

C O N T E N T S

HOPKINS--Report of P. E. Hopkins, made August 1929.

P. E. Hopkins is a well known consulting engineer and geologist of Toronto. Formerly with the Ontario Government.

MAPS-----Enclosed in envelope at back of reports.

- (1) Sketches by Chas. C. Starr.
- (2) Claim Map showing surveyed and Un-surveyed claims.
- (3) Assay plan by O'Grady and Watson.

O'GRADY--Report of B. T. O'Grady from Minister of Mines Report for 1922.

B. T. O'Grady is the B. C. Government, Resident Engineer, stationed at Nelson, B. C.

STARR----Report of Chas. C. Starr, made July 1928.

Chas. C. Starr is a well known consulting engineer and geologist of Nelson and Vancouver, B. C.

SUMMARY OF FINDINGS--Compiled from all reports.

STARR--Report of Chas. C. Starr, made August 1926.

E. W. Watson is a consulting engineer and oil geologist of Calgary, Alta., and Vancouver, B. C.

PROPERTY FILE

S U M M A R Y

LOCATION:

Twenty seven miles up Big Bend highway from Revelstoke, B.C. Then up Carnes Creek by good pack trail for nine miles (consult map). Estimated cost of nine mile road, under \$15,000; mostly grading. Free from snow slides, &c.

PROPERTY:

Twenty six claims all held by location. 12 partially surveyed. All full claims of 51 acres each (consult plan of claims).

OWNERSHIP:

T.E. Arnold, 1013 Stock Exchange Building, or 1045 West 11th Avenue, Vancouver, B.C., owns 14 claims and has the balance of 12 under option. (Trinity 3497 or Bay 1233X).

TIMBER:

Good cedar and hemlock cover the property.

WATER-POWER:

Several hundred horse-power available from creek. Flow of creek exceedingly variable. Good regular flow near mouth.

TOPOGRAPHY:

Very mountainous

CLIMATE:

Heavy snow in winter, but not very cold. Roads can be kept open easily.

CAMP SITES AND MILL SITES:

Good camp and mill sites free from snow slides, etc. are obtainable.

EQUIPMENT, BUILDINGS &C.

Hand tools only. Small cabin.

TONNAGE ESTIMATES

HOPKINS - 300,000 to 325,000 tons.

He states vein is traceable for 4,500 feet horizontally, 2,000 feet vertically, with width of 1.75 feet. (This gives tonnage of 750,000 tons), but his estimate is based on length of 3,000 feet, depth of 600 feet and width of 1.75 feet. He gives his average width in summary of sampling as between 32 and 35 inches.

STARR - 400,000 Tons above the J & L Tunnel alone.

He states vein is traceable for a length of 4,000 ft. depth of 2,000 ft. with an average width of about 4 ft. (This gives a tonnage of 1,600,000 tons.)

NOTE: The vein is traceable for a much greater distance than given in either of these estimates.

METALLURGY:

A good clean lead flotation concentrate can be obtained which carries considerable gold and nearly all the silver.

A bulk concentrate of the zinc-blende pyrite arsenopyrite can be roasted and the gold extracted by cyanidization.

Very little gold is associated with the zinoblende.

No effort is made to save the zinc for the present at least, due to the low price prevailing.

OTHER POSSIBILITIES:

At least one other parallel vein is known to exist. No work has been done on it.

The shipment of J. & L. ore has been
sampled and assayed with the following results:

Gold	0.525 oz/ton
Silver	10.26 " "
Copper	0.55%
Zinc	7.90%
Lead	12.05%
Arsenic	9.20%

SIGNED -

A.K. Anderson,

Ore Dressing Laboratories,
Mines Br. Dept. of Mines.

B. T. O Grady
B.C. Government Resident Engineer. Nelson.
Minister of Mines Report for 1922

REPORT ON J. & L. GROUP OF MINERAL CLAIMS

This group consists of 5 claims. The cabin is 9 miles from the River with a difference in elevation of 1050 ft. or 2650 ft. above sea level. The formation, consisting of schist and limestone, shows uniformity. The strike is N. 65° to 50° to the N.E. The vein, conforming to the stratification of the enclosing rocks, follows a contact between schist and limestone, cutting diagonally up and around a shoulder of the mountain in a S.E. direction from the creek. The hanging wall of the vein is schist and the foot-wall is limestone. The vein, from 4 to 10 ft. in width, is apparently of the bedded fissure type, being well defined with in places distinct gouges on the walls.

The ore is a complex mixture of iron, zinc and lead sulphides carrying gold and silver values. The solid sulphide ore occurs in the vein in bands from a few inches up to 3 ft. in width, but in places the vein is entirely decomposed. The gold values are apparently associated with the iron sulphides which predominate in the ore. The silver is associated probably with the galena. In two places assays of samples gave from 0.5 to 0.8% copper in addition to gold, silver and zinc. Numerous other samples however did not contain any copper.

The vein was encountered at the creek, but little work was done at this point. The highest workings are 1800 ft. above the creek. Commencing at the highest point near where the vein crosses the summit of the ridge and gradually descending towards the creek and going round the mountain towards the north, the development and ore showings examined are as follows:

Near the summit of the ridge, 1800 ft. above the creek, the vein is 5 ft. wide where exposed in an open-cut. Some 800 ft. NWY. along the outcrop and 1700 ft. above the creek an open-cut shows 6 ft. of ledge matter with, towards the hanging wall side, a band of solid ore 8 to 10 inches, a sample across 8 inches gave, Gold 0.8 ozs., Silver 0.8 ozs., Copper nil, Lead nil, Zinc 4%. The earthy, decomposed ledge matter on each side of the solid ore gave but negligible results upon assay.

At 1550 feet above the creek and 575 feet farther along the vein N.W. an open-cut shows 8 ft. of solid ore and disseminated mineral in decomposed ledge matter. The solid ore is

in two bands, each 18 inches wide on the hanging-wall and foot-wall respectively. A sample across 8 ft. gave: Gold 0.24 ozs., Silver 4.5 ozs., Copper nil, Lead 2%, Zinc 2%.

At 1500 ft. above the creek and 175 feet farther to the N.W. an open-cut shows the vein to be nearly 9 ft. wide with bands of solid ore on the foot-wall and hanging-wall. Samples assayed as follows: Across $2\frac{1}{2}$ ft. on the hanging wall side: Gold 0.3 ozs., Silver 2 ozs., Copper nil, Lead nil, Zinc 5%. Across 1 foot on the foot-wall side - Gold 0.26 ozs., Silver 1.2 ozs., Copper nil, Lead trace, Zinc 3%. Upon assay, the intervening $5\frac{1}{2}$ ft. proved to contain no values. The ore, however, would break freely from waste.

At 1220 ft. above the creek and 1000 ft. farther to N.W. is a tunnel 90 ft. long which cross-cuts the vein at a depth of 60 ft. below the outcrop. From the end of this cross-cut a winze has been sunk 125 ft. on the vein which at this point is from 5 to 6 ft. wide, much crushed and decomposed. Throughout the lower 80 ft. of the winze there is a band of solid ore 6 to 20 inches wide, close to the hanging wall. A sample across 6 ft. at the bottom of the winze gave: Gold 0.32 ozs., Silver 3 ozs., Copper nil, Lead 3%, Zinc 2.5%.

At the top of the winze, the vein was drifted on 80 ft. S.E. The vein in this drift is soft and entirely decomposed for a width of from $4\frac{1}{2}$ to 6 ft. A sample across $4\frac{1}{2}$ ft. gave: Gold 0.6 ozs., Silver 6 ozs., Copper nil, Lead 8%, Zinc 2%.

At about 1100 ft. above the creek and 760 ft. horizontally and N. around the hill there is an open-cut which shows 2 ft. of solid ore against the hanging-wall, with some oxidized ledge matter below it; Assay over 2 ft. gave: 0.3 ozs. Silver 0.8 ozs., Copper and Lead nil, Zinc 2%.

At 970 ft. above the creek and 675 ft. farther N. round the hill, an incline shaft has been sunk 135 ft. on the vein, which is 4 ft. wide. Throughout the lower 75 ft. of the shaft, there is a band of solid ore $1\frac{1}{2}$ to 2 ft. wide along the foot-wall, the schistose ledge-matter on the hanging-wall shaft being crushed and stained from oxidation. The upper part of the shaft contains streaks of solid ore in decomposed ledge-matter. Assays from the incline gave: Across $1\frac{1}{2}$ ft. of ore from the bottom of the shaft: Gold 0.42 ozs., Silver 9 ozs., Copper nil, Lead 8%, Zinc 6%. Across 2 ft. at 50 ft. from bottom of shaft: Gold 0.26 ozs., Silver 8 ozs., Copper 0.5%, Lead 4%, Zinc 7%.

At about 610 ft. above the creek and 665 ft. farther N around the hill there is 2½ ft. of solid ore exposed in a short tunnel. An average sample gave: Gold 1.14 ozs., Copper nil, Silver 1.5 ozs., Lead 1%, Zinc 9%.

At 510 ft. above the creek and 160 ft. N along the outcrop there is a tunnel 217 ft. in length. The first 100 ft. of this tunnel having been driven in the limestone footwall, does not expose the vein, but a change of direction just beyond this point brought the vein into the tunnel, showing an average width of about 2 ft. 160 ft. from the portal of the tunnel containing considerable zinc-blende. A sample across 2 ft. gave: Gold 0.3 ozs., Silver 7 ozs., Copper nil, Lead 9%, Zinc 20%. A grab sample from a large pile of ore outside the portal of this tunnel gave: Gold 0.62 ozs., Silver 8 ozs., Copper 0.7%, Lead 8%, Zinc 14%.

In addition to the workings along the section of the outcrop above described, there are a number of other open-cuts which, together with the workings mentioned, trace the vein at short intervals over 5,000 lineal ft. In these open cuts, which have been omitted in the description, the vein shows much the same characteristics as noted above, the mineralization being remarkably persistent, indicating ore bodies of great length. The average width samples was 32 inches, but milling values would probably extend over a good stopping width in many places. The average in gold and silver (silver 65-3/4¢ per oz.) gave \$10.90. Owing to lack of time, an examination of the workings between the lower tunnel and the creek (750 lineal ft.) could not be made, but the writer was informed that the vein was traced throughout by open-cuts and stripping with good ore showings in places.

Transportation would not present a difficult problem as the country traversed between the Columbia River and the property is of the easiest description for wagon-road construction with only short span bridges required in the entire distance, and as the elevation of the cabin is only 1050 ft. above the river, a very easy grade is obtainable.

Adequate waterpower for mining and milling could probably be developed economically at the intersection of the east fork and Carnes Creek, half a mile below the property. There is an abundant supply of mining timber on the claims.

Providing a satisfactory solution for the treatment of the ore can be made, the J. & L. Group would seem to have the makings of a mine with some life in it.

REPORT ON
J. & L. PROPERTY
OF
PIEDMONT MINES, LIMITED
CARNES CREEK, REVELSTOKE MINING DIVISION
BRITISH COLUMBIA

INTRODUCTION:

This property was visited during the period July 2nd 1929 to July 5th 1929 inclusive. My associate engineer, Mr. C.H.E. Stewart, also visited the property during the period July 2nd 1929 to July 12th 1929 inclusive. The surface and underground workings were carefully examined, sampled and mapped geologically.

This report is accompanied by five maps as follows:-

- Map No. 1 Sketch Map showing location of the J. & L. Property.
- Map No. 2 Sketch Map surface outcrops, J. & L. Property
- Map No. 3 Sketch Map J. & L. Tunnel workings.
- Map No. 4 Sketch Map Vertical Section "Annie M" Shaft Workings.
- Map No. 5 Sketch Map "98" Workings.

LOCATION:

The property is located on the south slope of Goat Mountain approximately one-half mile south of the east fork of Carnes Creek. The property is approximately 36 miles from the town of Revelstoke by motor road and trail. (See Map No. 1 for location.)

ACCESSIBILITY:

The property may be reached from Revelstoke by a good motor road, 27 miles in length, which follows the Columbia River to the junction of Carnes Creek therewith.

Thence a trail, 9 miles in length, follows the valley of Carnes Creek to the property. This trail is in good condition and suitable for transportation by pack animals. The grades on same are good with the exception of the portion which leads from the Cabin to the various workings. On this portion the grades are steep.

PROPERTY:

The property consists of nine mining claims and one fractional mining claim, all of which are unpatented. (See Map #1) The camp site is not located on the property.

HOPKINS

TIMBER:

The property and the surrounding district are heavily timbered with Fir, Cedar and Balsam, suitable for mining and domestic purposes.

WATER:

There is a small spring just above the junction of the trails to the lower and J. & L. tunnels. The East branch of Carnes Creek flows in close proximity to the camp site. This creek affords a plentiful supply of water for domestic and mining purposes.

There is no data available on the flow of the Creek. The flow should be considered, however, even in the dry season. Power sites are not good.

TOPOGRAPHY:

The property extends across the point of Goat Mountain between Carnes Creek and the East Branch thereof, and northwest of the East branch. Between the intersection of the Creeks and the base of Goat Mountain there is an area, several acres in extent, of relatively level land. From its base, the mountain rises steeply along both creeks and has an average slope of about 35 degrees.

Approximate elevations, as indicated by aneroid barometer readings, are reported as follows:

The junction of Carnes Creek with the Columbia River,	1700 feet.
The J. & L. Camp site,	2500 feet.
The Lower Tunnel,	2800 feet.
The J. & L. Tunnel,	3000 feet.
The highest vein outcrop (York Claim)	4400 feet.

CLIMATE:

Winters are long and fairly severe, with a reported snow fall of from four to eight feet. There are no snow slides in the immediate vicinity of the camp site or mine workings, but there are two small slides across the trail between the property and the motor road.

HISTORY:

The property was originally located in 1896 and has been worked intermittently since that date.

In 1925, the property was bonded to the Porcupine Goldfields Development and Finance Company, Limited. This company did approximately 100 feet of drifting in the lower and J. & L. tunnels. They also had some metallurgical tests made on the ore which were not successful.

PLANT, BUILDINGS AND EQUIPMENT:

There is no mining plant on the property. The only equipment consists of a few hand mining tools and the only building a small cabin in poor condition.

DEVELOPMENT:

No. 1 or Main Vein: Surface: The No. 1 or main vein has been explored on the surface by thirty test pits and trenches extending across the J. & L., Annie M., "98", and a part of the York Claim (See Map #2).

"98" Workings: Near the northwest end of the "98" claim a 75 foot cross cut tunnel has been driven to the vein. The vein was then drifted on for a distance of 80 feet in a south easterly direction. (50 feet now caved badly) and a 125 foot incline interior shaft was sunk on the vein. (See map No. 5 for detail of these workings).

Annie M. Workings. Near the northwest end of the Annie M. claim, an incline shaft has been sunk on the vein to an incline depth of 130 feet. (See map No. 4 for detail of these workings).

J. & L. Tunnel Workings: Near the centre of the J. and L. claims tunnel 265 feet in length has been driven. 225 feet of which is on the vein. Two short crosscuts with a total length of 28 feet is on the vein. Two short cross cuts with a total length of 28 feet have been driven from this tunnel (See Map No. 3 for detail of these workings.)

Lower Tunnel. Near the north west end of the J. & L. claim and at a horizon approximately 200 feet vertically lower than the J. & L. tunnel, a 75-foot tunnel has been driven. This tunnel was driven at an angle with the strike of the vein and has not advanced sufficiently to intersect the vein. (See Map No. 2).

No. 2 Vein. No. 2 vein outcrops approximately 150 feet to the south west of No. 1 vein and has a strike parallel thereto. This vein has been traced for a lineal distance of 250 feet and has been explored by four test pits. (See Map No. 2.)

General Geology. The area in the immediate vicinity of the vein outcrops is obscured by a heavy covering of overburden, brush and timber and the slopes of the mountain are steep. Hence the geology of the area was not studied in detail except in the underground workings.

The rocks in the immediate vicinity of the vein outcrop are of sedimentary origin, consisting of rusty weathering sedimentary schist, quartzite, argillites, greywacke and limestone, ranging from a crystalline to an impure variety, generally thinly bedded. No igneous rocks were observed during the examination, but a very small outcrop of a porphyritic rock is reported as occurring on the Northwest corner of the York claim.

The strike of the rocks varies from N. 35 degrees W. to 45 degrees W. and the average dip of the vein is 40 degrees northeast.

Extending across the York claim and to approximately the centre of the "98" claim, both the foot and hanging wall of the vein consists of the rusty weathering schist. Thence Northwesterly across the remainder of the "98" claim, Annie M. and to a point just above the lower tunnel the hanging wall of the vein is schist and the footwall limestone. From this point to the East Branch of Carnes Creek, the foot and hanging walls consist of schist. In two or three places the vein was observed to have a quartzite hanging wall which is a local condition.

Hence the vein does not follow the bedding planes or stratification of the rocks perfectly, but in general, does so. There is no evidence of faulting having occurred in the workings examined. Numerous outcrops of basic and acid igneous rocks occur in the surrounding area.

The geological and structural conditions prevailing on the property are favourable for the occurrence of ore deposits.

Origin of Veins. The sulphide lenses have been deposited along the contact between the sedimentary schist and limestone or along bedding planes in these rocks. The deposit consists of a series of lenses and stringers of massive sulphides which have been injected into the sedimentary rocks. These lenses and stringers have sharp, clearly defined walls along the bedding planes of the enclosing rocks. There is no impregnation or metasomatic replacement of the wall rock. The joint planes or cross fractures in the host rocks have not been filled with the ore minerals.

The sulphide lenses and stringers consist of a solid solution of sulphides, carrying values in gold and silver, in a silica (quartz) medium.

All the evidence at hand points to the deposit being the result of differentiation in an igneous magma. Many large masses of acid and basic igneous rocks outcrop in the surrounding area.

Magmatic differentiation has occurred in an underlying magma with the result that the more volatile constituents of the magma, consisting of the sulphides, gold, silver and silica (quartz) were forced out of the main mass of the magma and segregated in the upper portions of the magma. Owing to the pressures exerted on the molten mass of both internal and external character, these more volatile constituents were forced upward as a highly concentrated solution and were injected along the bedding planes in the overlying sedimentary rocks to form the lenses and stringers as they now occur.

NO. 1 or MAIN VEIN:

General Description: The No. 1 vein consists of a solid solution of massive sulphides in a matrix of silica. The chief sulphides are arsenopyrite, pyrite and sphalerite with lesser amounts of galena and traces of chalcopyrite and pyrrhotite. The massive sulphides vary in width from 6 to 30 inches. Narrow and irregular lenses and stringers of massive sulphides occur along the bedding planes of the wall rock on both the foot wall and hanging wall sides of the main sulphide lens. These lenses and stringers are parallel to the main sulphide lens and occur for a width of from 1 to 2½ ft. on either side thereof. They vary from a half inch up to a maximum of 6 inches in width. Isolated narrow sulphide stringers of no importance occur over a zone 20 feet in width.

The vein has an average dip of 40 degrees to the North east, but varies locally between the limits of 35 degrees and 50 degrees.

The strike of the vein is variable. In the J & L Tunnel workings, the vein strikes N. 40 degrees W. In the "98" workings, the vein strikes N. 55 degrees W.

Surface Outcrops The main vein has been explored on the surface over a lineal distance of 5500 feet, by thirty open pits extending across the J & L, Annie M. "98" and a part of the York claim. (See Map No. 2 for details of these workings) Considerable oxidation of the vein occurs along the surface outcrop.

On the southerly one-third of the York claim and on the Dunbar claim, the vein becomes irregular and is broken up into narrow stringers which disappear about the centre of the latter claim (Dunbar).

On the J & L claim, below the J & L tunnel, the vein is narrow and irregular North west of the East Branch of Carnes Creek and extending across the J & L Fraction the Badger, Fischer and Curlew Claims the vein outcrops are few and show the vein to be narrow and irregular.

The average width of the main sulphide lens on the York "98", Annie M. and J & L, Claim south of the J & L Tunnel is 21 inches.

On the northerly two-thirds of the York claim the vein is persistent and fairly uniform as to width and values. For a distance of approximately 450 feet across the southwest part of the "98" claim this condition continues. Two pits in this area show two parallel sulphide lenses, occurring about 2 feet apart and separated by a rib of schist. From this point to the "98" shaft the vein outcrops are badly decomposed but a fair width is indicated by the gossan capping. From the "98" shaft to the Annie M. shaft the vein outcrops are heavily oxidized, but a fair width and persistence is indicated by the gossan occurrences. From the Annie M. shaft to the J & L Tunnel there are very few outcrops. One short tunnel (25' in length) driven into the hillside above and J & L Tunnel workings have exposed a very good section of the vein. This section has an average width of 28 inches and consists of massive sulphides which give good values in gold.

Underground Workings: In the "98" workings the vein is very heavily oxidized and leached. The main sulphide lens has an average width of 21 inches. It follows the schist-limestone contact and short irregular lenses and stringers of massive sulphide occur in the limestone footwall. The limestone is decomposed and has been impregnated with leaching solutions which deposited values in lead, zinc, gold and silver therein over a zone parallel to the sulphide stringers and approximately 3 feet in width. This secondary enrichment has taken place throughout all these workings. (See map No. 5).

In the Annie M. shaft the main sulphide lens follows the schist-limestone contact. It has an average width of 15 inches. Short narrow lenses and stringers of sulphides occur in the schist hanging wall which is altered and silicified to some extent. Oxidation of the deposit is extensive in these workings. (See Map No. 4).

In the J & L Tunnel workings the main sulphide lens has an average width of 18 inches. In these workings the vein occurs in places on the schist-limestone contact and at other places in the limestone. At the tunnel entrance the vein is entirely decomposed. Oxidation has been very slight from the first crosscut in the tunnel to the face thereof. The vein is exposed over a length of 225 feet in these workings. At the face of the tunnel the main sulphide lens has a width of 6 inches. Narrow sulphide stringers and lenses occur in the footwall of the vein (See Map No. 3).

The lower tunnel was commenced at a point south of the vein and driven with the bedding planes of the rock to intersect the vein. This tunnel has not yet reached the vein and there is nothing of economic importance exposed therein.

No. 2 Vein: No. 2 Vein consists of iron pyrites, arsenopyrite and quartz with minor quantities of sphalerite, galena and traces of chalcopyrite in a silica matrix. The vein occurs along the bedding planes in the schist approximately 140 feet south west of No. 1 vein and strikes parallel thereto. It is exposed for lineal distance of 200 feet by four trenches. It has not been traced north of the East branch of Carnes Creek. The vein has an average width of 21 inches over the exposed length of 200 feet and dips at an angle of 53 to 60 degrees to the Northeast. (See map No. 2 for location and date relating thereto).

Sampling: General Remarks. The underground workings and the surface outcrops were sampled where it was considered advisable, sixty-four samples in all being taken. All samples were assayed for gold and silver but owing partly to the oxidized and leached condition of the outcrops and workings only a part of the samples were analyzed for their lead, zinc and copper content.

The samples assayed for lead and zinc were selected as typical of the lead-zinc content of the sulphide lens. All assay results and analyses are shown on tables on the accompanying maps.

Surface: The outcrops which were too badly oxidized were not sampled.

Sixteen samples taken from the outcrops of No. 1 vein on the J & L, Annie M., "98" and York Claims gave an average metal content of \$10.70 gold and 0.92 oz. silver per ton over an average width of 21 inches.

Seven of the above samples which were analyzed for lead zinc gave an average metal content of 2.52% lead and 3.79% zinc over an average width of 26 inches.

"98" Workings. Six channels taken from the "98" shaft averaged \$6.96 per ton in gold and 4.01 oz. per ton in silver over an average width of 55.3 inches. Samples were taken at 20 foot intervals.

Four samples were analyzed for lead and zinc and gave an average metal content of 3.49% lead and 3.02% zinc over an average width of 31 inches.

Annie M. Workings. Seven channels taken across the main sulphide lens in the Annie M. shaft gave an average metal content of \$9.10 gold and 7.02 oz. silver (3.51 @ 50¢ per oz.) per ton over an average width of 15.5 inches. Owing to the decomposed condition of the lens in these workings only one sample was analyzed for lead and zinc and it gave a metal content of 5.02% lead and 4.82% zinc.

In this shaft the values are confined to the main sulphide lens which follows the footwall side of the shaft closely. The rusty decomposed schist along the hanging wall of the lens does not contain values of importance.

J & L Workings. In the J & L tunnel twelve complete channels gave an average metal content of \$5.22 gold and 4.89 oz. silver (over an average width of 34.75 inches in a length of 170 feet).

Six samples taken from the main sulphide lens gave an average metal content of 5.69% lead and 10.00% zinc over an average width of 27.65 inches. There is a section 85 feet in length in these workings where the main sulphide vein is in the hanging wall and roof of the drift. Hence it could not be sampled at regular intervals.

SUMMARY OF SAMPLING:

No. 1 Vein. Twenty-five samples taken from the surface and underground workings gave an average content per ton of \$6.70 in gold and 4.74 oz. in silver over an average width of 35.1 inches.

Forty-one samples taken from the surface and underground workings gave an average content per ton of \$7.37 in gold and 4.10 oz. in silver over an average width of 31.6 inches.

Eleven samples taken from the underground workings gave an average content of 4.63% lead and 5.99% zinc over an average width of 25 inches.

Eighteen samples taken from the surface and underground workings gave an average content of 4.08% lead and 5.42% zinc over an average width of 25 inches.

No. 2 Vein - Four samples taken from the No. 2 vein gave an average content per ton of \$3.62 in gold and 0.77 ozs. in silver. The lead and zinc content of this vein is small.

The copper content of both veins is less than 0.50%.

There is a high arsenic content in both veins. No arsenic determinations were made on the samples taken.

Ore Developed - There is no ore definitely blocked out on the property. The main vein has been traced for 4500 feet along the line of strike with evidence of fairly consistent values over most of that length, where trenched.

There is a reasonable possibility indicated that eventually 300,000 to 325,000 tons of ore might be developed above the level of the J & L tunnel. This figure is arrived at by assuming a length of 3000 feet, a width of 1.75 feet, an average depth of 600 feet and allowing 10 cu. ft. of vein material per ton.

Metallurgy of the Ore - The ore is very complex. There are two possible methods by which the ore might be successfully treated, namely selective flotation and leaching. It will require extensive experimentation with both methods to determine which of the two is the more adaptable. The selection of the most economical process will depend on the results of these experiments and a careful comparison of plant costs, treatment costs, tonnage available and marketing conditions.

According to Mr. Fran Echelberger, a process based on leaching the ore to recover the lead, zinc and silver and later roasting and cyaniding the residue to recover the gold, gave good extractions of the various metals. The lead, silver and zinc are recovered as chlorides, the gold as bullion and the arsenic as arsenic trioxide. The process is said to recover 95% of the gold and lead and 90% of the silver and zinc.

The cost of installing such a plant, designed for a daily capacity of 350 tons, would be approximately \$600,000.00, exclusive of a hydro-electric plant. Such a plant would require a supply of electrical energy, as a part of the process is based on electrochemical reactions. The same source of energy would supply the power as well for mining operations and the mechanical processes involved in the milling operations.

The estimated treatment cost is \$10.00 per ton in a plant of the above capacity operating under the process.

Mining Problems - The vein dips flatly at an angle closely approaching the angle of repose for broken rock.

Mining operations will necessitate a means of supporting the hanging wall, either by leaving pillars at systematic intervals, by driving raises in the hanging wall at intervals to supply waste rock for backfilling operations or by a combination of the two methods.

The vein is narrow and mining operations will require the breaking of some waste rock along with the vein material.

Concentration of Mine Product. The "run of Mine" material will contain approximately 50% waste rock. This would require to be crushed to pass 60 mesh and then treated by gravity concentration. The concentrate would then be ground fine and treated in the leaching plant. This method would eliminate the valueless part of the "run of mine" product and would effect a saving in the leaching plant by reducing the tonnage treated therein.

Power Supply There is at present no source of hydroelectric energy available and the development of the property would require the installation of such a plant.

There are several power sites available. One should preferably be selected on the Columbia River and a transmission line built to the property therefrom. The selection of a power site on Carnes Creek in the immediate vicinity of the property is not advisable.

Arsenic Content of the Main Vein. From the data available, a conservative estimate of the arsenic content of the main vein is 7.5%. The arsenic would be recovered as arsenic trioxide under the leaching process.

Arsenic trioxide - 0.75% metallic arsenic.

The present market price of arsenic trioxide is 4 cents per lb. Assuming this value, the value per pound of metallic arsenic is 5.28 cents per lb.

Assuming a value for metallic arsenic of 5 cents per lb. and an average arsenic content of 7.5%, the gross value of the arsenic content on the main vein is \$7.50 per ton.

Summary and Conclusion. The main vein has been traced for a lineal distance of 4,500 feet by a series of open pits. The indications are that the main vein has an average width of 1.75 feet over a length of 3000 feet. The deposit is deep seated in origin and it is reasonable to expect it to continue to much greater depth than the lowest horizon at present developed. The possibility of increasing the known length of the deposit is not good.

From the data available the average metal content per ton of the main vein is approximately \$7.00 in gold, 4.00 ozs. in silver, 4.0% lead, 5.0% zinc and 7.5% arsenic. Assuming a value for silver of \$0.50 per oz. and a value of 5 cents per lb. for lead, zinc and arsenic, the average gross value of the ore is \$25.50 per ton. These values would not be completely recoverable.

The future of the property depends on the development of an efficient and economical treatment process whereby a high percentage of the gold, silver, lead, zinc and arsenic content of the ore would be recoverable. The gold and silver content is not high enough and the ore is too complex in nature to permit the treatment of the ore for these metals alone.

The possibility of successfully treating the ore by leaching, roasting and cyaniding would appear to be the most feasible process as all the valuable metals are stated to be recoverable under this method of treatment. The flotation process would require that the lead and zinc be separated and marketed as concentrates. Under this process of treatment the arsenic content would not be recoverable and the shipping and smelting charges on the concentrates would be prohibitive.

The leaching process would require the erection of a hydro electric plant at a suitable power site, a transmission line to the property and a leaching, roasting and cyaniding plant at the property.

Exhaustive investigation of the problem of treating ore will be required before a decision regarding the type of plant is arrived at. If a process can be developed which will economically and efficiently recover the gold, silver, lead, zinc and arsenic content of the ore, the property will require a systematic programme of development, in order to definitely determine the tonnage available. Until the treatment problem is successfully solved, further development is not advisable. If the treatment problem is successfully solved, the property warrants development.

The development of the property would require that a good motor road, 9 miles in length, be constructed from the Columbia River to the property.

The estimated costs of equipping the property for production, including the power plant, transmission line, road, treatment plant and preparation of the ore deposit for production is between \$1,000,000.00 and \$1,250,000.00.

Recommendations (1) It is recommended that the problem

of treating the ore be exhaustively investigated. A shipment of approximately 1000 lbs. of the ore should be selected from the mine workings care being taken to secure a representative sample. This sample should be taken from the J & L tunnel workings and where the ore is least oxidized and leached and the sample collected under the supervision of a capable mining engineer. This shipment should be sent to a metallurgical testing laboratory for investigation.

(2) Until the treatment problem is successfully solved, further development of the property is not recommended. If the treatment of the ore is successfully accomplished, the next step should be the development of the ore deposit by tunnels and raises in order that the tonnage and average metal content may be definitely determined.

(3) It is recommended that four additional claims be located, adjoining the J & L, Annie M "98" and York claims on the north, in order to secure the downward extension of the main vein, which will dip off the property to the north-east at a horizon approximately 1100 feet below the level of the J & L tunnel or at an elevation of approximately 1900 feet above sea level.

(4) It is recommended that one claim be located adjoining the J & L Fraction, and the J & L claim on the south provide a location for a permanent camp site.

(5) It is recommended that the claims be surveyed, and that title to same be secured at as early a date as possible.

Respectfully submitted,

"P. E. HOPKINS"

Geologist.

ACKNOWLEDGMENTS:

To Mr. J.W. McBean, who supplied much useful information regarding the property during the examination

To Mr. Fran Echelberger, who supplied certain valuable data regarding the leaching process which is said to be capable of effecting a good recovery on the ore.

REFERENCES:

Annual Report of the Minister of Mines 1923, Province of British Columbia.

Geological Survey, Canada 1929, Big Bend Area, Columbia River, British Columbia by H.C. Gunning.

APPENDIX "A"

Assay Results as reported by the Department of Mines, Ottawa, on a shipment of samples from the J & L property by J.W. McBean.

<u>No.</u>	<u>Gold</u> <u>oz.</u>	<u>Silver</u> <u>oz.</u>	<u>Copper</u> <u>%</u>	<u>Arsenic</u> <u>%</u>	<u>Lead</u> <u>%</u>	<u>Zinc</u> <u>%</u>
1	0.74	1.44	0.12	17.81	1.48	4.37
2	0.36	1.22	0.03	14.85	1.13	2.50
3	0.88	0.38	0.02	21.81	0.44	2.09
4	0.30	8.22	0.36	5.66	11.68	16.57
5	0.72	0.62	0.16	14.47	0.59	0.87
6	0.52	6.42	0.73	10.40	7.10	8.08
Composite	0.56	2.50	0.17	15.64	3.25	4.72

Ottawa, November 22nd, 1924.

REPORT OF EXAMINATION

of the

J. & L. MINE

Revelstoke, B.C.

by

CHARLES C. STARR

Dated July 5th, 1928

Mining Engineer and Geologist

Hume Hotel, Nelson, B.C.

STARR

INTRODUCTION:

The writer spent three days on the property in 1925, with Mr. McBean, the owner, and revisited it July 4th and 5th, 1928.

LOCATION AND ACCESSIBILITY:

The property, which consists of ten claims is located on the South slope of Goat Mountain, about half a mile from Carnes Creek, and south of the East branch of the creek, in the Revelstoke Mining Division. It is best reached from Revelstoke by automobile road to Carnes Creek, a distance of twenty-seven miles along the Columbia River, thence by trail nine miles along Carnes Creek. The grades are generally good and the trail is in passible condition except for about a mile which is difficult for pack animals.

The country traversed by the trail is one over which a road could be built at an average cost of \$4.00 per mile.

TIMBER:

The property and the surrounding district are heavily timbered with a heavy stand of fir, balsam and cedar.

WATER:

There is a small spring at about the elevation of the lower tunnel, and some three hundred yards south west, which is sufficient for domestic use.

There are no data on the flow of the Creek, but it is probable there is considerable water even at dry seasons.

On the East Fork of the creek above the camp there is a fall of 350 feet in one and a half miles; on the main creek the fall is approximately 100 feet to one and three quarter miles, but there is probably twice as much water as in the East fork.

The installation of water power equipment, while entirely feasible, will be rather expensive.

TOPOGRAPHY:

The property extends across the point of the mountain between Carnes Creek and its East fork. Between the intersection of the creek and the foot of the mountain there are a number of

acres of practically level land; from there the mountain rises steeply along both creeks, and has an average slope of about 40 degrees, with numerous small cliffs.

Elevations as taken by aneroid barometer are as follows: The junction of Carnes Creek and Columbia River 1700 feet, the J & L Camp 2500 feet; the lower tunnel 2800 feet, the upper tunnel 3000 feet; and the highest vein outcrop 4400 feet.

CLIMATE:

Winters are reported to be long, though not extremely cold, and there is said to be a small fall of four to eight feet. There are no snowslides in the immediate vicinity of the mine or camp, but small ones across the trail, between the Columbia River and the mines.

CLAIMS:

There are ten claims in the group (See map). They are held by location and have not been surveyed. One or more additional claims should be located to cover the present camp site.

HISTORY:

The claims were located at various times since 1896, and assessment work appears to have been performed regularly. Mr. McBean purchased part of the claims and located others himself.

In 1925 the property was bonded to the Porcupine Goldfields Development and Finance Company. They drove about 100 feet of tunnel and had some unsuccessful metallurgical tests made on the ore.

EQUIPMENT:

There is a little equipment, a few hand mining tools, and a very poor cabin being all.

DEVELOPMENT:

There are 25 or 30 small open cuts and trenches on the vein, extending across the J & L, Annie M, "98" and the York claims. Near the northwest end of the "98" claim an 80 foot cross-cut tunnel has been driven, from there is an 80 foot drift (30 feet now caved) and 120 foot inclined winze. Near the Northwest end of the Annie M. Claim there is an incline shaft 130 feet deep on the vein. Near the centre of the J & L claim a tunnel 268 feet long has been driven, from which there are 30 feet of cross-cuts; 185 feet of the tunnel is on the vein. Near

the Northwest end of the J & L claim a 75-foot tunnel has been driven, 200 feet vertically lower, but does not show the vein although it is undoubtedly very close to it.

GEOLOGY:

On account of the steep slopes of the mountain and a heavy covering of soil and brush, the surface geology was not studied in detail.

The country rock consists of schisted argillites, impure limestone generally thin bedded, and some massive quartzite. No igneous rocks are known in the vicinity of the mine, except near the Northwest end of the York claim, where a very small outcrop shows a porphyritic rock.

The average strike of the rocks is N40 degrees W and the dip 40 degrees Northwest into the mountain.

There is no evidence of serious faulting, but there are undoubtedly a number of small breaks. On the Southeast end of the property the hanging wall is schist, the footwall also schist, but more siliceous, but at the third cut from the Southwest end of the York claim and thence northward the hanging wall is schist and the footwall limestone, extending several hundred feet to the Northwest of the J & L tunnel. From this point the footwall is again schist, as well as the hanging.

It is evident from this change in the wall rocks that the vein does not follow the stratification of the rocks perfectly, but it appears in general to do so.

The geology of the area is favorable to the formation of a strong vein, persistent in depth, and to the presence of ore. The regularity of the strata and vein should be conducive to low mining costs.

VEIN:

The South Eastern part of the vein strikes N. 44 degrees West and dips 37 degrees N.E. while the North Eastern part strikes N. 30 degrees W. and dips 45 degrees N.E.

The vein has been opened by cuts at close intervals for 4,000 feet; to the extreme Southeast on the Dunbar claim the vein narrows and breaks into stringers and disappears at a distance of several hundred feet.

On the Northwest end of the J & L claim the vein is not well exposed but two or three small cuts near the Creek show

sulphides still present, together with a considerable amount of quartz, and with locally a quartzite hanging wall. There is a possibility that the vein has split some distance above the creek, as there is another stringer about 150 feet to the Northward; each appears to converge toward the tunnel.

The vein varies in width from one foot to ten feet. The average width of all samples is about $3\frac{1}{2}$ feet, but this is less than the true width of the vein as many of the samples did not include the lower grade portions. The vein filling consists of veinlets and lenses of nearly solid sulphides with some quartz, seams of sulphide in partially decomposed schists, bluish nearly barren quartz, and an iron stained residuum of schist and limestone from the oxidation of sulphides and leaching of the rocks by acid. The sulphides consist of a fine grain mixture of arsenopyrite, galena and sphalerite, with which there is a small amount of fine grain quartz.

As a rule there is small gouge on the hanging wall and frequently also on the foot wall. The walls are generally strong, but at a few places are broken and slabby. The vein is not entirely unoxidized at any point that can now be seen, but near the face of the tunnel the oxidation is very slight.

Over the northerly two-thirds of the York claim the vein appears to have good width and values in general, although somewhat variable, and this condition holds for a distance of from five to six hundred feet on to the "98" claim. Thence the vein is rather lean and narrow nearly to the "98" shaft. At the "98" shaft the vein is ten feet in width and throughout these workings the width is greater than at any other point exposed. In the first two cuts north of the "98" - Annie M. Line, the vein is narrow and appears to be low-grade; it is then generally of fair width, and fair apparent values up to the Annie M. shaft. In this shaft the best ore is about two feet wide while the vein proper is about $3\frac{1}{2}$ feet wide. From this shaft to the tunnel the vein appears a fair grade though not very wide.

At the J & L Tunnel the vein is comparatively narrow and consists of sulphide, except for a few inches next the foot wall.

The face of the tunnel shows two feet of vein only a small part of which is ore. Further down toward the Creek two cuts expose two veins, both of which show seams of ore.

SAMPLING:

Thirty-five samples were taken on the property, covering the greater part of the open cuts, and the underground workings at intervals of 20 feet.

Nine samples taken from various surface cuts on the York Ninety Eight, Annie M. and J & L claims a distance of 3,800 feet give an average metal content of \$8.46 gold, 1.8 oz. silver, 2.0% lead and 2.1% zinc over an average width of 3.2 feet.

The average of twenty-two samples taken in the underground workings is \$6.74 gold, 4.7 oz. silver, 5.8% lead and 3.9% zinc, over a width of 3.6 feet.

The average of both surface and underground samples is \$9.54 in gold and silver (silver taken at 60¢ per oz.) 4.6% lead and 3.4% zinc.

The sulphide ore also contains arsenic up to the extent of 20% in places, but this is of no present value.

ORE DEVELOPED:

There is no ore blocked out; there is, however, evidence of fair values throughout the vein for 4,000 feet along the strike, and there are apparently shoots of specially good ore near the junction of the York and "98" claims at the "98" shaft, at the J & L tunnel, and possibly at the Annie M. shaft. It is reasonable presumption therefore that 400,000 tons of ore may eventually be developed above the level of the J & L tunnel alone.

ORE TREATMENT:

The ore is very complex and the difficulty in reducing it to marketable products has prevented the mine from being developed years ago.

The oil flotation tests made by the Minerals Separation Company several years ago were unsuccessful, but recent advances in flotation knowledge have lead this Company to express the belief that they now would be able to treat the sulphide ore successfully.

Steps are now being taken to investigate claims that the Standard Metals and Chemical Company are able to treat the ores of the J & L Mine economically and efficiently.

SUMMARY:

The vein lies essentially with the bedding planes of the enclosing limestone and schists. It has been developed by open cuts over a length of 4,000 feet on the strike, and at elevations nearly 2,000 feet apart, indicating that it has an average width of about 4 feet.

The average gross value of the gold and silver in the ore now exposed is \$9.50 per ton, and the gross value of the lead and zinc (figured at present market quotations) is \$8.30 additional. In actual mining, the grade of the ore would probably be reduced say 20% , by dilution of the order with waste rock unavoidably included.

Physical conditions, except that of transportation, are good and development and mining costs should be reasonable. The principal difficulty would appear to be the development of an efficient process of ore reduction, and the claims that such a process has just recently been developed are now being investigated.

RECOMMENDATIONS:

As previously noted, there is presumed to be a large tonnage of commercial ore in the vein, but it is not developed sufficiently so that it can be evaluated.

It is recommended that development be started to further open the mine and to block out the ore so that it may be definitely measured and sampled.

Such development can best be begun by extending the tunnels on the J & L claim Southeasterly along the vein. This rock should be supplemented by driving raises on the vein at frequent intervals.

Considerable preliminary preparation of trail, camp accommodations and equipment is necessary before any substantial work is undertaken.

The J & L is an exceptionally promising prospect and while the vein is neither large nor high grade, it promises to show under proper development a large tonnage of commercial ore.

A large amount of work will be necessary to definitely prove up the mine, and is fully justified by the present showing.

RESPECTFULLY SUBMITTED,

(Signed) "CHARLES C. STARR"

REPORT OF PRELIMINARY EXAMINATION OF THE J. & L. MINE

REVELSTOKE, B. C.

INTRODUCTION

The writer spent three days on the property with one assistant, in company with Mr. McBean, the owner. The examination was of a preliminary nature, but a more thorough examination would not be apt to change the conclusions in any way.

LOCATION AND ACCESSIBILITY:

The property is located on the south slope of Goat Mountain, about half a mile from Carnes Creek, and south of the East branch of the creek in the Revelstoke Mining Division. It is best reached from Revelstoke by an automobile road, sixteen miles in length, and ten miles by trail, along the Columbia River to Carnes Creek, whence the trail follows Carnes Creek for nine miles. The grades are generally good and the trail is in fair condition, except for about a half mile.

The B.C. Government is now improving the auto road, and plans to extend it at least to the mouth of Carnes Creek within a year or two. The country now traversed by the trail is one over which a road could be built comparatively cheaply, as there is no rock work, except for short distances.

For a number of years a steamer was run up the Columbia River, from Revelstoke beyond the mouth of Carnes Creek, and if thought advisable a new service could be inaugurated to serve the mine and the surrounding country.

TIMBER:

The property and the surrounding district are heavily timbered with a heavy stand of fir, balsam and cedar.

WATER:

There is no water even for domestic purposes, except near the Creek. There appears to be ample water for power purposes in either the main Carnes Creek or in the East Fork, but a considerable length of ditch would be required to obtain a good pressure. It is reported that the

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best power site is a mile or two below the junction of the two creeks. So far as is known, no measurements have been made of the flow of either creek, but it seems probable that it is sufficient to furnish several hundred horse power at all seasons.

TOPOGRAPHY:

The property extends across the point of the mountain between Carnes Creek and its East Fork. Between the intersection of the Creek and the foot of the mountain there are a number of acres of practically level land. From there the mountain rises steeply along both creeks, and has an average slope of about 40 degrees, with numerous small cliffs.

The following elevations were taken by aneroid during variable weather and are therefore probably inaccurate. The junction of Carnes Creek and Columbia River 1600 feet; the J & L Camp 2600 feet; the J & L tunnel 2900 feet; the highest point of the vein Apex 3900 feet.

CLIMATE:

Winters are reported to be long, though not extremely cold, and there is said to be a snowfall of four to eight feet. There are no snowslides in the immediate vicinity of the Mine or Camp, but two small ones across the trail, between the Columbia River and the Mine.

CLAIMS:

There are eight claims in the group, of which 5 - the J & L, Annie M, "98", York, Dunbar, lie to the south of the East fork. To the North of the fork there are three more claims, said to be on the same vein, which were not visited. All the claims are of approximate full size (1500 feet square) and are held by the performance of annual assessment work, and have not been surveyed. Before any development campaign is undertaken on the property, more adjoining claims should be located. They are owned by Mr. E. McBean, Box 412, Revelstoke, B.C.

HISTORY:

The claims were located at various times since 1896, and assessment work appears to have been performed regularly. Mr. McBean purchased part of the claims and located others himself.

EQUIPMENT:

There is practically no equipment a very few hand tools and a poor cabin being all.

DEVELOPMENT:

There are 25 or 30 small open cuts and trenches on the vein extending across the J & L, Annie M, "98" and York claims. Near the Northwest end of the "98" claim an 80 foot crosscut tunnel has been driven, from which there is an 80 foot drift (30 feet now caved), and 120 foot inclined winze. Near the Northwest end of the Annie M claim there is an incline shaft 130 feet deep on the vein. Near the centre of the J & L claim a tunnel 218 feet long has been driven from which there are 30 feet of crosscuts; 150 feet of this tunnel is on the vein.

GEOLOGY:

On account of the steep slopes of the mountain and a heavy covering of soil and brush, the surface geology was not studied very carefully.

There are no Government publications covering the geology of the district, except a few notes by Mr. O'Grady, a Government Engineer who states that the formation consists of schist and lime and shows great uniformity. That the vein conforms to the stratification of the rocks and is situated on a schist-lime contact, the hanging wall being schist and the foot wall lime. He classes the vein as a "Bedded Fissure."

The country rock consists of schisted argillites, impure limestones, generally thin bedded, and some massive quartzite. No igneous rocks are known in the vicinity of the mine, except near the Northwest end of the York claim, where a very small outcrop shows a porphyritic rock.

The average strike of the sedimentary rocks is N. 40° W but it is slightly more East and West at the south end and more North and south at the North end. The dip varies from 25 degrees to 50 degrees, averaging about 40 degrees Northeast and into the mountain.

There is no evidence of serious faulting, but there are undoubtedly a number of small breaks, one of which is in evidence between the first and second cuts from the Northwest end of the York claim. On the Southeast end of the property the hanging wall is schist and the footwall also schist, but more silicious, but at the third cut from the Southwest end of the York claim, and thence Northward, the hanging wall is schist and the footwall limestone, extending several hundred feet to the Northwest of the J & L tunnel. From this point

the footwall is again schist, as well as the hanging.

It is evident from this change in the wall rocks that the vein does not follow the stratification of the rocks perfectly, but it appears in general to do so.

VEIN:

The Southeastern part of the vein strikes $N. 44^{\circ} W.$ and dips $37^{\circ} N.E.$, while the Northwestern part strikes $N. 30^{\circ} W.$ and dips $45^{\circ} N.E.$

The vein has been opened by cuts at close intervals for 4,000 feet. To the extreme Southeast on the Dunbar claim the vein narrows and breaks into stringers, and disappears at a distance of several hundred feet. On the Northwest end of the J & L claim the vein is not well exposed, but two or three small cuts near the Creek show sulphides still present, together with a considerable amount of quartz, and with locally a quartzite hanging wall. There is a possibility that the vein has split some distance above the creek, as there is another stringer about 150 feet to the Northward, each appears to converge toward the tunnel.

The vein varies in width from one foot to ten feet. The average width of all samples is about $3\frac{1}{2}$ feet, but this is less than the true width of the vein, as many of the samples did not include the lower grade portions. The vein filling consists of veinlets and lenses of nearly solid sulphides with some quartz, seams of sulphide in partially decomposed schists, bluish nearly barren quartz, and an iron stained residuum of schist and limestone from the oxidation of sulphides and leaching of the rocks by acid. The sulphides consist of a fine grain mixture of arsenopyrite, pyrite, galena and sphalerite, with which there is a small amount of fine grain quartz.

The sulphide streaks usually occur on the hanging wall, occasionally on the foot or on both foot and hanging, and rarely in the centre of the vein, and rarely as small stringers through the vein. The centre of the vein is apt to be lean oxidized material, and the material on the foot wall is generally thoroughly oxidized and frequently earthy. As a rule there is a small gouge on the hanging wall and frequently also on the foot wall. The walls are generally strong, but at a few places are broken and slabby. The vein is not entirely unoxidized at any point that can now be seen, but near the face of the tunnel the oxidation is very slight.

Over the Northerly $2/3$ of the York claim the vein appears to have good width and values in general although somewhat variable and this condition holds for a distance of five or six hundred feet on to the "98" claim. Thence the vein is rather lean and narrow nearly to the "98" shaft. At the "98" shaft the vein is ten feet in width and throughout these workings the width is greater than at any other point exposed. In the first two cuts North of the "98" Annie M. line the vein is narrow and appears to be low grade. It is then generally of fair width and fair apparent values up to the Annie M shaft. In this shaft the best ore is about two feet wide while the vein proper is about $3\frac{1}{2}$ feet wide. From this shaft to the tunnel the vein appears a fair grade though not very wide.

At the J & L tunnel the vein is comparatively narrow and consists of sulphides, except for a few inches next the foot wall. The tunnel has been in part driven along the foot wall of the vein, and the first 80 feet of the tunnel is completely in the foot wall. Except for an oxidised out 100 feet from the tunnel the vein is not exposed until near the creek a distance of five or six hundred feet where it appears to be narrow, although possibly a fair grade.

SAMPLING:

Thirty five samples were taken on the property (see map). The greater part of the open cuts were samples and the underground workings were sampled at intervals of twenty feet.

Adjacent to the York - "98" end line five sample cuts representing the length of vein of 500 feet average Gold \$6.89, Silver 2.4 oz., Lead 2.5%, Zinc 2.7% over an average width of 3.6 feet. In general the samples include the best of the oxidised material and all of the sulphides but not always the full width of the vein. Sample No 3073 is from sulphides on both foot and hanging, which are separated by four feet of low grade vein matter which was not included in the sample.

In the "98" incline seven cuts across the vein average Gold \$7.14, Silver 4.2 oz., Lead 5.9%, Zinc 1.6% for a width of 5.6 feet and covering a distance along the dip of 120 feet. At the top of the incline the width of the vein is 10 feet and at the bottom 6 feet, while the average width is probably about 7 feet rather than the 5.6 feet sample. At this point by far the greater portion of the vein is oxidized. The assays from the drift in the "98" workings are not included in the average, as they are extremely low grade.

The average of the two samples from the surface of the Annie M average Gold \$7.72, Silver 0.5 oz., Lead 0.9%, Zinc not assayed, over average width of 2.9 feet. To the North and South of these cuts the vein appears to be of equal or slightly less value; it is partly sulphide ore and partly oxidized.

In the Annie M shaft seven cuts across the vein covering a length of 130 feet on the dip average Gold \$6.28 Silver 4.5 oz., Lead 4.4%, Zinc 3.2%, over a width of 3.2 feet. Slightly the greater part of the vein is oxidized. It is probably 12 to 18 inches wider than indicated by the samples, but this portion is undoubtedly low grade.

On the J & L surface samples from two cuts the upper one oxidized, and the lower one solid sulphide average Gold \$3.88 Silver 1.2 oz., Lead 1.5%, Zinc 2.8% over a width of 2.6 feet.

In the J & L tunnel five cuts across the vein, representing a length of 130 feet average Gold \$6.30 Silver 6.6 oz., Lead 7.9%, Zinc 13.6% over a width of 2.2 feet. The samples are entirely of sulphide ore, except that a few inches of oxidized material along the foot wall is included.

The average of all underground samples except those in the "98" drift is Gold \$7.74, Silver 4.7 oz., Lead 5.8%, Zinc 3.9% and the width 3.6 feet.

The average of all surface samples except No 3075 is Gold \$8.46, Silver 1.8 oz., Lead 2.0%, Zinc 2.1% and width 3.2 ft.

The average of all samples taken, with the above exceptions, is Gold \$7.26, Silver 3.8 oz., Lead 4.6%, Zinc 3.4% and the average width 3.5 feet. Figuring Silver at 70¢ per oz., Lead at 8¢ per pound and Zinc at 7¢ per pound, the value of the above ore is \$22.04 per ton. It is possible that in addition the arsenic contained in the ore may have a commercial value but the assays for arsenic have not yet been received.

There is no very definite ratio between the values of the various metals evident in the above samples. This may be due to the mixture of sulphide and oxidized ore. A large sample of clean sulphide sent to Ottawa by Mr. McBean assayed Gold \$11.20, Silver 2.5 oz., Copper 0.17%, Arsenic 15.64%. Lead separately indicates that the Gold varies with the arsenic and the Lead, Silver and Zinc vary together.

ORE DEVELOPED

There is no ore blocked out. There is however evidence of fair values throughout the vein for 4,000 feet along its

strike, and there are apparently shoots of especially good ore near the Junction of the York and "98" claims at the "98" shaft at the J & L tunnel and possibly at the Annie M shaft. There is, therefore, very strong indication of a very large tonnage of ore of a good gross value.

ORE TREATMENT:

The ore is very complex, and the treatment of the Sulphide will undoubtedly be complicated by the presence of the oxidised products. Tests on the sample of ore sent to Ottawa by Mr. McBean are now being made by the Division of Ore Dressing and Metallurgy of the Canadian Department of Mines. A sample of the ore has also been sent to the Mineral Separation Company at San Francisco for flotation tests. Any further examination of the J & L Mine should be deferred until the results of this test are received.

SUMMARY:

The vein lies essentially with the bedding planes of the enclosing limestone and schists. It has been developed by open cuts over a length of 4 000 feet on the strike and at elevations over 1,000 feet apart, indicating that it has an average width of about 4 feet. The average gross value is in the neighbourhood of \$20.00 a ton, omitting the value of the Arsenic. If a narrower width should be mined, the value of the ore would be considerably increased, while, on the other hand, if the full width of the vein should be mined, the value would be somewhat reduced.

Physical conditions, except that of transportation, are good, and development and mining costs should be fairly cheap. The principal difficulty would appear to be the development of a cheap and efficient process to treat the ore. The price is very reasonable and the terms easy.

CONCLUSION:

If the results of the ore tests are satisfactory, I strongly recommend that an option on the property be secured and that a thorough examination and sampling be made.

Respectfully submitted,

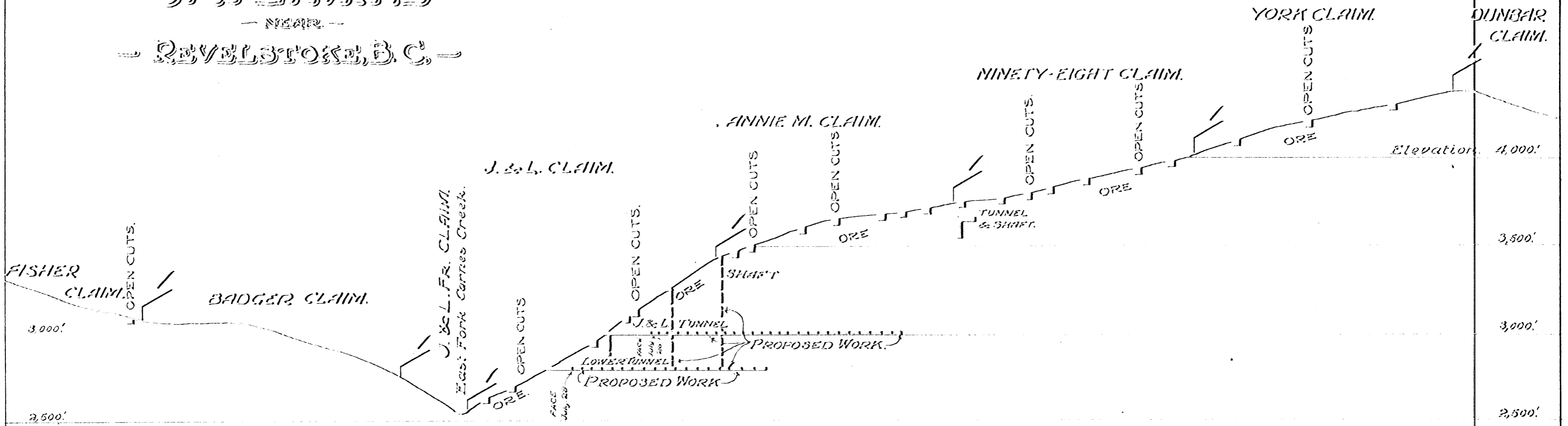
"Chas C. Starr"

ADDENDUM:

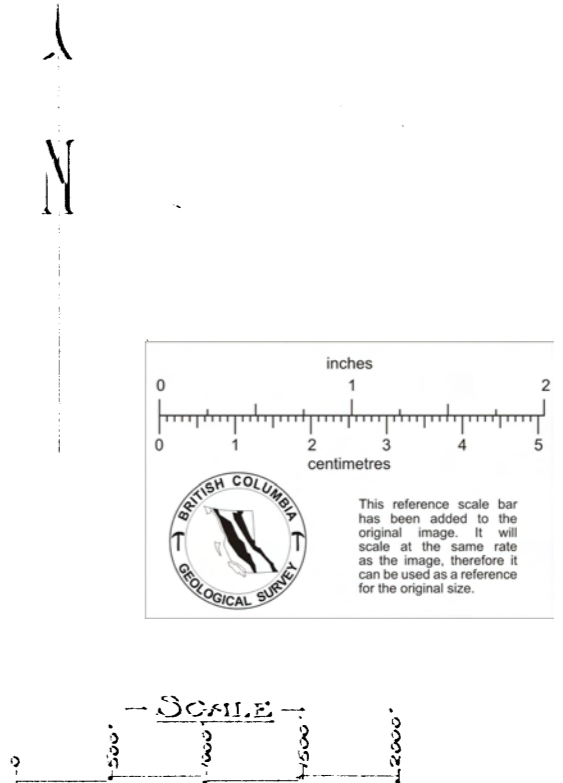
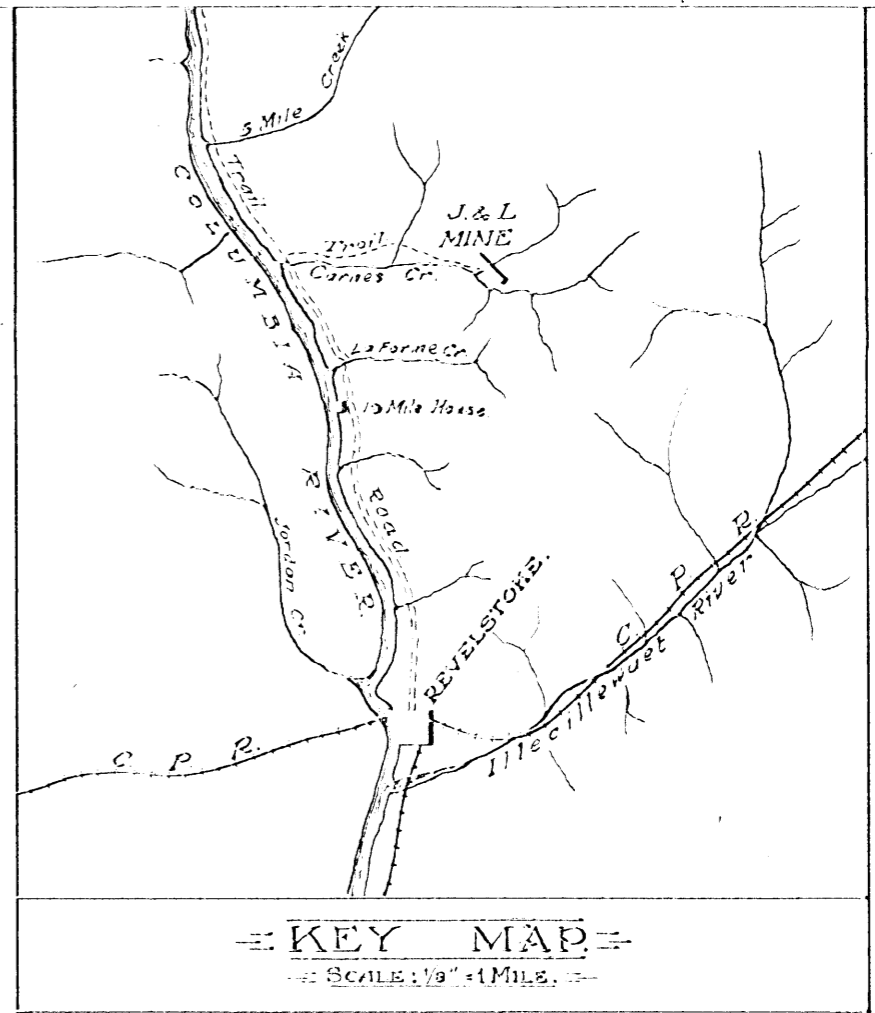
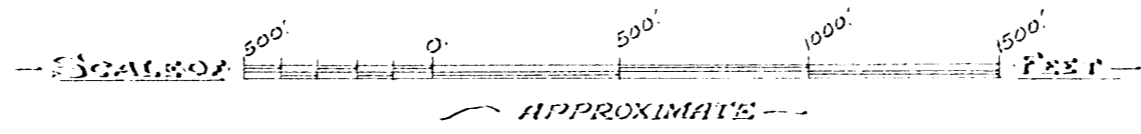
The following samples were assayed for Arsenic with the following results:

No. 3071 - 10.04%
31003100 - 10.14%
3102 - 20.68%

J. & L. MINE
 NEAR
REVELSTOCK, B. C.



SECTION ALONG VEIN OUTCROP - N.W. & S.E.



Plan approximate only as Claims have not been surveyed.
 (Copied) To accompany Report - Chas. C. Starr, July, 1928.