

W.A. No.

NAME *J. L.*

SUBJECT *REPORTS*

004762

PROPERTY FILE

82M003-01

Equinox Resources Ltd.

PROPERTY FILE

82M003

WRS → property file

THE J&L PROPERTY

Equinox Resources
November, 1988

1.0 Introduction

Equinox Resources Ltd. has entered into a joint venture with Pan American Minerals Co. to explore and develop the "J&L" deposit. The deposit contains potentially economic values of lead-zinc-silver and gold hosted in arsenopyrite and massive sulphide ore.

2.0 Location, Access, Physiography and Climate

The property is located along and north of Carnes Creek, approximately 32 air km north of the town of Revelstoke (see Figures 1 and 2), at latitude $51^{\circ}17'N$ and longitude $118^{\circ}08'W$.

Access is provided by approximately 35 km of paved road (Highway #23), and then a rough 10 km bush road to the property. Helicopter service is also available from Revelstoke. A rough four-wheel drive road and several overgrown walking trails are found within the property.

Maximum relief in the area of the property is 2,349 metres (3,050 to 701 metres). The J&L adits are found at the 830 metre elevation and the 986 elevation respectively, and are accessible by road and/or trail. Access throughout most of the property is difficult and slow as the steep-sided valleys generally obtain slopes of 30 to 40 degrees and are densely covered with rotting cedar and hemlock trees. Locally, windfall, deadfall, alders, devils club, stinging nettles and second growth are extensive.

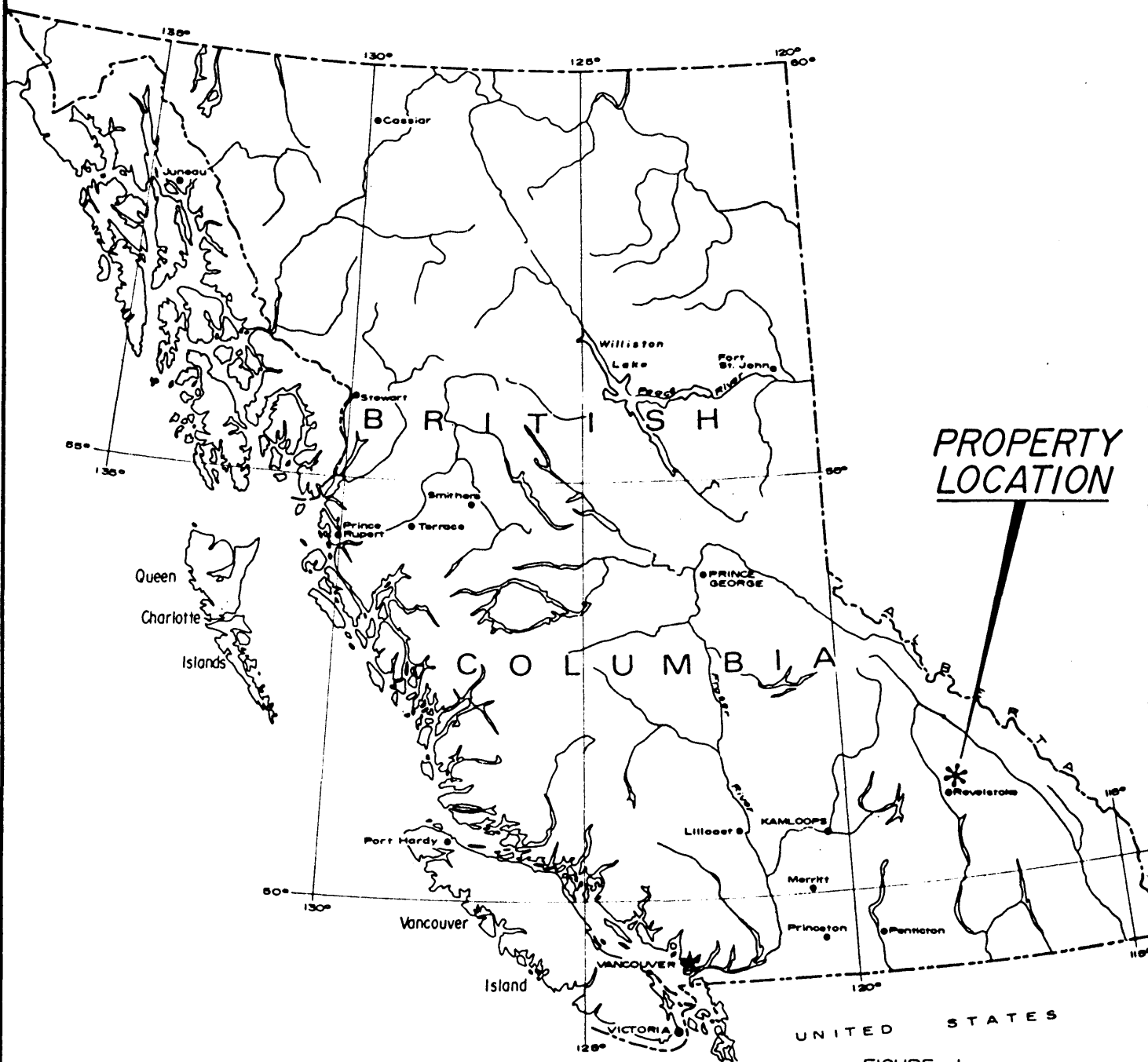
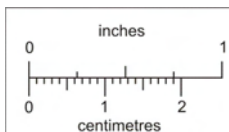


FIGURE 1

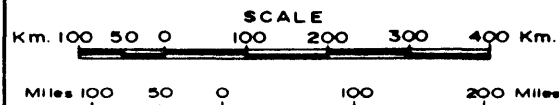
EQUINOX RESOURCES LTD.

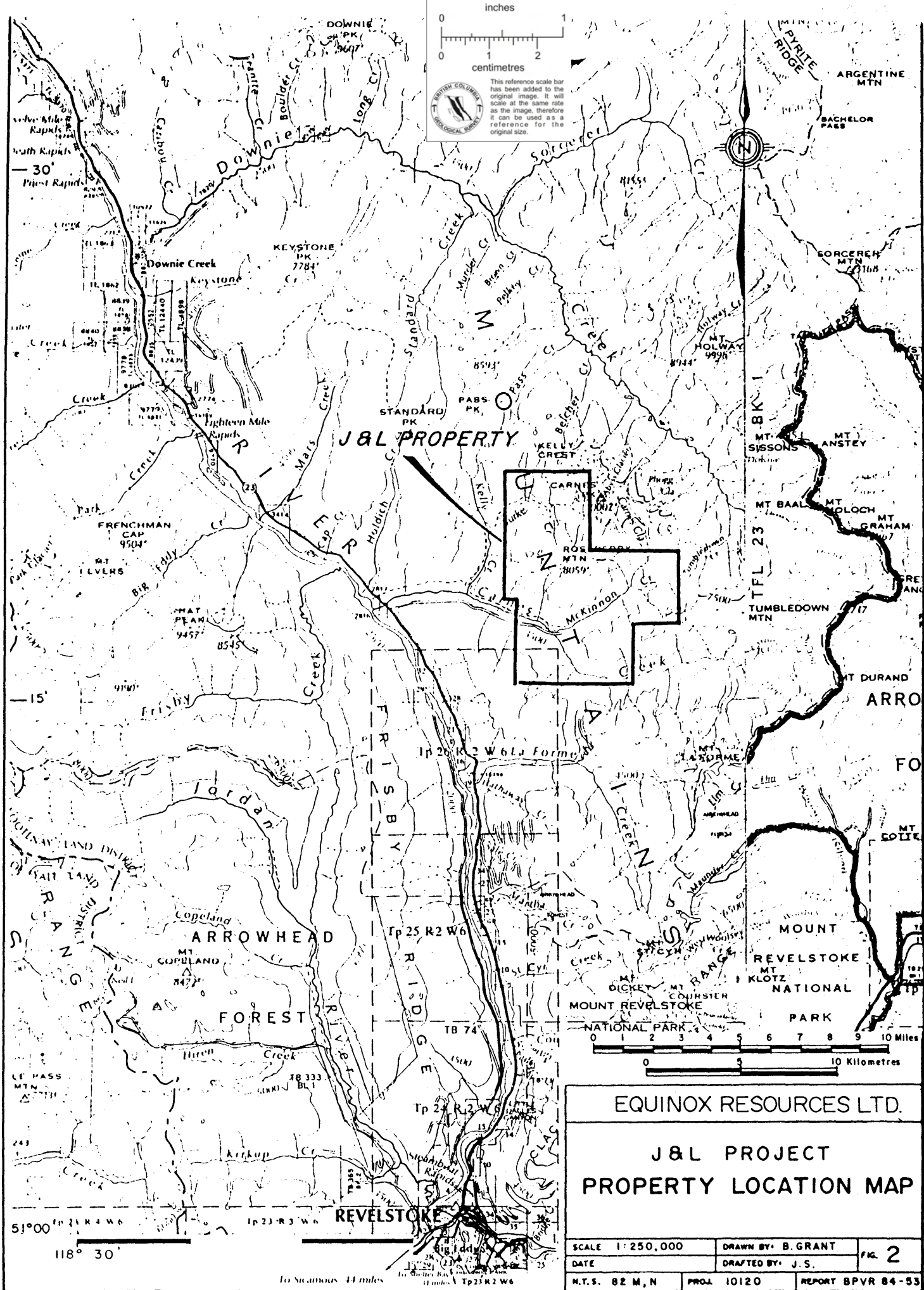
J & L MINERAL PROJECT
REVELSTOKE MD, B.C.

LOCATION MAP



This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.





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**J & L PROJECT
PROPERTY LOCATION MAP**

SCALE 1:250,000	DRAWN BY: B. GRANT
DATE	DRAFTED BY: J. S.
N.T.S. 82 M, N	PROJ. 10120
REPORT BPVR 84-53	

FIG. 2

51°00' 118° 30'

To Stamos - 44 miles

To Shovel Bay - 44 miles

To Shovel Bay - 44 miles

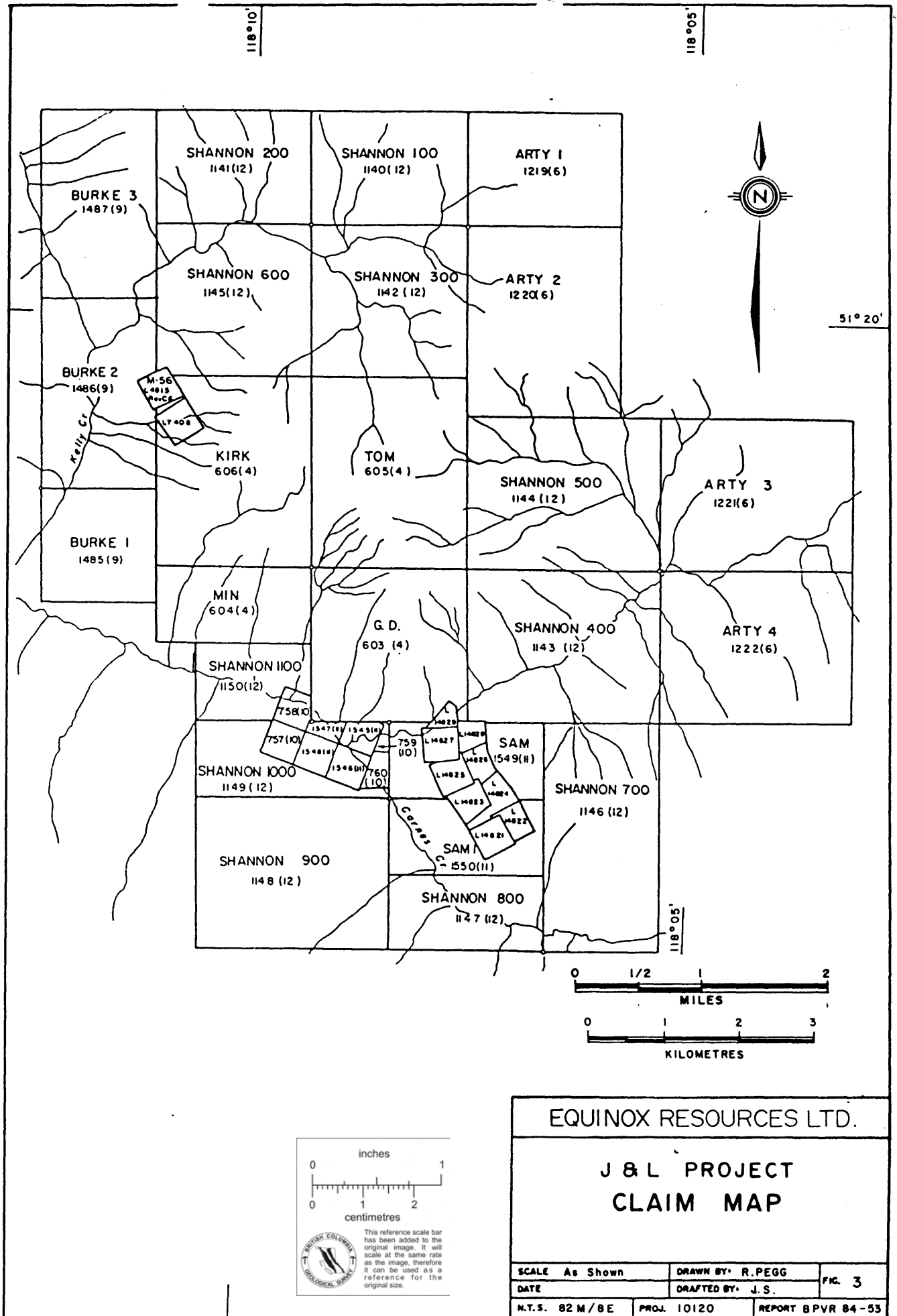
Equinox Resources Ltd.

Treeline is at approximately the 1,980 metre elevation and permanent glaciers are found above 2,286 metres. The property is fairly well drained on the south and east by Carnes and McKinnon Creeks and on the west by Kelly creek.

The winters are long and relatively mild with snowfall of between 1 and 4 metres. The mountainous terrain results in numerous snow and earth slides. The summers "usually" have a medium rainfall and temperatures range from 16 to 30 degrees centigrade.

3. Property Status

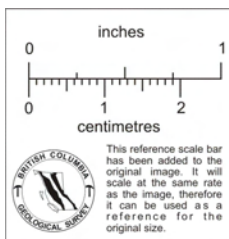
The property consists of 10 crown granted claims and 28 claim blocks (285 minerals claim units, see Figure 3).



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**J & L PROJECT
CLAIM MAP**

SCALE As Shown	DRAWN BY: R.PEGG	FIG. 3
DATE	DRAFTED BY: J.S.	
N.T.S. 82 M/8E	PROJ. 10120	REPORT BPVR 84-53



4. Geology

The area first became an exploration target after 1865 when placer gold was discovered in Carnes Creek. The "J&L" prospect was initially staked in 1896.

Work on the property has been intermittent since the turn of the century with major underground programs conducted by Wesair Mines in 1964, BP Selco 1983-1985, and Pan American Minerals 1987. To date approximately \$5 Million has been spent, largely since 1982.

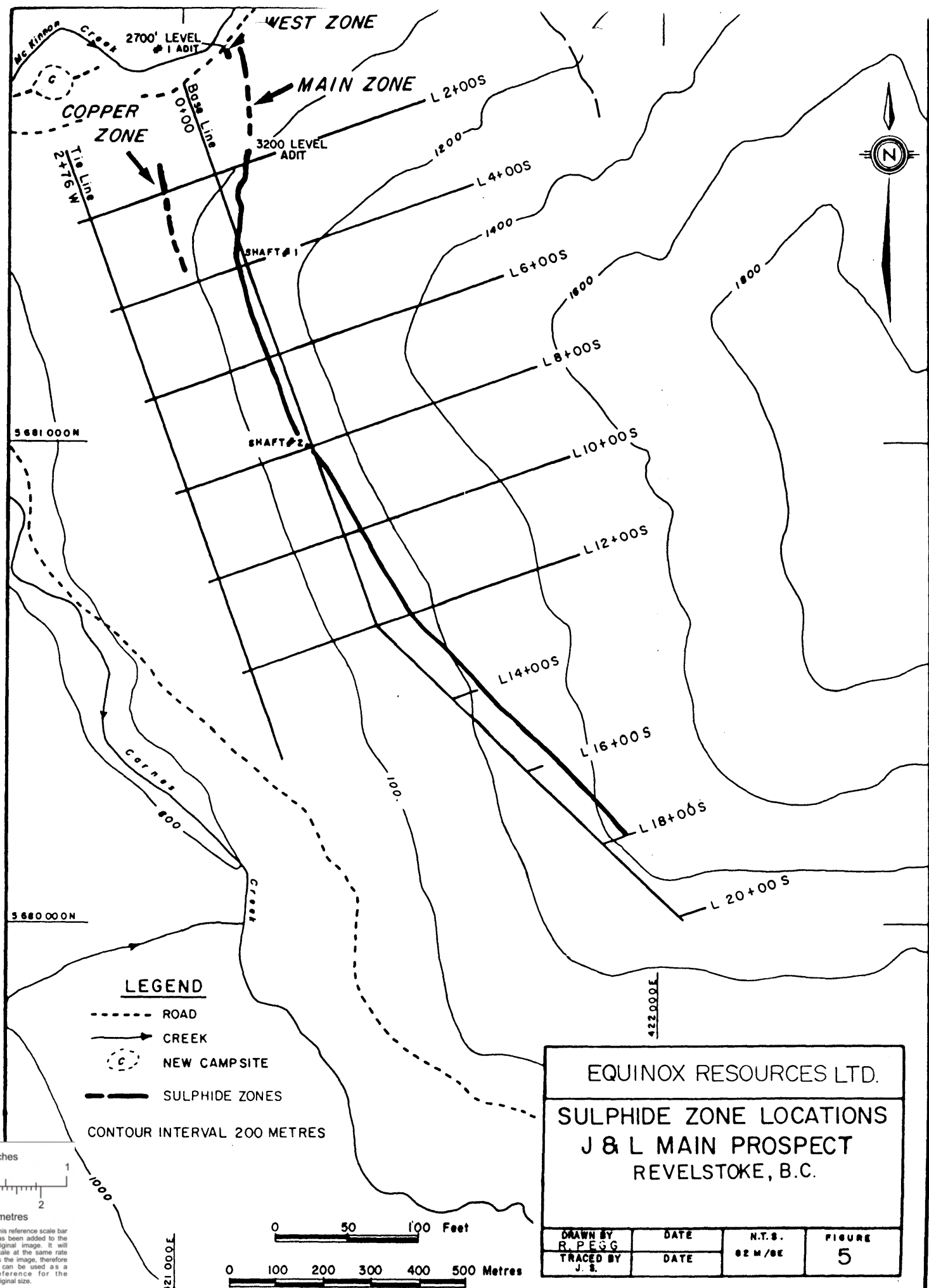
The J&L deposit is best described as an arsenical gold-silver-lead-zinc sed-ex deposit. The J&L structure is found in the Upper Hamill Formation (phyllitic-quartzite units). Underground the host rocks for the main sulphide zone are quartzites and quartz sericite phyllites along both the hangingwall and footwall for the first 1,000 feet or so, then, the footwall becomes a gray banded carbonaceous limestone.

Mineralization appears as bands, lenses and stringers of massive sulphides, the majority being arsenopyrite and pyrite with lesser amounts of sphalerite and galena and minor amounts of pyrrhotite and chalcopyrite. Gold appears to be intimately associated with the arsenopyrite and silver values are strongly associated with the galena.

The last round taken in the 830 metre level during 1984 left a drift face of a massive sphalerite. The weighted average assay results for eight chip samples cut across the face yielded 20.51% zinc. The J&L Main Zone appears to be widening at this point

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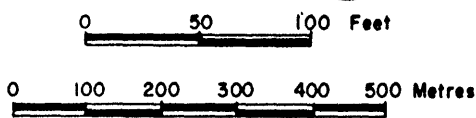
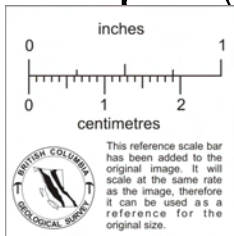
which is 845 metres from the portal. The structure should extend for another 1,000 metres to the south as indicated by surface mapping and trenching. The structure pinches out to the south, but it has been extended northerly across McKinnon Creek for 1,150 metres along the face of Roseberry Mountain and may be the same structure hosting the old Roseberry prospect. See Figure 4 Regional Geology, and Figure 5 J&L Main Prospect, Surface Exposures Figure 6.



LEGEND

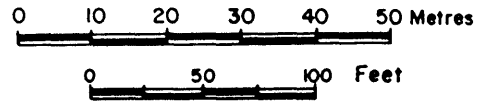
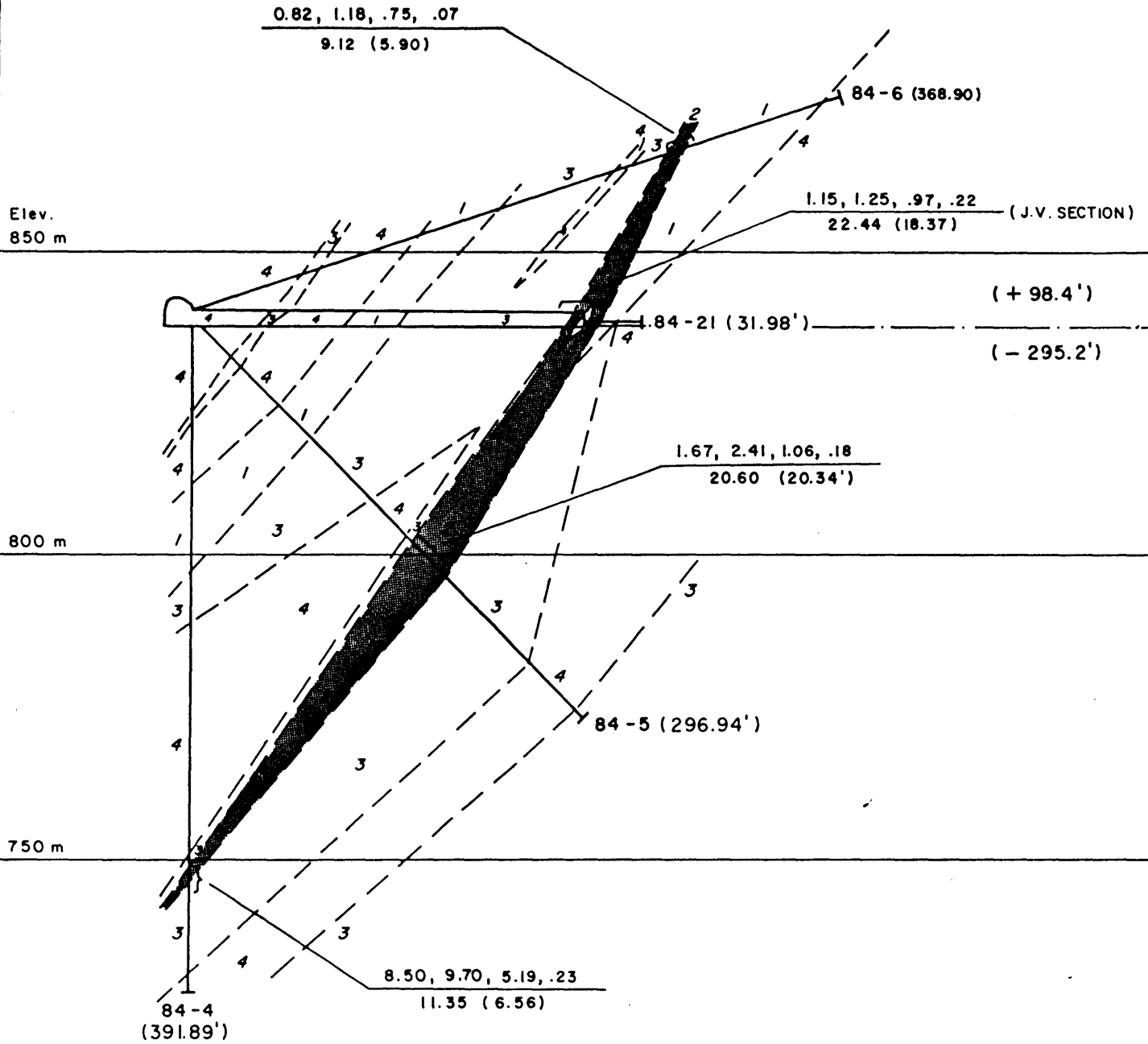
- - - ROAD
- CREEK
- (C) NEW CAMPSITE
- SULPHIDE ZONES

CONTOUR INTERVAL 200 METRES



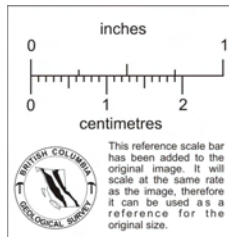
EQUINOX RESOURCES LTD.			
SULPHIDE ZONE LOCATIONS			
J & L MAIN PROSPECT			
REVELSTOKE, B.C.			
DRAWN BY R. PEGG	DATE	N.T.S.	FIGURE
TRACED BY J. S.	DATE	02 M/0E	5

Dip Comp. 145 m - 475'



LEGEND

- 4 Chlorite Schists
- 3 Sericitic Quartzite & Chert
- Massive & Disseminated Sulphide
- / Limestone



8.50, 9.70, 5.19, .23 % Pb, % Zn, o/t Ag, o/t Au
 11.35 (6.56) core length (true width), feet

EQUINOX RESOURCES LTD.		
J & L PROJECT		
SECTION- 670 CROSSCUT		
LOOKING SOUTH		
SCALE 1:1000	DRAWN BY: R. PEGG	FIG. 6
DATE	DRAFTED BY: C. H. K.	
N.T.S. 82 M/BE	PROJ. 10120	REPORT BPVR 84-53

4.1 Ore Reserves

Various ore reserve figures have been published varying from proven-probable reserves of 813,000 t grading 0.15 oz/t Au, 1.77 oz/t Ag, 1.84% Pb, and 3.81% Zn to possible reserves totalling 11,400,000 t grading 0.2 oz/t Au, 2.01 oz/t Ag, 2.56% Pb and 4.48% Zn.

The ore zone has been traced on surface for more than three kilometers, and surfacing sampling indicates grades similar to above. To date an underground drift at 830 metre elevation has drifted on the zone for 845 meters demonstrating the continuity. In addition multiple cross-cuts have provided drill stations and an envelope of 100 m in depth around the drift level has been drilled off. No hole drilled on the property has failed to intersect the zone. A typical section as outlined by drilling is shown in Figure 6.

Grade variability within the drift is extensive with respect to all minerals, however in general the zone appears to be widening to both the south and to depth.

5.0 Mining

Future mining operations at "J&L" will be underground and will likely utilize both shrink stoppage and bulk mining techniques. The current infill drilling program will better define the geometry of the ore zone and its width fluctuations. At present it is envisioned that initial mining will be via a decline.

6.0 Metallurgy

The most problematic area of the "J&L" prospect has been the metallurgy. Approximately 70% of the gold is associated with the arsenopyrite matrix resulting in high cost technology for gold recovery. The two processes under serious consideration are pressure oxidation and bioleaching.

The production of lead and zinc concentrates requires both fine grinding and minesite blending to produce saleable products that are not subject to prohibitive arsenic penalties.

The current program is aimed at establishing recovery parameters for various high grade areas of the deposit. Areas being examined include:

- a) As-Fe ratios
- b) acid-generation potential of discard streams
- c) sink-float upgrading of mine feed
- d) concentrate quality

8.0 Economics

The location of the minesite will allow a workforce to be drawn from the Revelstoke area. An abundance of skilled tradesmen and knowledgeable miners exist from the mega projects which Revelstoke has been exposed to over the last 15 years. The finish of the Roger's Pass tunnel has created an employment vacuum at present. In addition, the town boasts most facilities required for maintaining and supplying a small mining operation.

9.0 Equinox's Proposed Plan

Equinox is currently infill drilling on the property and taking bulk samples. This program will facilitate the planning for mining methods as well as establishing metallurgical recoveries and characteristics of discard streams.

At present Equinox envisions a small mining operation (350 tpd) taking advantage of higher grade lenses in the deposit to offset poor metallurgical recoveries typical of sed-ex deposits.

Baseline studies for water quality, hydrology and meteorology are ongoing, and early contact with the Mine Development Steering Committee will be made to ensure that all areas of concern are addressed and the project proceeds on an orderly development schedule.

Equinox Resources Ltd.

APPENDIX I

Exerpts from 1984 Waste Management Studies,
by Knight and Piesold Ltd., Pages 29 and 30

7.0 - SUMMARY

This report presents the finding of a preliminary feasibility study for the waste management facilities for the J & L Project, British Columbia. The objectives of the study were to prepare a conceptual layout for the surface works and tailings storage facility within the constraints of the local topography, to address potential environmental concerns associated with the waste management and to prepare preliminary cost estimates for the waste management facilities.

On the basis of a site visit and examination of surficial features at the site a conceptual design for the tailings facility has been prepared. Two possible layouts have been presented with storage capacities for the total anticipated tailings and for the fine fraction only should underground backfilling be implemented. Basic design objectives for the tailings facility are for a system that achieves the maximum possible density in the tailings solids to maximize storage utilization, and to reduce seepage from the tailings to a minimum both during operation and after decommissioning.

The design presented incorporates an underseal and underdrainage system above the seal, and sub-aerial tailings deposition to maximize drainage and consolidation of the tailings. The system allows for on-going upstream construction on the tailings material with a resulting significant savings in capital expenditure, and produces a tailings mass that is laminated and partly saturated such that underdrainage flows will be minimal after the first few years of operation and will be virtually nil after decommissioning and construction of a surface seal. The design requires that the ponding of surface water be kept to a minimum, and all surface water is decanted and flows by gravity through a system of water treatment ponds prior to discharge into Carnes creek.



Principal environmental concerns will centre on achieving the effluent discharge guideline objectives as laid down in Federal and Provincial documents, and included in Appendix A. Other possible concerns which have been briefly addressed are the stability of the arsenic in the ore material, and the possibility of long term biological oxidation of the sulphides.

D. F. KIDD
MINING GEOLOGIST

REPORT ON THE J & L PROPERTY, CARNES CREEK
REVELSTOKE MINING DIVISION, BRITISH COLUMBIA

82M/8E
82M-392

BY

D. F. KIDD

ILLUSTRATIONS

- Map 1. Claim Map.
- Map 2. J & L Surface Plan
- Map 3. Geological Plan J & L adit.
- Map 4. Assay Plan J & L adit.

INTRODUCTION

The property generally known as the J & L is situate in the Revelstoke Mining Division of British Columbia. The showings were first mentioned in Government Reports in 1905. Development has been intermittent. Work done by the owners prior to 1909 suggested a narrow most persistent zone of rather low grade ore with values in gold, zinc and to a lesser extent lead and silver. From 1924 to 1926 Porcupine Gold Fields Development and Financial Company optioned the property. They carried out some underground work and sent ore for testing to the Mines Branch Laboratories at Ottawa. These tests showed the ore could not be cyanided or be concentrated. The option was dropped. Subsequently the property was sold, the claims lapsed, it was restaked and eventually acquired by the present owner Wilma Josephine Arnold who is a dummy for her brother T.E.C. Arnold (the real owner). Arnold had further test work done at Ottawa and also looked into other little used

PROPERTY FILE

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methods of beneficiation. All the work done indicated no commercially proven method short of smelting would give a good recovery of the gold or other metals.

A new technique of roasting ore has come to my attention. It has been developed at the University here by Frank Forward, Professor of Metallurgy as a result of work on arsenical concentrates from the Hedley camp in B.C.. A preliminary sample of J & L ore roasted with this technique and cyanided gave a higher gold extraction than the best results previously obtained.

Since reports on the property suggest a tonnage in narrow bodies of possible ore of hundreds of thousands of tons the present preliminary examination of the property was directed towards:

1. Determining if the showings were on the claims owned by W. J. Arnold.
2. Reviewing the data in previous reports particularly in one dated 1929 made by P.E. Hopkins of Toronto.
3. Check sampling the ore where it was fresh.
4. Obtaining for metallurgical test work a sample of fresh ore.

SUMMARY AND RECOMMENDATIONS

The property is an old one. Sufficient development has been done to indicate a zone several

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thousand feet long with at many places a band up to a few feet wide of solid sulphide minerals chiefly arsenopyrite, pyrite, sphalerite and galena. Almost everywhere it carries values in gold zinc, lead and silver. The ore has so far proved intractable to any known metallurgical process short of smelting.

The deposit is of replacement origin in limestone against its contact with siliceous mica schist, and along a fault of great persistence.

The ore zone was examined over a length of 4400 feet and it is said to extend further. Two small shafts and an adit in a distance along the zone of 2100 feet explore it at shallow depth.

There is no proven tonnage of ore. Hopkins estimated a possible 300,000 to 325,000 tons above the J & L tunnel with an average width of 1.75 feet. Elsewhere in his report he estimated a grade of \$7.00 in gold (1929) 4.00 oz. silver, 4.0% lead, 5.0% zinc and 7.5% arsenic. In view of the present shape of the surface workings, and the oxidized nature of much of the underground workings an estimate of even possible ore would be hazardous and have little meaning.

The writer is of the opinion however that the first problem at this property is not the finding of more ore but the development of a commercially feasible recovery process for gold and at least one

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other metal in the ore.

It is my recommendation therefore that test work on a laboratory scale be undertaken before any more work is done at the property. If this proves successful then the opening up of the workings and proving of the ore can proceed concurrently with further larger scale laboratory work and pilot plant testing. An estimate of as the cost of carrying out small scale laboratory tests on the ore is provided in a letter from Professor Forward.

PROPERTY

The Property consists of 6 crown granted mineral claims and 3 claims held by location for which however crown grants have been applied. The claims are:

Crown granted:

"View Fraction"	Lot 14827
"Goat Fraction"	Lot 14821
"Goat No. 2 Fraction"	Lot 14822
"Goat No. 3 Fraction"	Lot 14823
"Goat No. 4 Fraction"	Lot 14824
"Goat No. 5 Fraction"	Lot 14825

By Location

"Creek Fraction"
"View No. 2 Fraction"
"Goat No. 6 Fraction"

All are in the Revelstoke Mining Division.

These claims give coverage on the dip of the vein to 3000 feet. They do not cover the cabin or the best camp and millsite. Extra claims should be staked to cover them and to cover the ends of the vein more

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MINING GEOLOGIST

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adequately.

LOCATION AND ACCESS

The property lies approximately nine miles up Carnes Creek in the Big Bend area north of Revelstoke, B. C. . From Revelstoke (alt. 1200') the Trans-Canada Highway, a first class gravel road, is followed on easy grades for 24½ miles to Carnes Creek. A trail leads up Carnes Creek to a cabin (altitude approximately 2500') near the showings. The distance is supposed to be nine miles but seems less. There are five small snow slide tracks on the upper part of the trail. A somewhat shorter and better route free of slides could be located along the opposite side of Carnes Creek valley. A road was once surveyed along that hillside and from across the valley road construction looks easy.

TIMBER AND WATER

There is available nearby abundant timber. In the valley of Carnes Creek it is mostly large red cedar suitable for light construction. On the valley slopes on the claims it is smaller and there is plenty of hemlock, balsam, and fir of sizes suitable for mine timbering. There is an abundant water supply in the two forks of Carnes Creek but little water on the claims.

CLIMATE

The climate is not severe but winter snowfall is heavy of the order of several feet. The steeper slopes

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in the district are all potential snow slide areas. With the exception of two small slide tracks northwest of the J & L tunnel the claims are free of this hazard. Five slide tracks on the trail to the property might give trouble in some winters. They can be avoided by a route on the opposite side of the valley.

POWER

There is no developed hydro-electric power within reach of the mine. In the district precipitation is heavy but run-off in winter may be scant. There are almost no lakes with storage possibilities. There is probably a fair powersite at the canyon at the mouth of Carnes Creek nine miles from the property but supplemental diesel power might be necessary. From a somewhat larger stream at Revelstoke the town can develop continuously without storage 2500 H.P. at 40% load factor, throughout the year with the exception of a few days in early winter when frazil ice causes trouble.

WORKINGS

A narrow zone with lenses and bands of heavy sulphide mineralization has been traced by pits and workings for several thousand feet up and over the shoulder of a mountain spur. Most of the surface pits have sloughed in but all the significant underground workings are still accessible. The lowest tunnel is at elevation 2800' and is caved. The J & L tunnel at elevation 3000'

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is an adit with short crosscuts. The Annie M. working at elevation 3400' is an incline shaft 120 feet deep and dry to the bottom. The "Ninety-Eight" workings at elevation 3700' consist of a cross-cut 70 feet to the vein, a drift (partly caved) on the vein and a winze 120 feet deep on the vein. This winze too is dry.

A second about parallel zone lies at the north-west end of the No. 1 zone just south of Carnes Creek. Two trenches 100 feet apart were found on it.

GEOLOGY

The claims are on the timbered shoulder of a mountain with slopes of over 30 degrees for 1000 feet and at places slopes up to 60 degrees.

The claims are underlain in the parts examined by a group of tilted metamorphosed sedimentary rocks comprising crystalline limestone, micaceous schist, and quartzite. These strike northwest and dip northeast at 35 degrees to 50 degrees.

Sulphide minerals have been found at intervals along a northwesterly trending zone traceable for several thousand feet. This zone is a fault, in part at least a thrust. The fault in its central part from the 'J and L' to the 'Ninety-Eight' workings is along the contact of footwall limestones with hanging wall micaceous siliceous schist. The fault has the

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same dip as well as strike as the bedding. Northwest of the J & L tunnel quartzite or schist occurs on both walls and at the southeast end of the zone as far as observed a similar condition exists.

The ore has formed along the fault by replacement of the footwall limestone adjacent to the schist hanging wall by sulphide minerals. These are in order of abundance arsenopyrite, pyrite, sphalerite and galena. There is a little chalcopyrite and tetrahedrite. These minerals form an exceedingly intimate and fine grained mixture. The replacement has been in part selective with narrow ore bands in limestone but much more commonly complete with bands up to several feet wide of solid sulphide minerals. Contacts of ore and wall rock are usually sharp. There is some quartz near or with the ore. It is not important in amount and its relations are not known.

The controlling factors in ore emplacement were first a fault zone channel and second a limestone horizon susceptible to replacement. The partial damming action of the relatively impervious hanging wall may have had some effect in localizing replacement adjacent to it. These ideas explain the relatively small amounts of ore in the zone where both walls are schist. They also suggest

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that only the limestone-schist-fault conjunction is favorable for ore occurrence.

There has been irregular, at places unusually deep, surface oxidation. While at places entirely fresh ore is present at the surface, in the 'Annie M' and 'Ninety-Eight' workings at the surface the ore is entirely altered to a porous crust of limonite (?) and other secondary products and even at the bottoms of the two shafts there is still much rusty ore.

In the No. 2 zone at the north-west end of the property both walls of the vein are sericite schist. Between is up to 36 inches of quartz with abundant arsenopyrite and pyrite.

SAMPLING AND VALUES

In view of the exhaustive sampling of the property by a responsible engineer, P.E. Hopkins, this job was not done again at this time. At the time of his report, too, the surface workings must have been far better exposed than they are now. It is doubtful if the values in the weathered ore are representative of those in the fresh - they may be either higher or lower - so that any further sampling of them is not at present warranted since they will form only a very small part of the ore bodies. Check Sampling was therefore confined to those places where fresh ore was exposed.

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Samples were taken in the J & L tunnel at 20 foot intervals where possible, in two cuts on the surface where fresh ore was exposed, and at the bottom of the Ninety-Eight shaft where there is one band of fresh ore. The results of these samples are not presumed to be representative of fresh ore throughout the great length of the ore bearing zone. Twelve samples cannot be. They do however confirm that important values exist in gold, zinc and to a lesser extent lead and silver at places along this zone.

The weighted average of nine samples from 185 feet length of the J & L drift is .248 oz. gold and 6.6 oz. silver across 21 inches and a composite of these nine samples ran 10.4% zinc, 7.5% lead and 0.3% copper. Two of the nine samples (No. 1251-2) may have only caught one branch of the ore. Hopkins' report says 12 samples by him from this tunnel ran \$5.22 in gold (1929) 4.89 oz. silver across 34.75 inches. Six samples assayed for lead and zinc averaged 5.69% lead and 10.00% zinc across 27.65 inches. His values compare closely with mine but the width is greater.

The average value in gold of all the samples taken by various engineers (Galloway, Markaus, Hopkins) is considerably higher than .25 oz. gold.

B. T. O'Grady of the B.C. Department of Mines in 1922 took 11 channel samples along a length of 4180

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feet of the zone. The weighted average of these is 0.409 oz. gold (highest 34 inch ounces, lowest 14 inch ounces) 3.75 oz. silver and 4.5% zinc.

Hopkins summarizes his sampling as follows:

"Sixty-four samples were taken." "The outcrops which were too badly oxidized were not sampled."

			Width	Gold	Silver	Lead	Zinc
Average of 16 samples	from outcrops		21"	.516	0.92		
" " 7 "	of above		26"			2.52%	3.79%
" " 6 "	from Ninety-Eight workings		55.3"	0.336	4.01		
" " 4 "	from Ninety-Eight workings		31 "			3.49%	3.02%
" " 7 "	from Annie M. shaft		15.5"	0.44	7.02		
one	" from Annie M. shaft					5.02%	4.82%
Average of 12	" from J & L tunnel		34.75"	0.252	4.89		
" " 6 "	" from J & L tunnel		27.65			5.69%	10.00%
" " 4 "	" from No. 2 vein		none given	0.175	0.77		

* Gold given in \$ calculated to ounces @ \$20.67 per oz.

While the grade of the fresh ore in the J & L tunnel is only .25 oz. I do not consider that this can be taken to indicate the average grade of fresh ore. For example directly above the J & L tunnel a fresh sample taken by me ran 1.82 oz. gold across 2.4 feet.

In the present shape of the surface pits no ore estimate can be made. The drift development at the J & L tunnel shows the solid ore there is persistent but varies in width and may occur as several bands.

PROPERTY FILE

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In the face of this tunnel it appears that one band of ore on the north-east side may have been missed. While it would be remarkable indeed if ore persisted through the great length of the zone it undoubtedly occurs at many places in it and may lie concealed at others where the overburden is too thick for trenching. The present sampling in conjunction with that of Hopkins shows there is sufficient ore in the deposit to warrant preliminary metallurgical test work prior to further development.

MINING

The known ore occurrences are narrow, often less than stoping width. The dip is so low that it is doubtful if ore will run in unlined chutes. It runs in the 'Annie M' shaft but not in the 'Ninety-Eight' shaft. The back appears good and has stood unsupported across six feet width for 35-40 years. The ore is dark in colour and could not be hand sorted from waste - but waste however could be picked out. Development to a depth of 1000 feet would be by drift adits.

TREATMENT

As indicated in the introduction, treatment difficulties are the prime obstacles in the successful

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development of this property. Extensive work was done on the ore by the Mines Branch Laboratories, Ottawa in 1926 and again in 1934. To date no commercially feasible method of recovery of the metals has been worked out.

Practically no recovery of the gold can be made by cyanidation of the raw ore. No separation of the gold can be made in any concentrate by differential flotation. Tests have been run using roasting methods but subsequent cyanidation has been poor and cyanide consumption high. The best recovery was 72% of the gold.

As mentioned in the introduction, Professor Forward head of the Department of Metallurgy at the University here has developed a variant on ordinary ore roasting techniques. This new technique was discovered in the course of research on roasting of arsenical concentrates from the Hedley Camp. A patent has been applied for on the technique, not with a view to profit but to prevent patenting by others.

Out of curiosity Forward ran a test using this technique on some J & L ore left at the University by Arnold. He secured 75% extraction of the gold and

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50% of the zinc was water soluble, this was increased to 75% soluble using weak acid. Forward attaches no quantitative significance to these results since he does not know from where on the property his material came or how representative it is. He does however, speaking to me, consider the matter worth following up with further laboratory scale roasting studies.

Harmond F. Kidd

Oct/92,

J & L (82M/8)

Notes from an MEG meeting, Vancouver, March 21, 1984

Brian Grant, speaker - Selco, B.P.

Attended by T. Hoy

PROPERTY FILESummary:

The J & L prospect is a Au-Ag-Pb-Zn-As deposit, presumed to be of SEDEX origin, in lower Cambrian to Eocambrian Hamill Group quartzite-schist-marble sequence in the Selkirk Mountains north of Revelstoke.

Talk outline:

The claims were staked in 1896 on behalf of Roseberry Consolidated Mines Ltd. In 1924 two 70-foot adits were driven by Porcupine Goldfields Development Co. T.E. Arnold, the present owner, acquired the property in the 1930's.

1940 - Mastodon - 40,000 tons production

1941-1946 - Raindor Gold Mines - shafts and trenching
- 500-foot upper adit driven

1965 - Westair Mines - 975 feet of drifts

1980 - Pan American

1981 - Selco-BP - rehabilitation, underground drilling

The main mineralized zone, approximately 2 metres thick, has been traced on surface for 1.9 kilometres and 530 metres underground.

It is stratabound, trending north, dipping 55 degrees east.

Grades: 5 g/t Au, 67 g/t Ag, 1.5% Pb, 3.5% Zn, 4.3% As.

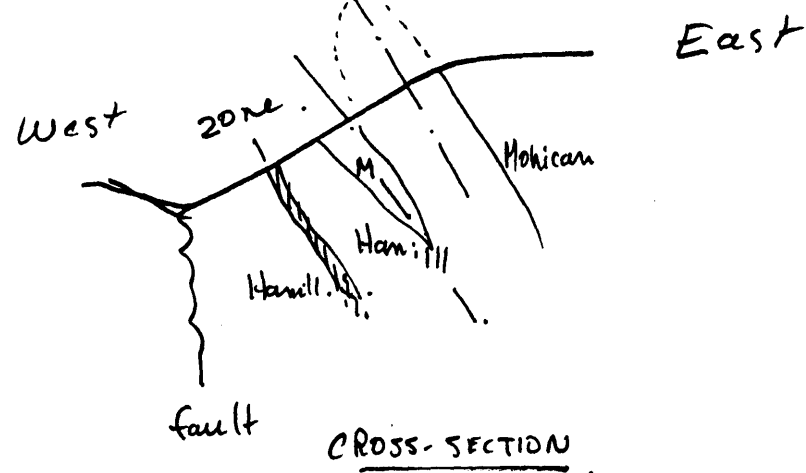
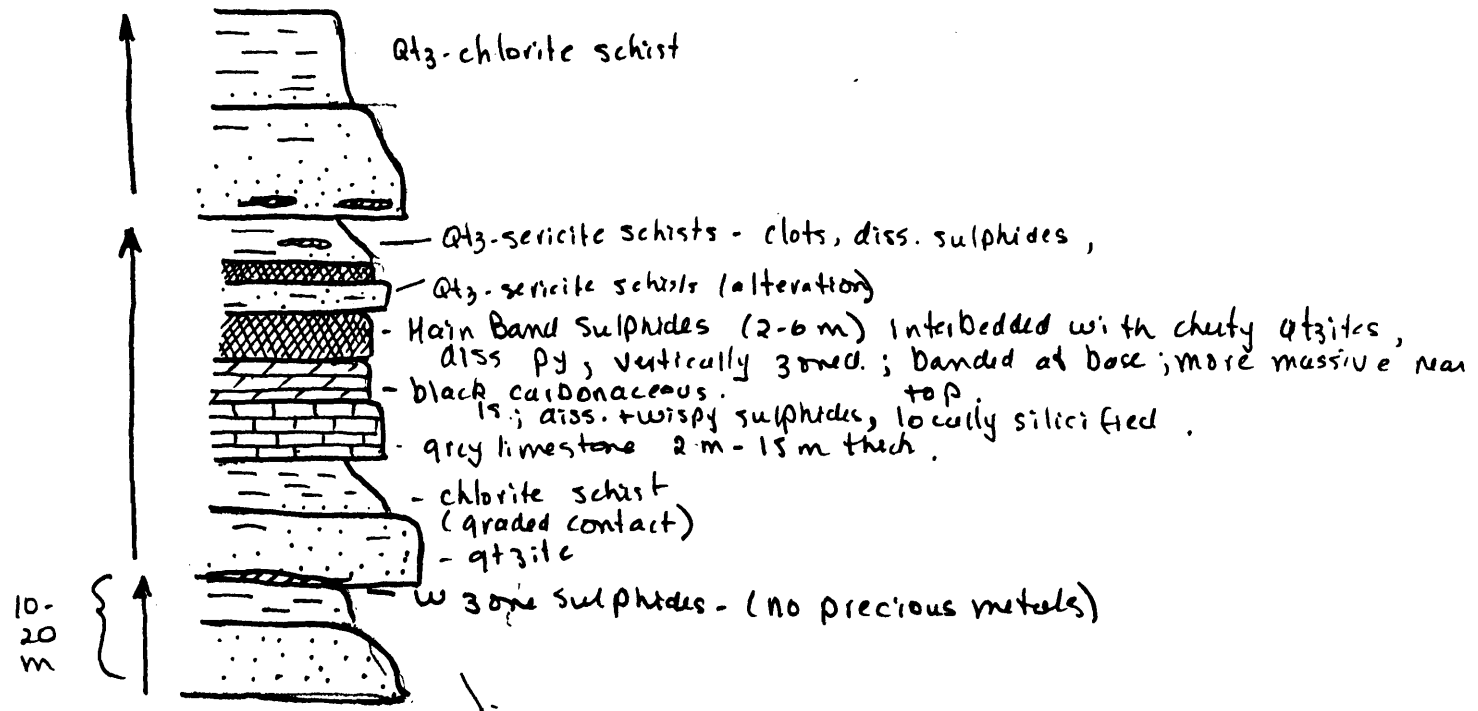
The main zone occurs within a cyclical sequence of quartzites that grades upward into chlorite schist. Mineralized zones occur near the top of the cyclical sequences, within the upper part of the chloritic schist. The main mineralized zone, however, is in black carbonaceous limestone that stratigraphically overlies a grey limestone at the top of one of the cycles.

Sulphides include pyrite, arsenopyrite, galena and sphalerite with trace chalcopyrite. Sulphide mineralization occurs as stringers, lenses, disseminations and massive bands in a quartz-sericite alteration zone, interbedded with "cherty quartzites" that contained disseminated pyrite. Main zone appears to be more banded at base and more massive near top. The immediate host, a black carbonaceous limestone, thins as the sulphide zone thins, suggesting that it too may have, in part, an exhalative origin.

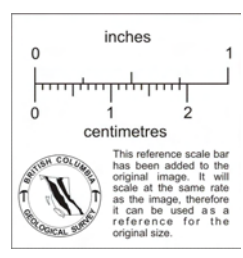
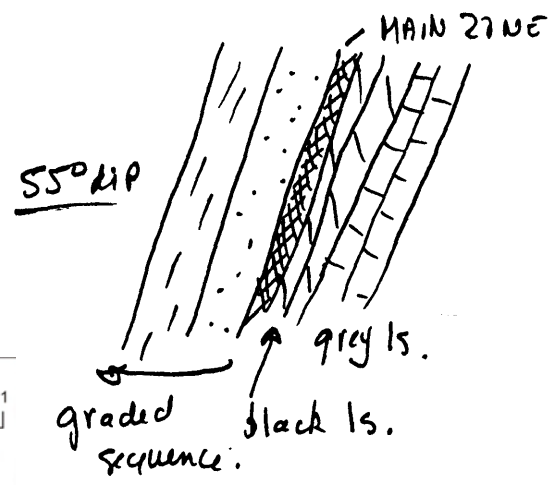
Lateral deposit zoning has not been established, but there is a suggestion the deposit is zoned vertically with a pyrite-arsenopyrite base and more zinc-rich capping (Main zone).

Drawings below are schematic!

ideal section



IDEAL CROSS-SECTION



827/
BE

REPORT ON J & L PROPERTY

CARNES CREEK

827-3, [REDACTED]

REVELSTOKE MINING DIVISION

made for

PIEDMONT MINES LIMITED

by

P. E. HOPKINS

AUGUST 9th, 1929.

PROPERTY FILE

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 the 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 No. 1) The camp site is not located on the property.

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 Canres Creek with the Columbia River	1700 ft.
The J & L Camp Site,	2500 ft.
The Lower Tunnel,	2800 ft.
The J & L Tunnel,	3000 ft.
The highest vein outcrop (York Claim)	4400 ft.

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 camp 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 & L claims a 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 crosscuts 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-ft. 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)

PROPERTY FILE

GENERAL GEOLOGY

The area in the immediate vicinity of the vein outcrops is obscured by a heavy covering of over-burden, 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 out-crops are of sedimentary origin, consisting of rusty weathering sedimentary schist, quartzite, argillites, greywache 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 TUNNEL

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 chalcopryt~~te~~e and pyrrhotite. The massive sulphides vary in width from 6 to 30 inches. Narrow and irregular lenses and stringers are parallel to the main sulphide lens and occur for a width of from 1 to $2\frac{1}{2}$ 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 Northeast, 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 claims south of the J & L 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 gossion 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 gossion 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~~ ^{the} 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

PROPERTY FILE

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 conditions 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 34.74 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 underground workings gave an average content per ton of \$6.-- 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-- 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 oz. 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, and 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 cost, tonnage available and marketing conditions.

According to Mr. Frank 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 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 hydro-electric 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 - 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 oz. 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

PROPERTY FILE

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. and \$1,250,000.

RECOMMENDATIONS

1. It is recommended that the problem of treating the ore be exhaustively investigated. A shipment of approximately 1000 lb. 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.

ACKNOWLEDGEMENTS

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

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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>	<u>Total value per ton</u>
1	0.74	1.44	0.12	17.81	1.48	4.37	\$ 39.69
2	0.36	1.22	0.03	14.85	1.13	2.50	22.53
3	0.88	0.38	0.02	21.81	0.44	2.09	42.25
4	0.30	8.22	0.36	5.66	11.68	16.57	45.11
5	0.72	0.62	0.16	14.47	0.59	0.87	33.00
6	0.52	6.42	0.73	10.40	7.10	8.08	41.55
Composite	0.56	2.50	0.17	15.64	3.25	4.72	35.20

(Gold - \$35.00)
(Silver .42)
(Copper .09)
(Arsenic .02)
(Lead .05)
(Zinc .05)

REPORT ON J & L PROPERTY

CARNES CREEK

REVELSTOKE MINING DIVISION

BRITISH COLUMBIA

taken from

B. C. MINISTER OF MINES REPORT

for

1 9 2 2

by

B. T. O'GRADY

RESIDENT ENGINEER

NELSON, B. C.

REPORT ON J & L GROUP OF MINERAL CLAIMS

This group consists of five calims. 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. 650 to 500 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 sulphide 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 opencut. Some 800 ft. NWY. along the outcrop and 1700 ft. above the creek and opencut shows 6 ft. of ledge matter with, towards the

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 opencut 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 opencut shows the vein to be nearly 9 ft. wide with bands of solid ore on the footwall 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 4%. Across 1 foot on the footwall 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 crosscuts the vein at a depth of 60 ft. below the outcrop. From the end of this crosscut a winze has been sunk 125 feet 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 $4\frac{1}{2}$ ft. 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 opencut which shows 2 ft. of solid ore against the hanging wall with some oxidized ledge matter below it; Assay over 2 ft. gave: Gold 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 4ft. wide. Throughout the lower 76 ft. of the shaft, there is a band of solid ore $1\frac{1}{2}$ ft. to 2 ft. wide along the footwall, the schitose 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 0.62 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 $2\frac{1}{2}$ ft. of solid ore exposed in a short tunnel. An average sample gave: Gold 1.14 ozs., Coper 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 ourcrop above described, there are a number of other opencuts which, together with the workings mentioned, trace the vein at short intervals over 5,000 lineal ft. In these opencuts, which have been omitted in the description, the vein shows much the same characteristics as noted above. The mineralization being remarkably persistant 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- $\frac{3}{4}$ ¢ 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 opencuts 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 to it.

PROPERTY FILE

BULLETIN NO. 1, 1932

"LODE-GOLD DEPOSITS"

of

BRITISH COLUMBIA

by

B. C. DEPARTMENT OF MINES

Refer to Page 119, from report of B.T. O'Grady, Resident Engineer, Nelson, British Columbia.

"The J & L, owned by the J & L Mining Company, of Regina, is an exceptionally interesting property. The ore contains consistent gold values associated with pyrite, arsenopyrite, sphalerite, galena, with minor amounts of chalcopyrite and grey copper. An analysis of a lot sent for testing to the Mines Branch, Department of Mines, Ottawa, was as follows: Gold 0.52 oz., to the ton: silver 3.50 oz. to the ton: lead 6 percent: arsenic 11.90 percent: antimony 0.22 percent: insoluble 16.38 percent. A very comprehensive summary of conditions, including the results of extensive testing of the ore, is contained in the above mentioned publication. The conclusions derived from the mill tests was that the flotation of the sulphides was not satisfactory, poor recoveries and poor separations being made in each test. The slightly oxidized condition of the ore interfered with the flotation. It is considered possible that better results might be obtained with unoxidized material and that the future of the property lies in the development of a sufficient tonnage of ore to warrant the erection of a mill capable of recovering all the values present. Assays are given in the writer's description in the Annual Report for 1922.

W.E. Narkaus, a mining engineer of Seattle, who subsequently examined the property, took twenty samples from the various showings. The lowest assay for gold and silver combined was \$4.15 and the highest \$27.10. The average of the twenty samples was \$12.04 in gold and silver to the ton and 12.7 percent As 203. Larger ore widths were subsequently opened up by the late E. McBean, then owner of the property.

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.

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 exceptionally 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 \$2,000 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 is 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 300 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 mine.

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 Gold-fields 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 corsscut 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 crosscuts; 185 feet of the tunnel is on the vein. Near the Northwest end of the J & L claim a 75-ft. 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 favourable 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 buty 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, throughout these workings the width is greater than at any other point exposed. In the first two cuts north of the "98" Annie M, lime, 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, 4.6 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 bein 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 (figures 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 cost should be reasonable. The principal

PROPERTY FILE

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 work 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) "CHALRES C. STARR"

PRELIMINARY REPORT

on

J & L PROPERTY, CARNES CREEK

REVELSTOKE MINING DIVISION

BRITISH COLUMBIA

made for

PORCUPINE GOLDFIELDS DEVELOPMENT CO., LTD.

of

LONDON, ENGLAND

by

CHARLES C. STARR

AUGUST 15

1 9 2 6

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 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 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 Fis sure."

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^o but it

PROPERTY FILE

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° W. and dips 37° N.E., while the Northwestern part strikes N. 30° W. and dips 45° 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 the 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 and frequently earthy. As a rule there is a small gouge on the hanging wall and frequently also on the footwall. 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 $\frac{2}{3}$ 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 footwall. The tunnel has been in part driven along the footwall of the vein, and the first 80 feet of the tunnel is completely in the footwall. Except for an oxidized cut 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 sampled, 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 ozs., Lead 2.5%, Zinc 2.7% over an average width of 3.6 feet. In general the samples include the best of the oxidized 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 ozs., 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 ozs., Lead 0.9%, Zinc not assayed, over

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 ozs., 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 \$14.38, Silver 1.2 ozs., 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 ozs., 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 footwall is included.

The average of all underground samples, except those in the "98" drift is Gold \$7.74, Silver 4.7 ozs., 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 ozs., 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 ozs., Copper 0.17%, Arsenic 15.64%. Lead separately indicate 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 indications of a very large tonnage of ore of a good gross value.

ORE TREATMENT

The ore is very complex, and the treatment of the sulphides will undoubtedly be complicated by the presence of the oxidized 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,

"CHARLES C. STARR."

August 12, 1926,

ADDENDUM

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

No. 3071 - 10.04%
3100 - 10.14%
3102 - 20.68%

J & L MINE METALLURGICAL WORK AND RESULTS ACCOMPLISHED

FLOTATION TESTS

Flotation tests have not been wholly successful to date because the minerals cannot be separated by grinding, and to some extent because of the oxidized nature of the ore tested. Tests are now being run by the U.S. Bureau of Mines to determine if a separation of the minerals can be made by their high-pressure steam pulverizers. (Refer to the June issue of the E. & M. Journal) Good results have been obtained when ores of a similar nature were tested.

CYANIDE TESTS

Commercial extractions by cyaniding the ore seem impossible because of the intimate association of the gold and silver with the other minerals. Roasting of the ore does not improve the extractions. Steam pulverizing of the ore, as suggested by the U.S. Bureau of Mines, is stated to improve recoveries. No results of these tests have been obtained as yet so no definite conclusions regarding that possibility can be drawn.

LEACHING TESTS

Dr. F.W. Traphagen states he has tested the ore and that perfect recoveries of all values can be made. The process is a modified form of the "Malm Chlorine Gas Process." He uses steam and chlorine gas to reduce the ore. The cost of a plant is, however, very high. That is the process referred to by P.E. Hopkins.

SMELTING TESTS

The Mines Branch, Ottawa, state that the ore can be successfully smelted as a lead ore provided the average lead content is over 10% lead. The ore is first roasted to remove sulphur and arsenic, and then smelted in a lead blast furnace. A lead bullion and a copper matte are formed.

If the copper content is above 0.3% it is stated the ore can be smelted pyritically. If that were done a great deal of the lead and zinc would be lost in the slog.

Smelting as a process does not look attractive due to the variable composition of the ore to be treated. The copper content varies between 0.1 and 0.5%, the lead content between 2% and 20% and the zinc content between 3% and 20% or more.

VOLATILIZATION TESTS

The Mines Branch, Ottawa, state that after a preliminary roast to remove sulphur and arsenic, that the lead, gold and silver can be volatilized, and the residue does not fuse even at a relatively high temperature. Recoveries of gold are 95%; silver 73% and lead over 90%. Salt addition is 10%.

G.H. Wigton, metallurgist for the Chief Consolidated Mines, Eureka, Utah, states he has operated a successful oxide volatilization plant there for years and that a successful oxide volatilization process could be developed to treat J & L ore. He states the coal consumption will run about 14 (fourteen) percent, and that almost perfect recoveries of gold, silver, lead and zinc can be made. (Refer to Transactions of A.I.M.M.E. for September 1925, published in 1926, for particulars regarding the Chief Consolidated plant.)

The cost of a 200 ton per day plant is quite high, being estimated at \$400,000 installed. Coal of suitable quality can be delivered to the mine for \$8 per ton, which would mean that at 14% consumption a cost for fuel of under \$1.25 would be possible, and a reduction cost of under \$2 obtainable.

BERZELIUS PROCESS

William E. Harris, consulting metallurgical engineer, of 167 Cameron Street, Ottawa, states he has sent all particulars regarding the ore to Germany, and that the metallurgical experts there are of the opinion the ore could be treated by the "Berzelius Process."

The process consists in roasting the ore to bring the sulphur and arsenic within workable limits. The roasted ore is then mixed with coke or coal, and sodium carbonate, and in some cases borax also; and

PROPERTY FILE

heated in a rotary kiln, where the lead and precious metals are recovered in a metallic form as a lead bullion, and the zinc is fumed off and collected as oxide.

The cost of a plant of that kind is about the same as a volatilization plant of the same capacity. Soda ash (dry) can be delivered to the mine for under \$20 per ton.

STEAM REDUCTION TO NATIVE ELEMENTS

It is stated by E.H. Records, of Spokane, Wash. that he can reduce the ore to metallic elements by the use of steam and certain chemicals that act as contact agents. He will give no details of the process, except stating the work can be done for under \$2 per ton, and that he reduced and recovered all the values from a sample of ore sent to him. This process is at present of academic interest only, but it may have value and is being investigated.