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REPORT

ON THE

METEOR MINES

SLOCAN CITY MINING DIVISION

BRITISH COLUMBIA

Arthur Lakes

July 6, 1924

PROPERTY FILE

82FNW137-07

I N D E X

MAPS

REPORT ON THE METEOR MINE

SLOCAN CITY MINING DIVISION, B.C.

Messrs. Mayfield and Murphy,
Dallas, Texas.

Gentlemen:-

In accord with directions in your telegrams to Hamilton and Wragge, Nelson, B.C., I examined the Meteor Mine, near Slocan City, B.C. My examination extended 7 days from June 21st to June 27th, inclusively.

Two purposes were in view (1) to determine what improvement, if any, the recent work had made to the property and (2) to make up complete structural maps, appraise the possibilities of the property as basis for (a) profitable operation or (b) for possible sale of the property.

The first intention of the examination I have covered in a letter to Mr. E.C. Wragge, sending a copy to you, the second intention is included in the following report. The structural relations, ore occurrences and possible limitations, etc. are shown on the accompanying Map "Geologic Plan and Sections of Meteor Mine" which is essential reference to this report.

I have striven for simplicity in language but it must be remembered that it is impossible to present any technical matter without using terms peculiar to it.

My report herewith is divided into (1) Summary and Conclusions in which are embodied essential facts and surmise followed by (2) details of the property, explanation of calculations, and outeline of the basis upon which the Summary is drawn.

Nelson, B.C.
July 6, 1924

(Sgd) ARTHUR LAKES.

Mining Engineer.

SUMMARY AND CONCLUSIONS

The Meteor group comprises three mineral claims which give an aggregate length of about 3,000 feet on the Meteor gold-silver vein in the "dry belt" of the Slocan district. The property has a production record of some $100,000 from less than 1200 tons of ore and is in a district geologically favourable for silver and gold and in a region where are other important producers of high-grade silver-gold ore, three of which have records of about $1,000,000 each, and a number of others have produced more or less continuously for the past 22 years high-grade ore mined by leasers.

The property is located in high rugged mountains nine miles by trail and wagon road from the railway to which ore is hauled for $9 per ton loaded on cars. The ore is of a fluxing character in demand at Trail smelter, hence has a preferential treatment rate. The freight rate from Slocan City to the smelter varies from $2.40 for the ore averaging around $30 per ton to $3.40 per ton for ore running $75 to $100 per ton which is about the average value of the Meteor ore before sorting. The higher grade ore running from $160 to $200 per ton (on basis of $20 per ounce for gold and an average of $0.65 per ounce for silver) requires a freight rate from 20% to 40% higher than the $100 ore. The cost of hauling, freight and treatment for the lower grade reject dump ore at about $30 per ton is $16 and for the average around $75 to $100 per ton is about $20 per ton and for the $160 and upwards about $22 per ton.

Mining by hand in this mine is estimated to cost from $25 to $30 per ton of high-grade ore shipped according whether or not the ore is available foradvantageous attack. Adding to this the cost of transportation and treatment it will be seen that the ore must run above $50 to $60 to make a profit. The general average (unsorted) indicated in the mine is around $75 per ton which may be sorted up to about $160 per ton. The main constituents being silver which is subject to fluctuations in price, the ore is subject to variations in value both upward and downward. The values in this report are based on an average of 65¢ per ounce for silver and uniformly $20 per ounce for gold.

It is indicated by that by installation of small efficient compressed air equipment the average cost of mining may be reduced to about $15 per ton which, if we add $20 per ton cost of transportation and treatment, it will be seen that the ore must run above $35 per ton to make a profit.

Preliminary estimates which I have at hand indicate that the cost of an efficient 1-drill compressor with drill, pipe, and all equipment ready to operate will cost around $3500 at the mine and that a 2-drill compressor similarly equipped, with two machine drills, steel, etc., will cost about $1000 more.

My examination indicates that the greater possibilities of the property lie in the possible ore extensions into the No. 6 level the greater part of which possibilities are not measurable and can have no tonnage estimate placed on them until more fully explored and developed. The partial area which is partly developed or in which we can feel reasonable assurance will produce ore in such restricted area as to make it possible to calculate a possible tonnage and remain within bounds of conservatism indicate that about 1245 tons of ore may be got containing an estimated 130,600 oz. of silver of $84,890 value on basis of 65¢ per ounce and 487 oz. gold of $9,740 value, a total gross value of about $94,600. It will be born in mind that this estimate is a minimum rather than an ultimate amount in that the calculations have been hedged by deductions demanded on account of the fact that the faces are not yet opened in the lower workings sufficiently to permit more accurate and possibly larger calculation. It will be born in mind that the possibilities that may not be at present depicted in terms of tonnage or value are in my mind the greater.

There are two ore shoots considered of immediate importance. These two ore shoots are practically virgin and should yield as above outlined by exploitation from the two lower levels of the mine, No. 5 and No. 6 tunnels.

If the smaller compressor plant is installed it is estimated that from $45,000 to $52,000 will be the net value of the above estimated ore, the profits varying from $28,000 if only the No. 1 ore-shoot is exploited to $38,000 if the estimated ore in both shoots is exploited. If exploitation is attempted by hand, the profits will be less than $21,000. By use of plant the partial ore possibilities as above estimated should be exploited in about 2 years. By hand the exploitation would be long drawn out and the return per year be small and inadequate considering the money involved. In the probability that the development will result in greater tonnage and values than the estimates by their nature can include it is within reason to expect that the plant would be in use for considerably longer than 2 years and that profits might accrue throughout.

Indications are that it will require a minimum capital of about $8,000 to around $15,000 to improve the property and put it on a profit basis. This estimate does not include payment of any debts due at the present time.

The Meteor vein is a small irregular one in which occur lenticular bodies of very high-grade silver-gold ore with larger and more continuous bodies of medium grade ore and ore running about $30 per ton. It is accompanied everywhere by an acid porphyry dyke from 8 to 20 feet wide which is itself mineralized to some extent and probably was one of the causes of mineralization in the vein. On account of the narrow width of the vein it would not warrant consideration of milling equipment to bring up the lower grade ores to commercial products, hence it will have to be considered as a high-grade shipping ore producer the product of which must be high grade enough to stand shipments to smelter. The small irregular character of the ore occurrences, the rather high costs of mining, transportation and treatment, result in it being necessary to produce ore of a minimum value of from $35 per ton where facilities are supplied to $60 per ton where hand work prevails, as at present, the property being unequipped. Should the dyke, after more extensive exploration, prove to contain values more or less unfformly distributed through it and of such amount as to bring up the grade of lower value quartz, then a mill might be considered. Whilst there are hopes that this may be brought about I consider the likelihood remote.

Whilst the mine has a reputed production of about $100,000 most of the records are unavailable. Only those records of production under the present ownership of J.C. Buchanan are available, together with sampling returns made by Wm. Buchanan and Geo. Long.

Mining 75.83 tons from a part of underhand stope No. 502 in No. 5 level, No. 2 ore-shoot produced 16,982.36 oz. silver and 70.35 oz. gold from which was got $15,860.25 net smelter at prices for silver ranging from 62¢ to $1 per ounce. Ore shipped from reject dump No. 5 level was 55.34 tons containing 2,333.34 oz. silver and 7.982 oz. gold from which was got $1,778.61 net smelter. Total 130.17 tons which produced 19,315.70 oz. silver and 78.34 oz. gold yielding net smelter and freight $17,684.86 or, $16,478.86 after hauling deduction, of a value per ton $126.76. This was the total shipped to Buchanan account.

Mining in No. 6 level, after long and expensive work in searching for the vein was conducted a short period resulting in 60 feet of drift and 280 sq. feet of stoping on the vein. This resulted in 6.6 tons of sorted high-grade ore running 230 oz. silver and 1.09 oz. gold per ton and yielding 1,515.13 oz. silver and 7.80 oz. gold netting after freight and treatment, $980.27. In addition was produced about 9.4 tons from stope which was reject in sorting and assayed 61.8 oz. silver and .16 gold, thus making about 16 tons

from the stope that averaged 0.58 oz. gold and 137.4 oz. silver or about $90.65 per ton (silver at 65¢ per ounce). In addition was produced from the drift 20 tons assaying about 56.3 oz. silver and 0.18 oz. gold, and 2 tons 230 oz. silver and 1.09 oz. gold, or 22 tons assaying 72 oz. silver and 0.26 oz. gold. The total production was 38 tons assaying about 99.5 oz. silver and 0.4 oz. gold or about $72.67 per ton, a total of about $2,761.00 gross which is a good record for this kind of work and argues well for the No. 1 ore-body at this depth.

The vein and its accompanying dyke is rather extensively faulted by a fault zone passing through the central part of the property. At first the effects of these disturbances were confusing but after correlation it was found that the vein strike and dip is quite uniform as is also the strike and dip of the faults therefore it is easy to project the position of the ore bodies at different levels. Had the geologic correlation and the map been prepared early in the advance of No. 6 tunnel it is probable that at least half the money expended in that tunnel would have been saved and over half the work have been in vein and ore thus possibly paying considerable of the expense and opening up ore for stoping and the property might be operating profitably today instead of being closed down at present with judgments against it.

In conclusion it is indicated that the greater possibilities of the property lie in the, at present, unmeasurable but probable extensions of the ore shoots No. 1 and No. 2. It is probable that when development has progressed into these ore-bodies at No. 6 level considerably more ore will be disclosed than the tonnage calculated herein. The property is a good little property with chances of making a fair profit on a comparatively small expenditure. It will never be a large property nor will it stand heavy overhead expense. However, knowledge of structural relations of the vein and various faults is necessary in the proper operation of the property and economy will probably best be served by having technical advice from time to time, particularly before entering into any new exploration or improvement.

I recommend that the necessary plant and equipment be installed and that work progress on conservative basis as outlined in this report.

(Sgd) ARTHUR LAKES

GENERAL. The Meteor group comprises three Crown-granted mineral claims, the Meteor, Cultus, and Ottawa No. 5, as indicated on the accompanying Sketch Map No. 1. Their total area is in excess of 100 acres and they are so located that they give an aggregate of about 3,000 feet along the strike of the Meteor lode though the dip of this vein will cause it to pass out NW side line of Meteor claim at the SW corner and to get depth by further tunnels it will be necessary to acquire the claims to the south and west. The present showing would not justify a development plan that would require these claims in the near future and consideration of their acquisition is a question for later date.

The property is located in the Slocan "dry belt" in the southeast part of Slocan City Mining Division of B. C. Slocan City is the nearest railway station, about 9 miles from the property. The route to the mine is 6 miles by wagon-road up Springer creek rising about 3,250 feet elevation above town to a horse trail up Tobin creek which extends 3 miles to the mine cabins about 4,750 feet higher than town, thence about 1,000 feet along the trail to the lowest or No. 6 tunnel which is at 6,600 feet altitude above sea-level or about 4,850 feet higher than the railway tracks at Slocan City. A wagon-road has been surveyed from the main road about ½ mile above the trail intersection. This surveyed road would be about 3 miles long, rising 1,350 feet in this distance. If put in it would greatly expedite transportation of ore to railway and supplies back to the mine and considerably lessen costs thereby.

Cost of ore transportation to cars at Slocan City is $9 per ton inclusive of haul by rawhide or sloop over the trail, wagon haul to tracks, and loading on cars. Costs of supply transportation are around $20 per ton from Slocan City to the mine.

Slocan City is 46 miles by auto road from Nelson, B. C. to which city it also is connected by C.P.R.R.. The Consolidated M. and S. Co. smelter at Tadanac, B.C. is 64 miles over C.P.R. tracks. The cost of ore freight from Slocan City to Tadanac is as follows:-

> Starting with value at $5 per ton rate is $1.50
> then increase of 10¢ per ton for each $5 increase
> value to $25, at $1.90 per ton.
> $30 ore at $2.40, $40 at $2.50, $50 at $2.60
> $60 at $2.90, $70 at $3.30, $80, $90, and $100
> ore at $3.40.
> Over $100 value add 20% to the rate for $100 for
> each $50 increase in value.
>
> The indicated average of low-grade ore on dumps after soting out higher grade is around 0.14 oz. gold and 42 oz. silver which on basis of $20 per oz. for gold and an average of 65¢ per ounze for silver would be worth about $30 per ton and get $2.40 rate.

The indicated general average of the ore in the mine at present (as calculated in the following report) is around 105 oz. silver and 0.4 oz. gold per ton, which on basis as above would be worth about $75 per ton and get $3.40 rate.

The indicated general average of the higher grade sorted ore is around 220 oz. silver and 0.9 oz. gold per ton which on basis as above would be worth about $160 per ton and call for a rate of $4.10 per ton.

Higher grade ore would rate accordingly.

The size of the vein and the fact that the transportation costs at best will be fairly high to Slocan City from the mine require shipments of fairly high grade ore to make money though there should be a small profit in shipping the dump ores in view of the fact that the cost of mining has already in every instance been paid and charged to the higher grade ore from which this dump ore has been cobbed to raise the grade. Under circumstances of proper development and the exploitation of the ore-shoots on a larger scale than the small localized leasing scale it is possible that more profit may be made by shipping the general average ore as got in the vein at a value around $75 per ton. The vein is too small to warrant consideration of a mill at the present time unless by further exploration it should develop that the accompanying porphyry dyke may contain sufficient values to make up a mill tonnage. Therefore for the immediate future operations will have to be conducted on basis of the high transportation cost as outlined.

The ore is highly siliceous and is therefore in demand as a flux at the Tadanac plant hence is treated at a low rate. The smelting schedule is as follows:

Pay for 95% of Gold assay at $20 per ounce
95% Silver on fire assay at the aver of the Engineering and Mining Journal New York quotations for foreign silver converted into Canadian funds, for the calendar week which includes date of arrival at Tadahac, (Allowances for U.S. exchange are made as below).

Base rate for smelting per dry ton of material $8.00
(a) add to the base rate per ton 25¢ per unit for all zinc contained.
(b) deduct from this result the total units of silica and lime at 7¢ per unit.
Provided that in no case shall said base rate be reduced more than $4 per ton as net result of said additions and deductions.

A charge will be made in addition to the above for all sulphur contained in excess of 2% at 30¢ per unit per dry ton provided charge shall not exceed $3 per ton in any case.

Exchange: All payments will be made in Canadian funds but allowance for U.S. exchange will be made based on the net value of gold and silver paid for on following basis: (a) when rate is 5% all exchange will be allowed in excess of 1% (b) when 10% or less, all in excess of 2% (c) when over 10%, all in excess of 3%.

Inspection of what records are available indicate that the ore will run from 70% to 90% silica, from no excess of sulphur to 10% sulphur, and that the rate will vary from around $5 to $8 per ton with an average of about $7 per ton, which is a satisfactory rate and of advantage to the mine.

The estimated rates on the three grades of ore above-mentioned would be about:

On dump ore ($30 value)	from $4	to $5 per ton.
General avarage ($75 value)	$5.50	to $7 per ton.
Higher grade sorted ($160)	$7.00	to $8 per ton.

The climate at this altitude is such that there is deep snow and strong winds for about half the year, making travel somewhat difficult, some expense in keeping trails open unless fairly continuous use of them, and the steep hillsides cause small but not destructive snowslides which temporarily block the trail and road. Owing to the discomfort of the climiate, the comparative inaccessibility of the mine in winter and the rather cramped and draughty quarters the prevailing rate of wages is here about 50¢ per 8-hour shift more than the prevailing scale in the Slocan generally. Thus when machine miners scale $5.00 per shift the wage here is $5.50.

Water for the camp is plentifully supplied by a spring which flows the year round.

Wood for fuel and for mining purposes is got from the area to the west of the camp at a lower elevation, hence has to be dragged uphill with a certain amount of difficulty and expense, particularly as the timber at this altitude is mostly scrub pine and hemlock. Fortunately the mine needs very little timber except for manways and chutes.

Lumber for chutes, etc., costs approximately $60 per 1000 feet B.M. This cost would be considerably lessened if the surveyed wagon-road was put in as a good part of the delivered cost is for dragging up the steep 3-mile trail.

The mine camp consists of a bunkhouse and boarding house sufficient for 10 men, though somewhat cramped at that capacity, 1 small office building, and a stable for 8 horses.

The mine plant consists of blacksmith shop and engine-compressor room combined in a building at portal of No. 6 tunnel, a covered track leading to the waste dump and passing the sorting house and small ore bin for sorted ore. The engine and compressor were recently taken away from the property. The showing warrants consideration of installation of a small plant consisting of oil engine and compressor sufficient to operate two small drills (say about 160 cu. ft. capacity).

According to Mr. Wm. Buchanan, 2 single jack miners in the granite or porphyry advanced from 15 feet to 20 feet per month of 30 shifts. One man with the rather inefficient second-hand machine drill advanced about 60 feet per month (from 2 to 3 feet per round). It is quite possible that by installation of machines of new type that this advance would be increased materially.

HISTORY. The Dry Belt of the Slocan was discovered about 1894 and from 1897 to 1904 was quite active, some of the mines, inclusive of the Meteor having operated more or less continuously ever since under small leases to individual miners. The Meteor was one of the early discoveries by Jas. Boyd and was sold by him and his partner to Finch and Campbell soon after. This firm was represented by Geo. Aylard (who later opened up the rich Standard silver-lead mine at Silverton) who worked the Meteor vein for a time and also opened up a vein on the Cultus property which I was told was a good looking showing but did not see as no one knew its whereabouts at the time of my visit. The greater part of production has been from small leases all from Meteor vein and mostly from ore shoots No. 4, No. 2 and No. 3. These leasers performed most of what development work has been done, usually worked a small area until they got a carload of ore or so, made a shipment and often left for a period to return for another stake when they could get a lease. The property is reputed to have produced about $100,000 gross in high grade silver-gold ore from possibly less than 1200 tons. Mr. Wm. Buchanan has tallied up more than $80,000 from the records available to him which do not include the older shipments from ore shoot No. 4, which was the first worked and, judging from the stopes between No. 2 level and surface, must have produced a good proportion of the ore total. In view of the long time over which this production was made it is evident that the yearly output was comparatively small. It is further evident that no one has tried to systematically operate or develop the property until Mr. J.C. Buchanan took over. The work done since he purchased the property consisting of driving No. 6 level was unfortunate in being just off the vein practically the entire distance as is shown in the geologic work recently done

and depicted on the structural map No. 2 herewith. Eventually the vein was encountered in No. 6 and shows up well in comparison with the upper showings, but unfortunately just about the time that work got well into the ore, financial difficulties arose and the mine was closed down in debt, and to date lies dormant. Knowledge of the structural relations at the outset would undoubtedly have saved the operator money and probably have put the mine on productive stage before the financial troubles thus probably permitting it to be profitably worked today. A small, second-hand, compressor and oil engine was installed just before the financial trouble and aided somewhat in driving the workings into and along the ore. Purchase of the machinery at the time and with the showing that then prevailed was ill advised though with the present showing and the possibilities on the lower levels as indicated by the geologic structural map, the comparatively small amount of dead work necessary to develop both No. 1 and No. 2 ore-shoots, installation of a small 2'-drill compressor and efficient machine drills is warranted and necessary if the best benefits are to be obtained from the ore-shoots.

TOPOGRAPHY. As will be realized from consideration of the considerable rise in the 9-miles from Slocan City to the mine (4850 ft) the topography surrounding the mine is steep and rugged. The workings lie in the Eastern part of Meteor basin, an amphitheatre of about ½ mile at the headwaters of Tobin creek formed by abrupt escarpments of granite. The summit forms a divide between Springer and Lemon creeks, the waters of Springer creek flowing westerly into Slocan lake, the waters of the North Fork of Lemon creek flowing easterly into Lemon creek, thence westerly into Slocan river which drains Slocan lake into the Kootenay river, which in turn flows into the Columbia. The steep slopes have afforded good tunnel sites.

The workings lie in the upper basin and No. 6 level is about as deep as could be got by tunnel unless a site were chosen in the lower basin which drops down to about 500 feet lower than the floor of the upper basin. To get 250 feet additional depth on the vein below No. 6 level would require about 1700 feet of tunnel along the unproven vein into downward continuation of No. 1 ore-shoot. Practically all of this work would be on other ground than that included in the Meteor group. If the work outlined herein proves successful and indicates a good downward extension of No. 1 and No. 2 ore shoots, it would be advisable to surface trench the NW extension of the vein to see whether other ore-shoots lie in that direction and arrange for acquiring the claims to the south and west. However, at the present time and for the near future such considerations are out of the question.

GEOLOGY. The so-called "Dry Belt" of the Slocan is part of the Nelson Batholith, a huge mass of igneous rock which invaded the older sedimentary and plutonic rocks in late Jurassic age. This igneous intrusion covers more than 1,000 square miles, outcrops over the southern part of the Slocan mining area and extends south through Nelson and Ymir districts into the Salmo area where it is again succeeded by older sedimentary rock formations. During the latter part of this igneous invasion occurred fissuring and mineralization in both the granitic rocks comprising the batholith and the sedimentary and metamorphic rocks comprising the invaded area, the ore coming from phases of the igneous rocks during the latter stages of the igneous activity and forming the ore-bodies of the important "wet" silver, lead, zinc deposits of the Slocan district generally in the sedimentary formations, slate, quartzite, and limestones, and the many smaller, though richer "dry" quartz, silver and gold deposits within the granitic rocks generally though occasionally in quartzite and slate near granitic contact. In addition, this batholithic invasion and the fissuring and mineralizing agencies of its last stages are responsible for the important gold, silver, lead, copper and zinc deposits of the Nelson, Ymir, and Salmo districts from 20 to 50 miles south of the Slocan. The dry belt of the Slocan extends northerly from Lemon creek along the east shore of Slocan river and Slocan lake for about 16 miles to where the granitic rocks contact the older sedimentary rocks which form the Slocan lead, zinc, silver district wherein the ores are "wet," that is the gange constituents are carbonates of iron (siderite) and of lime (calcite) with lead, zinc blende, iron pyrite and silver metals, in contrast to the predominating oxide gangue, quartz, of the "dry ore," with argentite (containing 87% silver), pyrargyrite (60% silver), freibergite, and other silver minerals, native silver, and gold, with little zinc, or lead, more though minor amounts of iron pyrites, etc. The belt is from 4 to 8 or 9 miles wide, extending easterly from Slocan lake. In this belt are many small producers and prospects which have shown small bodies of high-grade ore, three mines which have produced around $1,000,000 each, the Enterprise, Arlington-Speculator, and Ottawa, and a number of lesser producers that have operated more or less consistently during the past 25 years, including the Meteor, Black Prince, Two Friends, Westmount, and others. Some of the mines were operated in the old days under regimes of reckless extravagance and show no profit for the very respectable output credited them. Most of the properties have returned small but satisfactory returns to leasers and the Black Prince, Ottawa, Meteor and to lesser degree the Westmount, Enterprise and Arlington, have worked almost continuously for the past 20 years under leasers. Map No. 1 shows the relation of the Meteor to some of these properties and indicates it to lie within a zone of considerable mineralization though the ore occurs in small veins and in irregular bodies. The Meteor has been looked upon as one of the best for leasing, hence has had two or more leasers on it for years.

The prevailing country rock is a coarsely feldspathic granite, a phase of the Nelson grano-diorite batholith. This alkaline granite is intrudad by an acidic dyke made up mostly of quartz with feldspar very finely crystallized and giving the appearance of quartzite, in fact was locally called "quartzite" but is a true intrusive rock or porphyry as is indicated by its structure, texture, the fact that it is shot through by crystals of marcasite, argentite, and silver-bearing minerals. If it had been a true "quartzite" which would imply sedimentary origin it would have been a pre-existing rock caught up in the batholithic invasion and would have been a "roof pendant" or fragment, the ore occurrences through it would be in form of replacements in reticulating veinlets, etc. and not as crystals formed within and as part of the rock, as it does occur in this true dyke rock. I go to this extent in description in order to correct some impressions held with regards this formation, in view of the fact that this white acidic porphyry dyke is always in association with the ore, the ore vein occurring either on foot or hanging-wall of the dyke, between dyke and granite. It is indicated that this dyke has been an influence in forming the ore in the quartz vein, that it has been in part at least, the "ore carrier" and is responsible for considerable of the values in the vein. One indication to this conclusion lies in the fact that a nearby vein of quartz, generally of greater width and more continuity than the Meteor vein, was noticed to be practically barren throughout and was also noticed to be wholly within the granite with both walls granite country rock. If the dyke was a true quartzite (a pre-existing sedimentary fragment or bed caught up in the igneous rock when the latter intruded the older formation) the fact that the ore occurs everywhere in contact with it would reason that the pre-existing quartzite contained chemical constituents whereby the ore formed in contact by replacement or interchange. If, however, the dyke was a fragment or small "roof pendant" rather than an intrusive into the granite, the possibilities of its continuing in length and depth as a fragment would be much less certain than as a dyke, that is, the fact that the rock is a true porphyry gives greater assurance as to its continuity in length and depth, and as it evidently is one of the sources of the ore vein, and is without doubt an ore indicator, it follows in lesser degree that there will be greater assurance as to continuity of the ore in depth and laterally.

The acid porphyry dyke which varies from 8 to 20 feet wide cuts across the granite in a general N 80°E direction and dips an average angle of 33° to the NW. In No. 6 level and also in No. 1 level the dyke and accompanying vein change strike to N 80°W, a difference to 20°. This change is evidently caused at No. 6 level by steepening of the vein dip at the east end of shoot No. 1. The ore vein generally underlies the porphyry, thus having porphyry hanging-wall and granite footwall, but in No. 4 ore-shoot to East of fault 105-106 the ore lies on the hanging-wall of the dyke, in the east end of No. 1 ore-shoot in No. 5 level it does likewise and in the downward continuation of No. 1 ore-shoot in No. 6 level it is also on the hanging-wall of the dyke.

(See Map No. 2). There appears no particular reason why the ore should form on the footwall side of the dyke more than on the hanging-wall side but it seldom forms on both sides at one place, at least not in commercial size. The usual footwall occurrence of the ore has evidently caused a sense of disparagment of the possible value of ore occurrences on the hanging-wall side, which to my mind is not justified and the values in No. 6 are as good or even better than those which occur on the footwall side of the dyke in the same ore shoot in No. 5 above.

The granite country rock and the dyke and vein are cut and faulted by a zone of faulting, striking generally N. 35° to 45°E and dipping from 65° to 80° in a NW direction as indicated on Map No. 2 by "Faults, A. B. and C". At first the effect of these faults is confusing but after they were correlated and their influence worked out, the structure is quite simple as is shown on the Plan and Sections of Map No. 2.

As Map No. 2 illustrates the structural relations as noted by careful examination and calculations and the easiest way to comprehend these structural features is by viewing the Plan and Section I will describe the points with direct reference to the map.

Description of Geologic Plan and Sections, Map No. 2.

Map Scale = 40 ft. to 1-in.

The Plan shows SW corner and property lines of Meteor claim, the area NW and SW therefrom is on ground owned by other interests. Approximate contours at 50-foot intervals are indicated to outline the hill trend. The vein (or more correctly the indicating acidic dyke which the vein always accompanies when the irregular ore shoots form) on surface is indicated in its observed position by solid or heavy dash line of yellow, in its calculated position by yellow dotted line. The Accompanying "Vein Indicator" acid dyke is shown in green in its relative position to the vein, i.e., on hanging-wall or foot-wall side. The vein (and indicator dyke) position underground is shown in carmine (red), Faults are shown in blue, and Basic dyke rocks in purple hachuring. On account of the fact that levels No. 3, 4+44 and 4 cross each other in plan they are colored yellow, violet, and light green respectively in order to allocate them. Dip directions and degree of dip are shown by arrows at right angles to the courses with figures showing degree of dip. On the plan the horizontal projection of the ore shoots is shown in light red. The ore shoots are numbered in the order they are met in ascending the hill which is the reverse order of their original discovery and exploitation. Thus No. 1 ore shoot is the first up from the bottom, or the first encountered in No. 5 level; No. 2 ore shoot the next up the hill (though it does not outcrop, being cut off by Fault B in its upward continuation and being Shoot No. 3 on the opposite (SE) side of the fault) of the next shoot encountered in No. 5 level, No. 3 ore shoot

is the upward continuation of No. 2 ore shoot lying on the underside of Fault B (See Section B) and No. 4 ore shoot is the body at the hilltop which is upward continuation of shoot No. 3 on the opposite side and under Fault A (See Section B). Thus the ore shoot No. 4 on the map was No. 1 to be discovered and worked, No. 3 the second, No. 2 the third, and No. 1 the last (so far as No. 6 level is concerned). The stopes are depicted by numbering, first number with level over (or immediately under in case of underhand slope) which the stope lies with second or third number that of the ore shoot in which the stope has been driven; thus in ore shoot No. 1 at No. 5 level, the first stope is No. 51, the second above is 511, in No. 2 ore shoot same level first stope above is 52, next which is underhand is 502, etc. Surface workings are indicated by dash lines, tunnels by solid lines, upraises, shafts, etc. by dotted lines and indicated upraise by crossed square, winzes and shafts by half blanked square. The vertical sections A, B, and C, are depicted on the Plan by line = plane intersection with the Plan with arrows showing direction of sight. In margin lines are the results of calculation of fault intersections with the vein, showing direction of line of intersection and noting amount of dip of line of intersection.

Section A which is longitudinal section along the approximate average course of the vein follows the same color scheme but show the actual plane projections of the (q) respective ore shoots in light red, and (2) the intersection of fault planes in light blue. It is obvious that where the fault planes are projected there will be no ore. The surface indication of vein is shown in yellow. The stope projections at various levels are hachured.

Section B which is a cross section taken through ore shoots, 4, 3, and 2, and Faults A, B, and C, to show in vertical section the relation of faults to the vein and the effects to help make clear the horizontal conditions shown on plan. Vein at surface yellow, underground in observed and calculated position red, faults blue, and accompanying acidic dyke, green.

Section C which is a cross section through ore shoot No. 1 to show (a) dip and dip length between No. 5 and No. 6 levels (155-feet) and (b) relation of accompanying acidic dyke. Vein red, dyke green.

The prevailing N 80°E strike and 33°NW dip of the vein taken in conjunction with the horizontal migration caused by its downward progress along the mountain slope to the NW would result in the original vein outcrop - before faulting - bearing about N 60° W or out through the NW corner of the Plan, as depicted by dotted yellow line. The faults are all gravity or "normal" faults, in that the hanging-wall ~~mr~~ side of the fault moved relatively downward regards the footwall side. The effect has been to lower the NW side of fault with reference to the SE side as is indicated in Section B where the apparent moving along Fault A was vertically about 100 feet. (from "F" to 4,44) and apparent movement along fault B was vertically

about 140 feet (from No. 4 level to No. 5 level). The horizontal effects of these fault movements have been to shift the faulted segments southerly into the positions on surface indicated by the yellow lines "approximate position of vein on surface" which represents observed and calculated location of the vein, and into the positions underground indicated by red lines which represent observed and calculated position of vein. The net result has been that the vein segment indicated in Cuts C and D on surface has been shifted about 480 feet south from its proper unfaulted position. Faults A, B, and C, all belong to one zone of post mineral faulting, and merge and diverge into and from each other in both strike and dip, thus in places fault A and B are one fault "A-B", B. and C are on fault "C-B", etc., as indicated on both plan and sections. This merging has the effect of shortening and in places cutting out altogether the extension of vein between the faults. The divergence has the other effect and indicates in the case of No. 2 "Rich Ore Shoot" that the shoot length at No. 6 level will be greater than at No. 5 level, whilst going upwards above No. 5 level the ore shoot is cut out by merging of Faults B and C, and no ore may be got until just below No. 4 level where No. 3 ore shoot is got which lengthens upward until cut by No. A Fault along which is a blank of about 100 feet vertically to Shoot 4, above Fault A; Shoot No. 3 is cut out in downward continuation by mergence Faults A and B. The effects above described are shown on the Plan and particularly in Section A. Ore shoot No. 1 is evidently between Fault C and Fault D and probably will be found of commercial importance for a greater length to the NW than has been indicated underground by further exploration in that direction as suggested on Map.

Generally, the vein strike and dip is very regular as also are the strikes and dips of the faults within the main fault zone. Therefore when once understood the vein should easily be followed. The error in the No. 6 development was in not having an understanding of the effect of the faulting and therefore not making allowance for vein and fault relations in depth, the position of the vein was calculated in a wrong position without having taken into concern the above allowances. This resulted in expensive work being done before the vein was finally got (about half the entire cost of No. 6 tunnel work) as it is evident by inspection of the map (and more so by actual inspection of the property) that the vein could have been picked up much sooner (a) by driving ahead about 40 feet from sta. 603, or crosscutting about 20 feet NW from 603, and then the following work would have been drift in vein with its ore occurrences to help on the cost, the assurance that was abandoned for a time on account of not having found the vein where erroneously calculated would have been maintained and probably the property continued and remained in successful operation instead of being in default.

ORE SHOOTS. No. 1 ore shoot at the present time affords the greatest possibilities in the mine. It is evidently the longest ore shoot, being 130 feet long on No. 5 with possibilities that it may be longer in a westerly direction by exploration on No. 6 in vicinity

marked "Possible ore extension" west of sta. 606. It has been encountered and partially followed in good ore in the bottom (No. 6) level with showing of 30-in. wide in east face, a sample of which gave ore running an average of 50.8 oz. silver and 0.20 oz. gold per ton which on basis of the average of $0.65 per ounce for silver and $20 per ounce for gold is worth about $37 per ton. Any increase or decrease in the price of silver would increase or decrease this worth. Whilst this is hardly commercial ore for this mine, the drift and small stope produced an average throughout about 100 oz. silver and 0.4 oz. gold per ton, which on the above basis would be worth about $73 per ton, subject to variations as above indicated. 6.6 tons of sorted ore yielded 230 oz. silver and 1.09 oz. gold per ton or $171 per ton on above basis. (Note: The gross values as above figured will be depreciated 5% as the Smelter pays only 95% for gold and silver content). The length of ore shoot opened in No. 6 is 60 feet with evidence that the full extent has not been penetrated. Twelve samples along the 130-foot exposure of this shoot in No. 5 drift returned an average of about 86 oz. silver and around 0.3 oz. gold per ton according to Mr. Wm. Buchanan who took them. This value checks well with the average output in No. 6 as noted above. If the sample returns at No. 5 are averaged with the output from No. 6, the net gives silver 92.7 oz. and gold, 0.35 oz. per ton value of the ore. This ore shoot is the only one sufficiently opened up that it may be classed as measurable, and I here, and in my letter of July 4th, class the ore as "probable" or partially developed and have calculated tonnage on basis of 2/3 of the volume of the shoot as between (a) No. 6 and No. 5 levels, and (b) between No. 5 level and surface. Though No. 2 ore shoot is further into the mountain and generally would contain greater ore possibilities between No. 5 level and surface, on account of the described interruption by Fault B it has less possibility above No. 5 than has No. 1 ore shoot. The fact that ore was at least encountered in No. 6 level is to my mind of high importance to the mine and has increased its potential worth a number of times over its indicated worth before this ore was encountered, as is fully detailed in my letter of July 4th regards the comparative appraisals of value of the mine (a) under the apparent non-success of No. 6 exploration with (b) apparent partial success of No. 6 exploration.

No. 2 ore shoot or the "Rich Shoot" is separated from No. 1 ore shoot by Fault C a horizontal distance of 160 feet on No. 5 level and possibly 220 to 250 feet on No. 6 according to projection "W-Y" on Plan. It will be observed in both plan and Section A that upward continuation of this ore shoot above No. 5 level is cut off by Faults B and C. The small stope No. 52 has probably worked out all the commercial ore left therein. The shoot length on No. 5 level is about 100 feet long, but the west part for 20 feet has pinched down at the level so that it affords no commercial ore and the east 10 feet is in "fault breccia" or badly broken up so that it is not commercial thus the ore stope is about 70 feet long at this level.

Stope 502 (underhand) is under water but is described to me to be 35ft deep along vein dip, by an average of 60 feet long though the bottom is about 75 feet long according to sample records. The total production shipments by J.C. Buchanan came from partial operation of this stope 502 plus some dump ore from No. 5 level, which ore may have been sorted out from ore taken from shoot No. 2 or may partly have been from ore sorted out from the minor production made by leasers from No. 1 ore shoot. 75.8 tons of ore was produced which yielded 16,982.36 oz. silver and 70.36 oz. gold or about 224 oz. silver per ton and 0.93 oz. gold per ton, which on basis averages $0.65 per ounce for silver and $20 per ounce for gold, would be worth about $164.20 per ton which is about what the sorted ore from No. 1 ore shoot at No. 6 level returned ($171.00), thus indicating that possibly No. 1 ore shoot may carry around the same average as No. 2 ore shoot from which part of it (No. 1) was faulted in the first place. The actual returns from this ore was considerably more as it was sold when the price of silver was around $1 per ounce. The dump ore (reject in sorting) shipped was 55.34 tons which yielded 2,333.3 oz. silver and 7.98 oz. gold, or about 42.4 oz. silver and 0.145 oz. gold per ton, which is less than the grab sample of reject at No. 6 ore dump which assayed 61.8 oz. silver and 0.16 oz. gold per ton; however the shipment returns are more conclusive than hand samples, though the latter if properly taken may with discretion be averaged in with other results in some cases. Forty samples taken at the bottom of the 502 stope by Wm. Buchanan and Thos. Long were reported to me to have returned:-

East end	8ft. long.	8-in. wide:	0.92 oz. Gold,	336.0 oz. silver
West	4	14	1.60	307.
Center	10	15	.14	256.0
60-ft. long		14	.46	118.0

As the stope was full of water I could not see bottom and verify conditions but it is obvious that the difficulty of underhand stoping by hand, and cost of pumping water, etc. caused cessation of the work rather than cessation of values, the sampling as well as production record indicates this. The fact that No. 6 level penetrated into good ore which averages fairly well in value with the reported value from 502 stope together with the assurance of downward continuation of ore and vein given by that work are basis to my mind for allowing possible ore continuation below the bottom of this stope for twice the depth attained with a factor of safety of ½ the volume of the block thus calculated. It is probable that when No. 6 tunnel has penetrated under this ore shoot as indicated by projection "y-Z" on the plan that it will disclose good ore similar to that taken out and further in accord with the indicated divergence of the confining Faults B and C the Shoot length will be considerably longer, thus it is possible that the production from this ore shoot will exceed the calculation (as above suggested) by considerable. However, whilst these possibilities are evident they are not as yet measurable and it will require further exploration and development to make them so. I have no hesitation in recommending the work, however, and expect that satisfactory results will be got.

No. 3 ore shoot may afford small commercial possibilities (a) in upward and westerly extension of stope No. 413 and (b) in limited downward extension by underhand stope beneath 407-drift with diminishing size in the downward rake NE to the place where the ore shoot is cut off by mergence of Faults A and B, as indicated on the Plan and Section A. Otherwise it has not much future possibilities and probably does not extend to No. 5 or 6 level in ore.

No. 4 ore shoot and the possible ore occurrences east may prove worthy surface exploration around and east of points J and K, where what surface work has been done evidently was too far down the hill (except J and K) evidently the prospectors not taking into account the horizontal migration NE on account of the dip N and down slope of hill to the East. However, the section of vein in No. 1 level east of fault 105-106 is very narrow and poor in value. Before much consideration could be given to possible downward continuation of this vein area, surface exploration and further exploration at No. 1 level would have to be done. To get the possible downward continuation of this ore at No. 6 would mean driving along Fault "A-B" at No. 6 level from 500 to 550 feet from point "Z" on projection on Plan. The ore-body would be triangular in shape, Fault A-B one side, Surface exposure another and the undetermined east end of the ore zone the other. Uncertainties of the ore occurrence as suggested, the possible narrowing of the zone at No. 6 making it of lesser size in depth, etc. would deter this work. Should future exploration prove up good showings and success attend the work in depth in No. 1 and No. 2 ore bodies it may be worth considering attacking No. 4 and its east extensions at depth. For the immediate future No. 4 ore body holds no encouragement comparable to the exploration and development of No. 1 and No. 2 ore bodies which at present are by far the more important.

ORE DEVELOPED. Strictly speaking there is no assured ore in the mine that would be measurable in any quantity. As stated all ore from surface to No. 6 level in No. 1 ore shoot is properly classed as "probable" or partially developed ore wherein there is reasonable expectancy that ore will be found equal to the amount calculated, and with possibilities good that development from No. 6 level will increase the tonnage materially over the amount calculated. It is reasonable to expect that the ore will continue below No. 6 level and it is reasonable to expect that the No. 2 ore shoot should extend down to and below No. 6 level based upon the showings in No. 1 ore shoot. For conservative reasons it would not be possible to allow full extent of these presumed ore extensions where they are exposed by only one face and whilst the possibilities are good they are not properly measurable. However, I consider the following estimates to be within reason and further believe it possible that actual development of the ore zones may show up material improvement over the estimates.

The reputed production of around 1200 tons with a gross value of about $100,000 would indicate a worth of about $83 per ton. Not having the records in full I shall have to try to arrive at the possible metal content of the ore by application of the (a) partial records at

hand and (b) the sampling returns supplied me by Wm. Buchanan. In view of the fact that the production from ore shoot No. 1 at No. 6 level checks closely with the independent sampling in the same ore shoot at No. 5 indicates that the sampling was fairly accurate estimate of the actual tenor of the ore in place.

Ore Shoot No. 1.

Probable Ore:

Ore above No. 5 level, triangular body 125 ft. maximum height by 130 ft. long with average width of shipping ore 10-in. (0.8 ft) - 6400 cu. ft. which on basis of 14 cu. ft. per ton (quartz in place) equals 460 tons which on basis of 2/3 factor equals approximately 300 tons.

The average value of the 12 samples taken in No. 5 level, No. 1 ore shoot, according to Wm. Buchanan, was 86 oz. silver and 0.3 oz. gold per ton.

300 tons at 86 oz. silver would yield about 26,000 oz.
" 0.3 oz. gold " " " 90 oz.

Ore between No. 5 and No. 6 levels: opened 130 ft. full length of ore shoot from portal No. 5 to Fault C (sta. 501 to 504) and 60 ft. partial length of downward continuation this zone on No. 6 level 155 ft. on dip of the vein between the two levels.

130 ft. long x 155 ft. deep x 0.8 ft. width equals 16,240 cu. ft. which at 14 cu. ft. per ton equals 1,160 tons which on basis of 2/3 factor equals 740 tons.

	Silver	Gold
The value of the samples taken at No. 5 level	86.0	0.3
" " per ton basis No. 6 output	99.5	0.4

Average:

740 tons with an estimated 92.7 oz. silver per ton would yield about 69,800 oz. silver.
740 tons with an estimated 0.35 oz. gold per ton would yield about 259 oz. gold.

Total probable ore No. 1 ore shoot.

Above No. 5 level	300 tons	26,000 oz. silver	90 oz. gold
No. 5 to No. 6 level	740	69,800	259
	1040	95,800	349

or about $62,270.00 worth of silver on basis of average of $ 0.65 per ounce and
$6,980 worth of gold on basis of $20 per ounce,
a total gross value on above basis of $69,250.00

Possible ore in No. 1 ore shoot.

Below No. 6 level for 50 ft. by 60 ft. exposed in drift by 0.8 ft. equals 170 tons which on ½ factor - 85 tons.
Value of ore produced No. 6 level, Silver 92.7 oz
and sample No. 5 level, Gold 0.35 oz.
85 tons with estimated 92.7 oz. silver equals: 7,805 oz.
" 0.35 oz. gold equals: 30 oz.

which would yield approximately $5,070.00 in silver
and " 600.00 in gold
a total of about $5,670.00 on above price basis.

Total probable and possible ore No. 1 ore shoot.

	Probable ore.		Possible Ore.			Total.		
Estimated:								
Tons	oz. silver	oz.gold	Tons	oz.silver	oz.gold	Tons	oz. silver	oz. gold
1040	95,800	349	85	7,895	30	1125	104,000	379

1125 tons with estimated 104,000 oz. silver would yield approximately $67,000 on basis of $0.65 per oz.
1125 tons with estimated 379 oz. gold would yield approximately $7,580.00.
1125 tons would thus yield about $75,000.00.
which is the estimated gross value of the ore as calculated in Ore shoot No. 1, the average gross value per ton being thus about $67.60 per ton without sorting, subject to upward or downward fluctuation according to silver market.

Ore Shoot No. 2.

Ore below bottom of 502 stope for 70 ft. by the 60-ft. average length of stope worked by 0.8 ft. average width equals 3360 cu. ft. which at 14. cu. ft. per ton - 240 tons which on basis of ½ factor would equal about 120 tons.

The yield of part of the stope under exploitation by Long and Buchanan was 75.83 tons, returning 70.36 oz. gold and 16,982.36 oz. of silver over 10 inches average width or about 0.9 oz. gold per ton and 224 oz. silver per ton.

120 tons with estimated 224 oz. silver per ton would yield approximately 27,000 oz. silver.
120 tons with estimated 0.9 oz. gold per ton would yield approximately 108 oz. gold.

or about $17,500 worth of silver on basis of average of $0.65 per ounce and
$2,160 worth of gold on basis of $20 per ounce
a total gross value of about $19,600 on above basis.
This is the estimate of No.2 ore shoot on basis outlined though it is possible that full development from No. 6 may materially increase this figure both as to tonnage and as to metal content. I have no hesitation in advising extensions into this shoot with this view and feel that there is reasonable assurance of success.

Total ore developed according to calculations.

		Tons.	oz. silver.	oz. gold.
No. 1 ore shoot	Probable ore	1040	95,800	349
	Possible ore	85	7,805	30
No. 2 ore shoot	Possible ore	120	27,000	108
	Total:	1245	130,605	487

1245 tons containing an estimated 130,605 oz. silver would yield about $84,890.00 on basis of 0.65 per oz.
1245 tons containing an estimated 487 oz. gold would yield about $9,740 on basis of $20 per oz. or a total of about $94,600 gross, which is the gross value of the ore in the mine as above calculated with possibility that the development work in No. 6 will add materially to the amount estimated.

COSTS. Obviously the gross value of the ore in place is not the value to the operator. Costs of mining, development, hauling to railway, freight and treatment must be deducted to arrive at this figure. Under present conditions the transportation to cars is $9 per ton summer or winter, the freight and treatment on ore around $75 per ton (which is approximate average of the ore as figured above) would be about $10.40, thus the gross value per ton would be depreciated by these costs to about $55 per ton from which would come mining, development, and general charges to get the net value of the ore. Mining costs are dependent upon (1) mining facilities, power, timber, supply costs, etc. (2) extent of development. It is obvious that mining small restricted areas as is the usual method by individual leasers would wholly eat up profits for a company and that a greater percentage of profit may be got where the ore is sufficiently developed ahead to permit working at best advantage and thus facilitate mining, that overhead stoping (in this type of ore particularly) is more economical and

permits better saving than underhand stoping, (3) personal factor of management, the percentage of overhead to productive expenditure, etc. This mine will not stand very much overhead but it would be fatal to try to operate without some technical as well as business supervision, unless operations are conducted on leasing basis. Economy and forethought in expenditures are necessary or there could easily be a definit instead of profit. ((4) time factor which here means that the best profits may be got by removing the ore as quickly as reasonable operations will permit. It is obvious that there would be no profit to the owners if shipments of 20 tons or so were only made every now and then, the total averaging less than 100 tons per year as had evidently been the history of the property in the past leasing operations.

COSTS BY HAND. I am informed that Geo. Long had a contract to drive tunnel at $20 per foot and lost money. It is quite probable that labor cost by hand work would amount to about $20 per foot on small contract work in addition to which would be cost of (1) powder, etc. (2) boarding-house loss (3) overhead, which item would be proportionately larger as the productive work was restricted. Probably it would cost around $25 to $30 per foot to drive in the granite, porphyry, or vein, by hand. I am informed that the average advance by 1 man (with the second-hand inefficient machine drill that was on the property) per month was around 60 feet, the fuel and oil cost for the engine and compressor being about $150 per month on basis of 30 shifts per month, sharpening and labor care of compressor would probably be another $250 per month, mucking, etc. another $150 per month, a total for labor, supplies for compressor and engine, totalling about $715 per month or about $12 per foot to which would be added about $5 for powder, fuse and caps per foot, making the direct cost around $17 per foot. To this would be added supervision, technical direction costs, at say $300 per month or about $5 per foot, making the total about $22 per foot by machine drill according to the record of that inefficient machine. Obviously if compressor capacity was such as to permit two efficient drills operating at one time (the cost of fuel, labor, etc . being little more than for the one drill compressor) costs could be materially lessened and might approach about $15 per foot driving and a similar cost for stoping ore, provided sufficient development was done to work by overhead stoping at best advantage. By hand the cost of stoping is almost impossible to estimate in advance, so many factors enter into effect, principally that hand-mining requires a much higher degree of skill to break ground than does machine-mining. It is probable that none of the ore that was hand-stoped in the mine either by leasers or by the company cost less than $25 or $30 per ton as presented in the ore shipped. The new type drills of today should drill a 5-foot round per shift in the rock at this mine which would permit from 100 ft. to 125 ft. per month advance in drifting, or break from 80 to 90 tons per month in a stope averaging the size vein on which calculations herein are based. If 60 shifts per month were got from the drill the above could be doubled provided that the broken material was moved to make way. Cost of mining ore, inclusive of development in ore should be about $15 per ton under these conditions.

On basis of mining cost of say $20 per ton and transportation and marketing costs of $20 more per ton or total of $40 per ton, the net return from the ore as calculated 1245 tons of a value of about $94,600, would be around $45,000. On basis of mining cost of $15 per ton and transportation and marketing costs of $20 per ton, or a total of $35 per ton, the net return from the ore as calculated: 1245 tons of a gross value about $94,600, would be about $52,000. This latter is considered possible by installation of small efficient plant and use of up-to-date drilling machines. On basis of hand work in view of the slower time in getting out the ore, the added expense in breaking, etc. the costs being probably from $25 to $30 per ton of picked ore, the transportation and marketing being around $20 per ton as above the net value of the calculated 1245 tons at an estimated $94,600 would be about $37,100 which is from $8,000 to $15,000 less than the possible net value with better mining facilities.

PLANT. The plant, pipe, drilling machine, etc. which was installed in 1922 was taken out by West Kootenay Const. Co. (who sold it to the Meteor mine) in June, 1924. Therefore there is only the blacksmith shop and compressor building left at the mine.

A small but efficient compressor plant with oil engine, new type drill with hoses, steel and all accessories capable of drilling a 5 ft. round per shift in the formation at Meteor mine, at the 6600-ft. altitude would cost f.o.b. Nelson about $2,400 according to figures I have at hand. This plant should not cost more than $500 more to move up and install at the mine in view of the fact that the buildings are already there, suitable foundation already in, etc. Piping and coaling tanks are not included in the above but should be put in for about $300 more, making the cost of plant about $3,200 ready for efficient operation with probabilities that the net return from the calculated ore would be from $8,000 to $15,000 more than could be got under present facilities. The ore would be got out in less than half the time which is an important consideration. The possibilities are that full development of the mine at No. 6 level and by proper raises in the ore shoots the tonnage and values will be considerably increased therefore the net earnings by installation of the facilities will be proportionately increased. If such improvement is not considered it would be advisable to lease the mine out to tributors on royalty bais. The main objection to this plan is that the production will probably be so small that the net return from royalty will not pay reasonable interest on the money involved in the property at present.

A compressor and engine which would permit about twice the above operations would cost about $4,500 installed according to preliminary figures I have at hand (being subject to confirmation and possible change) inclusive of machines, etc. The cost per ton would be lessened proportionately as the pro rata in overhead, plant operation, etc. but the chief benefit would be the increase in advance and output of tonnage.

FUTURE DEVELOPMENT. Consideration of the future includes only such work in No. 6 level as will open up the two ore shoots most effectively. Consideration of further exploration and development is for some future investigation and report.

No. 1 Ore Shoot: will require about 100 feet further drive in ore to its probable intersection by Fault C at No. 6 level. Driving to the west would be advisable to determine the possibilities in that direction, as indicated on the Plan and on Section A, west of sta. 606. This work should succeed the other work in No. 1 shoot and should be performed with discrimination, i.e., if vein width and values are unsatisfactory in a reasonable distance it should be stopped. In that event a test crosscut into the vein extension might be put in from sta. 603 and if good values be got there, drift each way their full extent. Raises should be extended upwards 50 feet or so in such ore as may be got and in such manner as to permit most effective stoping along the lenticular shoots. The development work, if in accord with the little already done should provide enough ore to make at least part payment for the work. Subsequent stoping would pay a larger margin and should permit profits as suggested herein.

No. 2 Ore Shoot: If mining facilities permit the drift along Fault C from W to Y on No. 6 level should be run simultaneously with the further development of No. 1 ore shoot, after the drift therein has cut the fault at W. The cost of this work by use of the suggested plant should not amount to more than $4500 to $5000 and may be less. It would be "dead work" in that it would be through barren country along the fault and would produce nothing in the actual advance. The end to be attained would be to encounter and put available for development (and later for mining) the downward continuation of the No. 2 "Rich Ore Shoot" which is, it is found, as I feel it may be reasonably expected, should place available high-grade ore which would produce considerably greater returns than the estimated amount in this report. Following the possible encounter of this ore shoot it should be drifted on its full limit which is indicated on the Plan to about 200 feet and also the necessary raises put in for effectively stoping the ore. This work in the vein should produce sufficient ore to make material return on the expenditure for encountering and developing it and the subsequent stoping should permit profit as suggested herein.

RECOMMENDATIONS: This property in no sense of the word is a big mine. It is a rich little property with fairly good promise for profit on comparatively small capital outlay. The showings at present indicate the possible production of around $95,000 by performance of less than $5,000 feet of non-productive development and installation of plant and equipment of about the same amount. The future of the mine and its ultimate value lies more in its possibilities in the extension downward and laterally of the two ore-bodies so far developed in the lower levels. This is not a measurable or

calculative quantity but is indicated to such an extent that it is reasonable to anticipate that full development of the two ore-bodies at No. 6 level should provide tonnage and values in excess of the amount included in the above $95,000 gross. The net return that may be got from the gross content of the Ore shoots will be determined largely upon the capital expenditure it is decided to put in, the extent of operation plan, whether one shoot or the two are worked contemporaneously, etc. In one sense the property is an ideal leasing proposition and a small syndicate with careful management and low overhead expense could probably make a nice profit. The property will not stand heavy overhead expense in company operation. On the other hand, a considerable amount of money has been lost for lack of sufficient business and technical direction as is evident from the Plan on Map No.2 herewith, and from the other points touched on in this report. It is also obvious that if a certain amount of capital is expended in improving plant and in exploration and development ahead of mining in order to have a sufficient reserve to permit advantageous mining, better results and larger profits will result. The property is not large enough to warrant building an ore reserve proportionately to that demanded for proper operation in larger more regular lower grade properties but the ore should be developed sufficiently to permit advantageous attack. I recommend installation of small efficient plant in order to permit use of machine drills.

If it is decided to try to clear up No. 1 ore shoot and exploit that before driving to the possible downward continuation of No. 2 ore shoot, the profits therefrom, on basis of calculated probable ore content and in presumption of installation the smaller plant would be about as follows:

Value of 1125 tons	$75,000	
Costs at $35 per ton	39,000	
Net value:	$36,000	
Capital exp.	8,000	
Profits about:		$28,000

Capital expenditure allows for about $5,000 capital fund to meet expenses at the start and it is possible that the ore taken out in the development work might return a good part, if not all the sum, thus swelling the profits over and above the $28,000.

This ore should be completely exploited in say a year or 18 months after mining operations start. There is probability that complete development of the area will result in disclosing considerably more ore than tonnage used as basis of this calculation.

By hand, the costs would be about $45 per ton inclusive of mining, transportation, marketing, development, etc. the profits as follows:

Value of 1125 tons	$75,000	
Costs at $45 per ton	50,625	
Net, value:	$24,375	
Capital exp.	3,000	
Profits about:		$21,000

Possible that work in ore might repay the capital expenditure needed in getting started and thus swell the profits over and above the $21,000. However, the above production would probably take from 2½ to 3 years.

In view of the strong possibility that development in No. 1 ore shoot may expose considerably more ore than the above and that in any event the expenditure of the money for plant makes a quicker and better profit over the minimum tonnage and value calculation I recommend the installation of the plant at the start even on minimum operation basis as above.

If it is decided to advance sufficient money to take best advantage of the possibilities in No. 6 level the profits therefrom on basis of calculated probable and possible ore content and in presumption of installation of larger plant would be about as follows:

Value of the 1245 tons of ore:	$94,600	
Costs at $35 per ton	42,600	
Net value:	$52,000	
Capital exp. about	14,000	
Profits about:		$38,000

Of the above about $4,500 would be expended in the drift along Fault C in barren material. Part of the remainder would be returned from ore encountered in work in the ore shoot in event of success of the additional exploration. The possibilities are such that should this work prove successful in opening up No. 2 ore shoot at No. 6 level in like tenor and vein width that above the estimate of ore possibilities would at least double the calculation in this report and indication of increased ore shoot length at the No. 6 level whould when developed further augment the above. The possibilities for success here are such that I advise exploration into this ore shoot and recommend that a preliminary capital of about $15,000 be envisaged to accomplish this in conjunction with the development and exploitation of No. 1 Ore Shoot.