information could probably be best provided by geologic mapping of a zone extending about 100 feet on each side of the 9 Hour vein from the northeasterly side line of the Robert Emmett claim to the vicinity of Woodchopper Creek. The map should show the trace of the intrusive contact, the claims and the location of the crosscut portal as well as the Ohio, Black Diamond, and Jack Pot portals, and any other surface workings within the strip to be mapped geologically, and should be at a minimum scale of 200 feet to the inch.

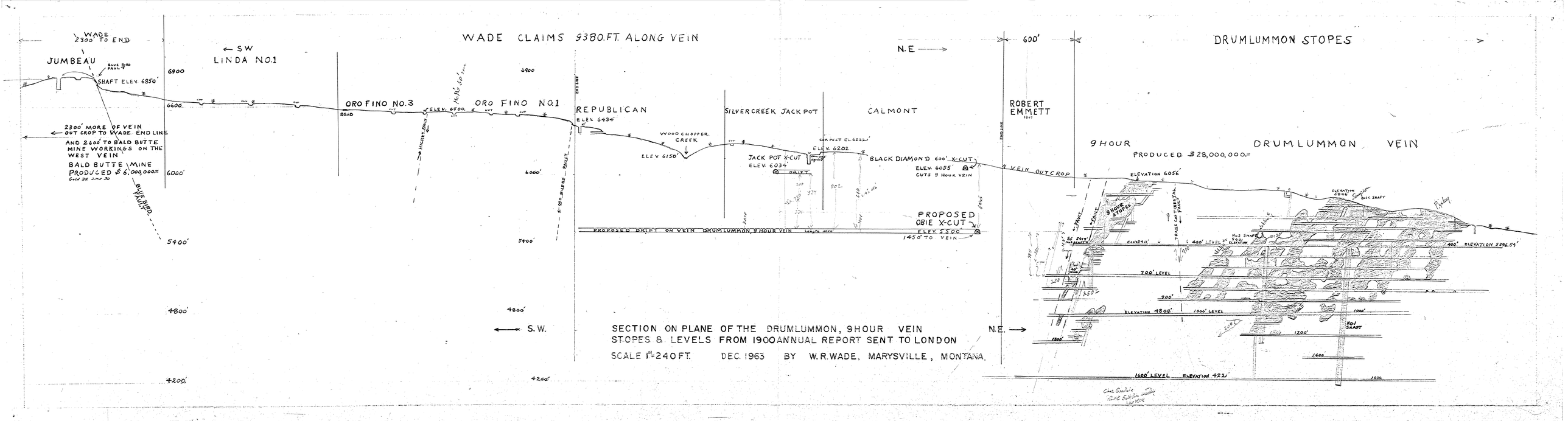
RECOMMENDATIONS

Although the Applicant has stated his objections to preliminary geologic mapping and has implied that such a step would be unacceptable, it is recommended that he be asked if he would consider the limited program of mapping outlined in the second paragraph of the conclusions above stated as a Stage I. If the mapping confirms the conclusions stated in the first paragraph in the section above, Stage II providing for 3400 feet of crosscut and drift is strongly recommended. If the limited mapping is not acceptable to the Applicant, Stage II is recommended as offering a better than fair chance of success, but its acceptance would seem to involve a policy decision.

In view of the above, the following program is recommended:


VERTICAL SECTION ON
OBIE TUNNEL
ROBERT EMMETT AND
BLACK DIAMOND TUNNELS
PROJECTED
SCALE 1" = 100'
AUGUST 16 1965 BY W. R. WADE
EL. 6310'
ELEV. 6035.56' ABOVE SEALEVEL
ROBERT EMMETT TUNNEL PROJECTED
ST. LOUIS VEIN IN ROBERT EMMETT TUNNEL
ST. LOUIS VEIN AT OBIE TUNNEL
PORPHYRY
SIDE LINE AT BLACK DIAMOND
SIDE LIDE CALMONT AT OBIE TUNNEL
GRANITE CONTACT
9 HOUR VEIN IN BLACK DIAMOND TUNNEL
9 HOUR VEIN AT OBIE TUNNEL
2 FT. VEIN DIP 66°30' MEASURED
2 FT. VEIN AT OBIE
BLACK DIAMOND TUNNEL PROJECTED
GRANITE
HORNSTONE
CREEK
OBIE TUNNEL
ELEV 5900'
DRIFT
86°
72°
60°
66°30'
ASSUMED XCUT LENGTH 1450' TO 9 HOUR VEIN AT 72° DIP
IF DIP 60° LENTH 1590'
140'


Assays
Au oz/ton
Ag oz/ton
582 B 0.18 0.12
583 B Tr. Tr.
584 B Tr Tr
585 B Tr Tr
586 B Tr Tr
587 B Tr Tr
588 B Tr Tr
589 B Tr Tr
590 B Tr Tr
ST. LOUIS M.G.
OBIE
CAL.
OTTAWA CREEK
VEIN
FRESNO
9 HOUR VEIN
50° to 80°?
CALMONT
JACK POT
Jack Pot upper adit
Jack Pot lower adit
587 B
588 B
586 B
590
Caved
590 B
589 B
VEIN
SILVER CREEK
584 B
582 B
583 B
Shaft
Trench
Hysol trench
"Hysol" VEIN
ORO
GRANITE CONTACT
HORNSTONE
9 HOUR VEIN
REPUBLICAN
585 B
ORO BLANCO No. 1
POINT HOPE
SCOTCH
AND SODA
ALPHA SIG.
GOLDEN BEAR
Sampson ore body at this intersection
No ore at this intersection
CHRISTMAS STOPES
9 HOUR STOPES
N
PLAT SHOWING PROPERTY
BY W.R. WADE
MARYVILLE, MONTANA
300 200 100 0 300 FEET


WADE CLAIMS 9380.FT. ALONG VEIN
WADE 2300' TO END
JUMBEAU
BLUE BIRD FAULT
SHAFT ELEV. 6850'
← SW
LINDA NO.1
6900
6600
6000'
5400'
4800'
4200'
2300' MORE OF VEIN OUT CROP TO WADE END LINE
AND 2600' TO BALD BUTTE MINE WORKINGS ON THE WEST VEIN
BALD BUTTE MINE
PRODUCED $6,000,000.=
BLUE BIRD FAULT
ORO FINO NO.3
ROAD
ELEV. 6500.
HICKORY FAULT
ORO FINO NO.1
END LINE
REPUBLICAN
ELEV. 6434'
WOOD CHOPPER CREEK
ELEV 6150'
SILVERCREEK JACK POT
JACK POT X-CUT
ELEV. 6034'
DRIFT
CALMONT
CAP POST EL. 6222'
ELEV. 6202.
BLACK DIAMOND 600' X-CUT
ELEV. 6055'
CUTS 9 HOUR VEIN
PROPOSED OBIE X-CUT
ELEV. 5500
1450' TO VEIN
PROPOSED DRIFT ON VEIN DRUMLUMMON, 9 HOUR VEIN
N.E. →
600'
ROBERT EMMETT
1897
END LINE
DRUMLUMMON STOPES
9 HOUR
DRUMLUMMON VEIN
PRODUCED $28,000,000.=
VEIN OUTCROP
ELEVATION 6056'
9 HOUR STOPES
ELEVATION 6046'
BOTTOM SHAFT
400' LEVEL
700' LEVEL
900'
ELEVATION 4808'
1000' LEVEL
1200'
1400'
1600' LEVEL ELEVATION 422'
1600
← S.W.
N.E. →
SECTION ON PLANE OF THE DRUMLUMMON, 9 HOUR VEIN
STOPES & LEVELS FROM 1900 ANNUAL REPORT SENT TO LONDON
SCALE 1"=240 FT. DEC. 1963 BY W.R.WADE, MARYSVILLE, MONTANA.