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THE CRONIN MINE

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INTRODUCTION

The writer first examined the mine, the surrounding mineralization and the geology during 1972. A feasibility study indicated that the mine could be operated profitably at a small tonnage. Operating experience and further exploration and development during 1973 has shown that the mine should be extensively developed and operations carried out at a higher tonnage for maximum profit. This report outlines such development.

The writer is a director of Hallmark Resources Ltd., owner of the mine, and acted as mine manager during 1973. He holds 140,000 of the common shares of Hallmark Resources Ltd. The ore tonnages and grades, as mentioned in the report, are not to be considered as reserves except where particularly named as such.

LOCATION

The mine is located approximately 20 miles northeast of Smithers, B. C. The mine, mill and camp can be reached by a 34 mile gravel road from Smithers, 28 miles of which is maintained summer and winter by the Department of Highways.

PROPERTY

The mine is located on a portion of eight Crown Grants. These are surrounded by 27 located claims, for a total claim block of 35.

TOPOGRAPHY

The mine is found on the southeast slopes of Cronin Mountain. Most of the vein exposures are found on a plateau at 5200 foot elevation but showings are known down to about 3800 feet. The lowest adit level of the

mine is located at 4775 feet and the mill and camp is at 3 feet. A 2 mile haulage road connects the mill and mine. The road is in good condition but should be widened for winter haulage.

GEOLOGY - GENERAL

The mineralization is found in a complex rhyolitic plug with irregular borders to sericitic and graphitic schist. Outcrops of rhyolite on other parts of the property together with well mineralized float and geochemical soil anomalies suggest other mineralized rhyolite in an extension of the plug or in other plugs.

The main plug is roughly 3000 by 2000 feet and the major mineralization has been uncovered at or near its northern border. Most of the southern border is covered in overburden but minor stripping has disclosed mineralization and geology (oxidation - silicification - bleaching) similar to that on the north side.

The mineralization consists of sphalerite and galena with relatively minor pyrite, boulangerite, chalcopyrite, freibergite and arsenopyrite. The minerals are found in quartz veins, or as massive veins, breccia zones or fracture filling in the rhyolite with little quartz. The major veins strike southwest - northeast and dip 45 to 65 degrees to the northwest.

The silver values are associated with the lead and usually run about 2 oz. silver per percentage lead. Cadmium is associated with the zinc and runs about 0.15% per percentage zinc.

There appears to be some evidence of zoning between surface (5200') and the lowest level of the mine (4650'), with an increase in the zinc to lead ratio. The evidence is somewhat tenuous, however, with the largest changes in ratio being due to simple local changes in mineralogy.

If there is zoning over the 550 feet of vertical mine workings, an increase of zinc with depth then there should also be an increase in the silver to lead ratio as freibergite, the silver mineral, ranks with sphalerite in the zoning pattern. Some float found at lower elevations has shown exceptionally good silver values (123 oz./ton).

MINE

The mine workings extend over 550 feet vertically and about 720 feet laterally on the veins. It consists of about 3800 feet of drifts and crosscuts and 1200 feet of raises. The lateral development has given about 40% ore, which is considered a very promising development ratio. Surface stripping 2000 feet ahead of the mine during 1972 and 1973 has shown about the same ratio.

Mining has been carried out on a small scale almost continuously over the last 21 years and about 30,000 tons, grading 12.52 oz. silver, 7.11% lead and 8.12% zinc, has been taken out. Ore remaining in the workings and near surface has been calculated at 46,752 tons indicated and 129,506 tons inferred. This represents only a fraction of the potentially ore bearing structure and the fracture zones with large tonnage potential have not previously been given consideration or were not known.

Practically all the development of the mine as it stands today was carried out between 1910 and 1927. Subsequent work was almost entirely production from the development and no surface stripping was carried out until Hallmark Resources Ltd. had a cat on the property in 1972.

Total
175,000
tons

WORK DURING 1973

A large program of construction and rehabilitation was carried out during 1973. Six trailers were purchased and installed as one camp unit with kitchen, dining room, showers and toilets included. The unit is heated by two propane furnaces. An aluminium pitch roof was constructed over the trailers. Comfortable accommodations are now available for 24 persons and four rooms are used for offices and a first aid room.

The old camp was partly rehabilitated and is used for warehouse, oil shed and chemicals storage. One cabin is available for married quarters.

A new tailings disposal area was constructed and approved by the Pollution Control Board. The tailings dam is about 500 feet long and 12 feet high. Ditches have been constructed around the dam and a small secondary dam built below to catch seepage water. Pumps were installed to return seepage water to the main dam and tailings water to the mill. Two smaller dams were constructed below the mill to catch accidental spills. The tailings dam will hold about two years of tailings but it is planned to increase the dam height next year with the coarser fraction of the tailings.

The mill was extensively rehabilitated. An additional power unit was installed and a large part of the electrical wiring redone. An additional bank of flotation cells was put in and the flotation flow rearranged and the plumbing renewed. The limiting factor on production is now the grinding capacity and another ball mill, which is on the property, will be installed in the spring. This should bring the mill capacity up to about 80 tons/day.

The access road was widened and slightly improved but much work remains to be done to bring it up to a 30mph standard (6 miles) and cut the travel time to Smithers to about 45 minutes.

At the mine the lowest adit level (# 5 level) was rehabilitated and the portal and 150 feet of drift retimbered. A trestle was built for ore dump. A number of chutes were built, piping was installed and stones prepared for mining.

The construction and rehabilitation occupied about 4 months from May to August. Production started in late August and carried on for two months until the beginning of November. About 1500 tons were treated and 1800 tons of broken ore remains in the stopes and on the dumps. The mine produced ore from two development headings and two stopes. One development heading and one stope encountered low grade ore. The other stope provided a limited amount of tonnage, due to limited development, of exceptionally high grade.

This ore was mixed with the lower grade for milling purposes. Four miners were able to break 140 tons per working day and provide exceptionally low cost ore. The high grade stope now requires further development and should provide some 6000 tons of comparable grade.

200 tons of concentrate was produced and shipped to Trail in 5 Ton concentrate bags. The bags were found to be unsatisfactory and future shipments will be by rail.

Capital expenditures and production costs have not yet been worked out and most concentrate delivery statements have not yet been received from Trail. The 1973 work will be considered in another report when the information is available.

1500 tons broken
in No. 1 level
1974

EXPLORATION - DEVELOPMENT

A program outlining additional ore and at the same time developing the mine for greater production will be set out below.

The program will logically move from development of well known ore in the present mine workings to following the veins into the hill to develop the downward extension of known ore exposures on surface. Development on # 3 level will be 250 feet below surface. This will increase to 400 feet as development progresses. The # 5 level is 275' below this again (distances down dip). The ore frequency found in the mine is about 40% and surface trenching on the veins ahead of the mine has disclosed about the same ratio, but because of the considerable heights being developed the variations in ore could be considerable. The development will be carried out along the known veins and ore widths may be expected to range between 3 feet and 25 feet for individual veins. The ore shoots on the veins will be considered first. Several areas of fracture type mineralization are known on the property. Some of this mineralization constitutes ore and will be mined by open pit mining. The extent of this mineralization and the possibility of larger scale open pit mining will be considered second.

3 AND # 5 LEVEL IMPROVEMENTS

The # 3 level will be widened to 7'x8' and 30 lb. track put in from the cliff portal to the end of present development, a distance of 630 feet. This improvement is necessary before any drifting is started. This adit should be connected to the other workings through a 60' drift to the chute on 323 stope to facilitate ore haulage from this major ore shoot. During this work a good ditch should be put in and a large water sump excavated in the crosscut near 312 chute to provide a reliable water supply for the mine.

The # 5 level should be rehabilitated in to the # 1 vein, a distance of 420 feet. The portal and 150 feet of drift was retimbered in 1973 but further widening and retimbering is required. The present track should be

replaced with 30 lb. track as this will be the major ore haulage level.

About 50 feet inside the portals on both levels the drifts should be widened to 14 feet to provide room for electric locomotive charging stations.

COST:

Wages, supplies (12 tons of rail) and overhead \$18,000.00

TIME REQUIRED: 4 miners; 6 weeks

311 - 312 STOPES

About 1500 tons of ore has been mined from the 312 stope. The grade and tonnage is well known from this production, from sampling on surface and in shaft # 1 which goes down about 60 feet into the centre of the unmined portion of the ore body.

DEVELOPMENT: It is proposed to develop 311 and 312 ore bodies together. A 160 foot sub-drift should be driven from the mined area toward surface. A raise should be driven on 311 ore body from the 3 level adit 10-20 feet inside the portal. The raise would be 160 feet in length and connect to the end of the subdrift. The raise will be driven on the vein inclining 48 - 50 degrees away from the surface. It will be a double compartment raise to provide access for water and compressed air and serve as manway as well as ore pass. The portal should be enlarged so that the ore chute, 20 feet inside the portal, can load directly into the ore truck. The adit should have ventilation doors inside the chute to prevent exhaust fumes from reaching the mine workings.

MINING: The mining method will be shrinkage stoping. A slusher will be placed in the subdrift at the raise and carried up on top of the broken ore.

ORE: The above development would open 4500 tons of proven ore for mining. An additional 1800 tons of probable ore may be available. The average grade of this ore has been calculated at 16.4 oz. silver, 13.1% lead and 14.3% zinc per ton. This represents \$112.00 per ton net from the smelter after allowance for mill recoveries.

DEVELOPMENT COSTS:

| | |
|--|--------------------|
| 160' subdrift at \$50/ft. | \$ 8,000.00 |
| 160' raise double compartment at \$120/ft. | 19,200.00 |
| Chute and services | 3,000.00 |
| Portal | <u>1,000.00</u> |
| TOTAL | <u>\$31,200.00</u> |

TIME REQUIRED: This development should be double shifted and both subdrift and raise could proceed at the same time.

4 miners - 7 weeks

22 - 223 STOPES

This ore body has been exposed along the entire length of # 2 level. The # 2 level was driven along a footwall vein of 5' average width. This vein was sampled along its length, 220 feet, by J. D. Galloway, Consultant, and gave an average of 4.3 ft., 23.0 oz. silver, 12.3% lead and 11.7% zinc.

This ore body was mined from # 3 level and up to # 2 level. It rapidly increased in width and at # 2 level the average width is 20 feet, including the drift and 15 feet in the hanging wall. This full width was not sampled at the time of mining and cannot now be reached.

The average production grade as delivered to the mill over the last 20 years is 12.52 oz. silver, 7.11% lead and 8.12% zinc, and, as the majority of the mill feed has come from these stopes, it will be assumed that this will continue to be the average grade. (N.S.R. \$76)

AVERAGE
GRADE
+
N.S.R.

DEVELOPMENT: A raise of 180' is required from # 2 level to surface to give a better picture of the ore outline and to provide access and ventilation for mining. The raise should follow the foot wall of the vein and frequent subdrifts should extend to the true hanging wall to give a good outline of the ore shoot.

MINING: Mining could begin after the above development proceeding from the raise on # 2 level. The 323 stope below, now nearly empty, would fill with broken ore and mining could be carried out working on the broken ore. The stope would have to be mined in two sections as it is too large for one shrinkage stope.

The mining method and details of mining plans must be reconsidered and refined when the raise has been completed.

ORE: The width of ore on # 2 level is 20 feet and the surface exposures show widths of 10 feet and up to over 25 feet. Assuming the average width to be 10 feet, the expected tonnage in the ore block is 32,000. If the average width is 20 feet then of course the expected tonnage will be twice as high, or 64,000 tons.

The grade should be 12.52 oz. silver, 7.11% lead and 8.12% zinc per ton, giving a net smelter return of \$75.00 per ton.

DEVELOPMENT COSTS:

| | |
|------------------------------------|--------------------|
| 180' raise at \$70/ft. | \$12,600.00 |
| Subdrifts to the true hanging wall | |
| 80' at \$50/ft. | <u>4,000.00</u> |
| TOTAL | <u>\$16,600.00</u> |

TIME REQUIRED: 1 miner - 10 weeks

521 EAST STOPE

The stope has been partly developed by taking down backs and building four chutes on # 5 level.

DEVELOPMENT: Further development required will be raising to break through to # 3 level to provide access for water and compressed air. Secondary access will be from 521 main stope. The raise will be 250 feet long and should be the width of the ore.

The chutes on # 5 level will have to be improved and one new chute built.

MINING: Conventional shrinkage mining methods will be employed.

ORE: 3100 tons of proven ore and 3900 tons of probable ore will be available for mining.

The grade on # 5 level is 3.5', 11.5oz. silver, 4.7% lead, 6.1% zinc.

The grade on # 3 level is 6.3', 22.3oz. silver, 11.7% lead, 15.5% zinc.

The # 5 level grade, being the lower, will be assumed to be production grade. This represents \$64.50/ton net smelter return.

DEVELOPMENT COSTS:

| | |
|------------------------|--------------------|
| Raise 250' at \$60/ft. | \$15,000.00 |
| Chutes | <u>2,000.00</u> |
| TOTAL | <u>\$17,000.00</u> |

PERSONNEL: 1 miner - 10 weeks

521 MAIN STOPE

About 1000 tons of broken ore remains to be trammed out from the stope. After it is removed the stope should be backfilled with rubble from the surface using a bulldozer. When it is backfilled to the level of the # 6 raise breakthrough mining could resume.

MINING METHOD: The mining method should be shrinkage stoping with the use of a slusher. The mining should be carried up to the # 3 level where

it can be terminated and the stope again backfilled.

Following this, both the footwall and the hanging wall of the drift should be closely diamond drilled to assess the possibility of open pit mining the ore above # 3 level.

ORE: Ore remaining in the hanging wall between # 5 and # 3 level may be from 10 feet to 30 feet wide and the tonnage may be from 6000 to 18,000.

COSTS:

Prepare for backfill

| | |
|--------------------------------------|---------------------------------|
| Block chutes, open raise to surface | \$ 500.00 |
| Backfill (12,000 to 20,000 tons) | \$3000 - \$5000 |
| Prepare for mining: Slush, lay floor | <u>1,000.00</u> |
| TOTAL | <u>\$4,500.00 to \$6,500.00</u> |

511 AND 512 STOPS

The # 1 vein has never been drifted on # 5 level. Some slashing in the wall of # 5 drift last summer exposed considerable well mineralized quartz. From experience, such mineralized quartz fracture filling will occur near veins and projections from # 3 level to # 5 level places the vein about 50 feet into the wall of the drift.

DEVELOPMENT: The mineralization should be followed in to the # 1 vein and the vein drifted on for 520 feet. Raises should be driven up on the 511 ore shoot and on the 512 ore shoot.

The drift should be 7'x3' and 30 lb. rail should be used because this will later be the main ore haulage way from the Wardell zone. Further development may be required following the above to prepare the ore

shoots for mining.

ORE: This development may open up 10,000 to 30,000 tons of ore. # 3 level has two ore shoots. The first one extends over 60 feet from the portal. It is narrow, being only 2.5 feet wide, and grades 12.0 oz. silver, 5.1% lead and 2.0% zinc or a net smelter return of \$47.00 per ton. The second ore shoot is 140 feet long, averages 3.6 feet wide and grades 13.0 oz. silver, 7.0% lead and 16.0% zinc for a net smelter return of \$101.00 per ton.

The amount of tonnage available is difficult to estimate. Mining above # 3 level has disclosed a higher frequency (80%) of ore than that found on the level (48%). The grade is exceptionally good at intersections between the vein and mineralized fractures.

DEVELOPMENT COSTS:

| | |
|------------------------------|--------------------|
| 520' of drifting at \$60/ft. | \$31,200.00 |
| 500' of raising at \$60/ft. | <u>30,000.00</u> |
| TOTAL | <u>\$61,200.00</u> |

TIME REQUIRED:

Double shift: drifting - 4 miners - 8 weeks
 Single shift: raising - 2 miners - 9 weeks

5 LEVEL HANGING WALL VEINS

Three different veins are known in the hanging wall of the # 2 vein on # 5 level. They will be numbered # 3, # 4 and # 5. The # 3 vein has been drifted on for about 80 feet on the # 5 level and 70 feet on the # 6 level. Ore was intersected on both levels and minor stoping carried out. Available assay information gives 3' of 8.9 oz. silver, 5.0% lead and

16.5% zinc over the drifted 70 feet on # 6 level (6 samples; Lou Manning) or a net smelter return of \$89.00 per ton. On # 3 level the ore shoot is 4 feet long and assays (3) average 5.9 feet in width of 7.6 oz. silver, 4.0% lead and 19.1% zinc or net smelter return value of \$92.00 per ton.

The vein is particularly high in zinc. It is not known if this is true of the entire vein or only this particular ore shoot. It has been noted in other veins that lead - zinc ratio can change considerably in different ore shoots. Due to this variation any zonal changes have not been positively identified.

EXPLORATION: The # 3 vein should be diamond drilled from the drift on the # 2 vein on # 5 level. Six holes, each about 80 feet deep, should be drilled from three set ups. Following this 200 feet of the vein should be drifted.

DEVELOPMENT COSTS:

| | |
|------------------------------------|--------------------|
| Diamond drilling; 500' at \$12/ft. | \$ 6,000.00 |
| Drifting; 200' at \$60/ft. | <u>12,000.00</u> |
| TOTAL | <u>\$18,000.00</u> |

4 and # 5 veins have been intersected in one diamond drill hole from # 5 level. No assays are available to the writer. The intersection on # 4 vein supposedly cut 6 feet of vein 3 feet of which was massive sulfides. No information is available on the # 5 vein. Both veins could, depending on strike, be controlled to strong fractures intersected in the # 5 drift.

EXPLORATION: Four diamond drill holes should be drilled from # 5 level in the hanging wall of 521 east stopes to check on the mineralization. The holes could be 80 to 120 feet deep.

| | |
|----------------------------|-------------------|
| COST: 400 feet at \$12/ft. | <u>\$4,800.00</u> |
|----------------------------|-------------------|

THE WARDSELL ZONE

Cat trenching during 1972 and 1973 exposed the main Wardell vein over most of its length. The vein has shown a constant width of about 10 feet over a length of 310 feet except at a vein junction where it increases to 23 feet for a total tonnage, shown on surface, of 372 tons per vertical foot. If the vein persists to the elevation of the # 3 level with these dimensions, a dip distance of 360 feet, the tonnage will be 134,000.

Surface samples in highly oxidized rock gave average values of 16.4 oz. silver, 5.6% lead and 4.1% zinc. Surface samples have shown themselves to be particularly deficient in zinc and somewhat deficient in lead while silver values appear to be little altered. The above values give a net smelter return of \$68.00 per ton. It is thought that the average mined value of \$75.00 per ton will be closer to its true value.

A parallel vein 15 - 18 feet in the hanging wall of the Wardell vein has not been extensively explored. The possibility of mining both veins together should be explored. If the hanging wall vein is of sufficient grade and/or if the intervening rock material contains sufficient fracture mineralization this could be possible, in which case the total tonnage of the zone would triple but the average grade would probably be lower.

Wardell Zone: Drifting on # 2 vein, 300 feet

Double shift - 4 miners - 5 weeks

Diamond drilling - 3 weeks

Cross cutting to and drifting in the footwall of the Wardell zone, 400 feet

Double shift - 4 miners - 7 weeks

Raising to surface, 360 feet; 2 miners - 14 weeks

DEVELOPMENT: Exploration - Development of the Wardell area should commence from the end of # 3 level (5000' el.) From this point a 180 foot cross-cut would be required to reach the projection of the Wardell vein on this level. It is, however, suggested that the # 2 vein, which appears promising in the face of the drift (Face assay - J. D. Galloway: 1.7' - 33.4 oz. silver, 3.2% lead and 0.6% zinc), be followed out for at least 300 feet. This may open a new ore shoot on the # 2 vein and would provide good stations from which to diamond drill the Wardell vein. In view of the possibility that the Wardell zone could hold ore widths in excess of 30 feet, the development must be carefully and correctly placed in order to mine an ore body of that size at maximum efficiency. The following exploration development is therefore outlined:

The # 2 vein and Wardell zone relationship on the # 3 level (5000' el.) is not clear and several factors influence the relationship. On surface a tongue of black graphitic schist separates the two veins. It is not known what happens to this schist tongue at depth.

The general dip of the # 2 vein in the mine is about 50 degrees. This is also the dip measured on the Wardell vein at surface.

No surface dip measurements have been obtained on the # 2 vein and dips less than 50 degrees will occur if correlation is correct. An intersection of the # 1 and # 2 veins will be encountered in 2/3 miles. What effect this has on the relationship of the veins is not known other than that it probably causes an enlargement and enrichment of the ore shoot. 300 feet should now be drifted on the # 2 vein beyond present development. Two diamond drill set-ups should be slashed out and four holes

drilled to a depth of 150 - 200 feet. Subsequently a cross cut over to and through the Wardell zone should be driven (200') and a drift driven in the footwall of the vein. Raising to surface on the vein would follow (360'). With the information from the above exploration, detailed development and production could be planned.

COST:

Total drifting and cross-cutting

- 700 feet at total cost \$60/ft. \$42,000.00

Diamond drilling

- 800 feet at \$12/ft. 9,500.00

Raising

- 360 feet at \$100/ft. 36,000.00

TOTAL

\$87,500.00

ORE MOVEMENT

To efficiently haul ore the level drifts and track must be improved as outlined earlier. 30 lb. track should be put in on # 3 and # 5 levels in to the point of new development and 30 lb. track should be used in all new headings. Ties should be closely spaced. An ore pass system must be established in waste, between # 3 and # 5 levels. The end of the proposed drift on # 5 level on the # 1 vein is probably a good location for such an ore pass as both the # 2 vein and the Wardell vein on # 3 level could be reached with diverging finger raises. It is important that the ore pass reach the Wardell drift as this will probably become a central area of future ore development. The location of the ore pass should only be finalized after the proposed development on the Wardell has been completed.

COST:

| | |
|--------------------------------------|--------------------|
| 500 ' of raising at \$80/ft. (6'x6') | \$40,000.00 |
| Air chute, grizzlies | <u>2,000.00</u> |
| TOTAL | <u>\$42,000.00</u> |

TIME REQUIRED: 2 miners - 9 weeks

EQUIPMENT REQUIRED

| | |
|---|--------------------|
| | \$ 4,400.00 |
| 2 Jackleg machines, Joy (Large) | 2,000.00 |
| 1 Stoper | 3,600.00 |
| 1 Slusher 15 H.P. scraper | 7,000.00 |
| 1 Electric Loci | 6,400.00 |
| 8 Mine cars, 1 Ton | 8,000.00 |
| 1 Power generator - 2 chargers | 2,000.00 |
| 1 Receiver tank | |
| Air and water pipe | |
| 1000' 4" victaulic, 1000' 2" victaulic, | <u>3,000.00</u> |
| 1000' 1" water, 1000' 3/4" water | \$36,400.00 |
| | <u>8,000.00</u> |
| 1 Crew cab | <u>\$44,400.00</u> |

Note:

Included in drift costs -

Total rail required, 24 tons plus 7 switches

2000 board feet ties (4'x6')

OPEN PIT POTENTIAL

A. An area near the # 3 level portal on the # 2 vein has been partly stripped and shows good grade ore in a zone of fracturing. Samples taken by the writer assay 6.1 oz. silver, 6.8% lead and 1.1% zinc over 6 feet and 10.5 oz. silver, 10.2% lead and 4.7% zinc over 7 feet. Broken ore assayed 7.6oz. silver, 8.5% lead and 3.5% zinc. The fracture zone lies off the footwall side of the # 2 vein and may be about 50 feet wide. Of this about 20 feet would grade like the above assays and the remaining 30 feet would be lower grade. The length of the zone is not known.

This zone (50 feet in width) plus the # 2 vein (15 feet in width) plus additional ore in the hanging wall of the # 2 vein as yet of unknown width, could possibly be mined by open pitting down to the level of the # 3 drift, a vertical distance of 40 feet increasing to 80 feet. The total tonnage is unknown but may be in the region of 200,000 tons. The grade should be exceptionally good for open pitting.

EXPLOSION

8 holes should be drilled through the fracture zone from surface and from the drift on the level. The holes should be spaced 50 feet apart and be 100 feet deep. Another 8 holes should be drilled in the hanging wall of the # 2 vein from surface and from the drift. Each hole should be 50 feet deep and spaced at 50 feet. This is a program of 1200 feet.

COST: 1200 diamond drilling at \$15/ft.

\$18,000.00

OPEN PIT POTENTIAL - WARDELL AREA

B. Following the development of the main Wardell vein a diamond drill program should be undertaken to examine the surrounding fractured areas, both on surface and underground. About 120 feet south of and parallel to the Wardell vein the # 2 vein has been partly exposed by trenching. The intervening area consists of white, very competent rhyolite and has been densely fractured. To the north of the Wardell vein are found a number of parallel and crossing veins together with one stripped area, 50x80 feet, well mineralized with fracture filling mineralization (7.4 oz. silver, 0.3% lead, 0.1% zinc and 10.7 oz. silver, 0.4% lead, 0.2% zinc). The limits of the fracture mineralization has not been reached in the stripping. The width of known veins and mineralized fractures north of the Wardell vein is about 320 feet, for a total width of mineralized rhyolite of 440 feet. A preliminary drill program, to be altered and refined as information becomes available, would be as follows: five holes drilled south from the Wardell area and further east from # 2 level to cut the fractures to the south. The holes should be 180 feet deep and spaced at 200 feet. These holes would also cut the # 2 vein.

Three 500 foot holes should be drilled from surface 400 feet north of the Wardell inclined 45 degrees toward the Wardell spaced at 400 feet.

The drill program would total 2400 feet.

Cost: 2400' at \$10/ft.

\$26,000.00

PROPOSED
DRILLING

This exploration target is some 440 feet wide and of unknown length. The grade is unknown but it is interesting to note that if the Wardell vein and the # 2 vein, both of which are contained within this block, give a net smelter return over 12 feet of \$75/ton, as they appear to, then the grade of this entire width (440'), not counting any other mineral than that in the two veins, would be \$4.10 net smelter return per ton. The fracture mineralization and numerous other small veins will substantially increase this figure, which is, of course, close to that required for open pit mining.

Other fracture zones are located on the south side of the rhyolite plug. This area has not yet been explored.

SURFACE EXPLORATION

The surface geology should be mapped in considerable detail and a soil survey should cover the property. Several areas of mineralization are known outside of the mine area and their geological setting, possible extent and relationship to the mine mineralization should be examined.

A cat trenching program could open up a number of known veins for examination and new targets for trenching would be outlined by the mapping and soil survey.

COST: Grid system

17 line miles (7600'x4000'), 400' spacing x \$100/mi. \$ 1,700.00

Geology, 1 man, 3 months 3,600.00

Soil survey, 440 samples 2,200.00

\$ 7,500.00

Cat trenching, D8 at \$40/hr. for 15 days 6,000.00

TOTAL \$13,500.00

GEOCHEMICAL SURVEY

An orientation geochemical soil survey was carried out in 1973 in preparation for a larger program in 1974.

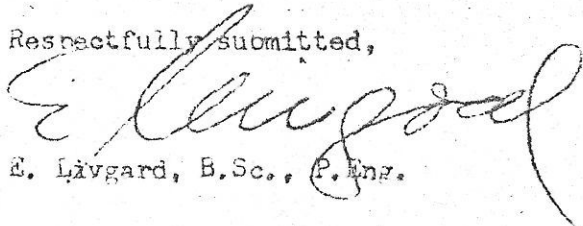
The topography and elevation vary greatly on the property and both contribute markedly to local soil conditions. Soils tend to be shallow above 5000 feet but even there soil development is strong. Below 5000 foot elevation the property is mostly covered with glacial till. Old talus and other areas of new rubble attest to the rapid breakdown of local rocks. Soils below 5000 feet are well developed podzols generally with deep profiles.

Spruce trees predominate below 5000 feet although hemlock, fir and pines are also present. Abundant rain and snow assist in the rapid formation of very acid soils.

The results obtained show a high average value for lead, zinc and silver. Possibly anomalous values could be 75 p.p.m. for lead and 170 p.p.m. for zinc. The highest values were located in a basin extending 2000 feet above the mill. This particular part of the property has poor soil development and the ground is almost entirely covered in "fresh" rubble. In spite of the obvious difficulty of soil collection and probable difficulties in interpreting the results, the basin must be soil surveyed and mapped geologically. The basin lies about 200 feet northeast of the mine and the drainage is such that mineralization there would not contaminate results in the basin. Mineralized rhyolite float, found in the basin, rapid erosion and high geochemical response suggests the possibility that there is here a separate mineralized rhyolite plug.

Other anomalous areas were encountered on the top of the hill above the basin, where a 6 foot vein has been reported but not located, and below the scree slope below the mine area. The latter may be due to drainage from the mine area (2000 feet away) or from mineralization on the south side of the rhyolite plug covered by the scree slope.

Respectfully submitted,


E. Løvgaard, B.Sc., P. Eng.