Cronin Mine
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GEOLOGICAL REPORT

Hallmark Resources Ltd. (N.P.L.)

by

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Vancouver, B.C.
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INTRODUCTION

This report concerns the mine known as the Cronin Mine located near Smithers, British Columbia.

Acting under instruction from the directors of Hallmark Resources Ltd. (N.P.L.), the present option holders of the Cronin Mine property, I have prepared a summary account of the current position of the property.

There have been numerous old and recent geological reports and current progress reports prepared and issued on this property and as a consequence limited reference only will be made to some features of the operation.

The writer visited the property on July 20th and 21st and inspected the surface workings, underground operations and the mill. Present during the visit were Mr. John Wilson, Mr. D. McPhee, Mr. Egil Livgard, P.Eng. and various other personnel.

Weather conditions were excellent for purposes of an adequate examination.

LOCATION & ACCESSIBILITY

The property is located on Cronin Mountain lying in the Eastern contact belt of the Coast Range Batholith. It is about 19 air miles north-east of Smithers, B.C. in the Omineca Mining Division.

The claims can be reached by various roads extending over a distance of approximately 30 miles, portions of which are good and a

minor amount which needs remedial work. The roads are essentially gravel or dirt type in nature.

Elevation of the mill and camp buildings is 3,750 above mean sea level, while the highest point on the surface mineral showings approximates 5,425 M.S.L.

Smithers is the nearest town. Its population approximates 5,000 persons and it is 225 miles by road or rail from the seaport of Prince Rupert and 875 miles by road from the lead-zinc smelter at Trail, B.C.

The area is served by Pacific Western Airlines and can readily be reached from southern British Columbia points. General mine supplies would in all likelihood be supplied through Vancouver, B.C. sources.

CLAIMS

The property consists of 8 Crown granted mineral claims and 27 claims held by right of location under the Mineral Act of the Province of British Columbia. The Crown granted claims are as follows:

	Lot Number
Sunflower Fraction	7417
Sunflower	7418
Homestake	1859A
Bonanza	1860A
Eureka	1861A
Lucky Strike	1862A
Babine Chief	1863A
Bulkley Pioneer	1864A

Located claims are:

	Recorded Number
Jim Fraction	12081
Sunny #1 to #3	93381 to 93383 inclusive
Sunrise #7	7894
Del #1 to #12	112982 to 113993 inclusive
View #1 to #8	115655 to 115662 inclusive
Mill #1 to #2	115663 and 115664

The claim groups are represented on accompanying maps.

ACREAGE

The claim group embraces 1,750 acres, more or less, and covers all the known mineral showings in the immediate area.

TITLE

The Crown grants and the Del claims are held by Hallmark Resources Ltd. (N.P.L.) under a purchase agreement with Kindrat Mines Ltd., while the located claims are owned by Hallmark Resources Ltd. (N.P.L.) through direct purchase from Messrs. B.F. and Melvin B. Messner.

HISTORY

Initial discovery of mineral was made on the claim area in 1905 and in the 1908-09 period Mr. J. Cronin formed Babine Bonanza Mining and Milling Company. Various forms of work were carried out on the

property over the years and varied changes took place in the corporate identity of the operation (see Geological report of Mr. J.A. Mitchell; October 25, 1972, for specific details).

Currently an option is held on the claim group by Hallmark Resources Ltd.

TOPOGRAPHY

The claim group lies on a mountain in the Babine Range which forms a part of the Coast Range.

Elevations are variable and can lead from canyon like topography to areas that more closely resemble Alpine meadows in nature. There are well timbered slopes and drainage patterns are well established.

Lower slopes contain good stands of pine, balsam and spruce suitable for any mining purpose. The tree line occurs at approximately 5,200 feet.

Precipitation is moderate and is about 30 inches, annually, at Smithers. The snow fall would be greater at the mine and would approximate 3 to 4 feet. With adequate base roads it would be no problem to maintain year around operations.

GEOLOGY

The general area is one where intrusion and its resultant metamorphism has taken place. The intrusive rocks are generally granodioritic in nature and have been intruded into volcanics and sediments of the Hazelton series.

rhyolitic

In the vicinity of the mine the intruded rocks are metamorphosed graphitic argillaceous schists, sericitic schists and quartzites while the intrusive rocks vary from granite porphyry to rock of rhyolitic composition.

Lt. grey rhyolite

The mine stock is very irregular in outline and its extent still remains a matter of question but is ample for establishment of a mining operation. The shape is broadly elliptical with a long axis in excess of 2,500 feet and a width exceeding 1,000 feet.

During intrusion intense shearing and fracturing has taken place in all rock formations. The predominant fracture patterns are in northeasterly and northwesterly directions with the former being the predominant trend. The argillitic rocks offer more resistance to fracturing than the more siliceous porphyries and rhyolites.

The main northeasterly trending fracture has a tendency to follow the Rhyolite - Sericite Schist contact and passes entirely into the Sericitic Schist to the southwest. The fracture has been traced in the Schist for a distance exceeding 500 feet.

ROCK TYPES

1. Rhyolite

The large stock containing the larger portion of the economic ore bodies has been classified as rhyolite. The material is essentially a fine grained granite porphyry that grades into true rhyolite as the margins of the body are approached. It is white to buff in colour and assumes a bleached and slightly oxidized appearance in the vicinity of strong mineralization.

The rhyolite forms the main plateau above the mine site and the steep bluffs south of the mine.

There is another rhyolite stock lying about 1,500 feet north-east of the main body. This stock is also mineralized.

2. Argillite

The argillite rocks have been metamorphosed and in the fault and vein zones become a graphitic-argillaceous schist.

The argillaceous schists lie north-east and south-west of the main rhyolite stock. This material forms most of the scree slopes between the upper reaches of the mine and the campsite.

3. Sericite Schist

The sericite schist is undoubtedly a derivative of the intrusive metamorphism and as such carries a considerable amount of associated quartz. It is essentially competent and contains some of the vein zones that will possibly reach ore grade. It cannot be classed as favorable a host rock as the rhyolite.

The sericite schist lies north-west of the rhyolite and forms the more gentle slopes and plateaus on the higher reaches of the mountain.

4. Hybrid Rocks

As can be generally expected when intrusion takes place there will be certain changes creating hybrid rock conditions. As a result a dark grey to black, rather soft, blocky rock type has been identified as a hybrid rhyolite, while is actually a combined argillite-rhyolite. It is highly metamorphosed and its main occurrence to date has been noted on

See sa. no. C-31 from No. 3 level ?

the hanging wall of the No. 2 vein towards the end of the 3rd level.

5. Dyke Rocks

The main dykes are slightly more basic than the main rhyolite mass and may have a close genetic relationship. Contacts are often poorly defined and have a tendency to follow irregular fractures. The strike is predominantly north-east and the dip is commonly 35° south-west but may assume much steeper angles. The dykes, in general, cut through the ore but also give indication that they may have been late in origin when considered against time emplacement of the ore.

Lamprophyre dykes occur on the 5th level of the mine in graphite and sericite schists. This occurrence is about 500 feet south-west of the "Wardell" vein system. The dykes are well defined, strike north-westerly and dip steeply to the south-west. In all observed cases they cut the mineralized zones.

STRUCTURAL GEOLOGY

The entire structural concept and control that exists for the ore-body contained on the Hallmark Resources claims must be related to the effects created by the intrusion of the igneous stocks into volcanic and sedimentary beds.

When such intrusion occurs there are unlimited stresses and strains created that result in primary and secondary fracture patterns. These will in general follow the principles that are present in the theoretical "Strain Ellipsoid" in regard to directional trends and will also be controlled by the competence of the overlying beds that are being invaded.

I would describe the Hallmark ore occurrence as a fairly classical example of the above principle.

The predominant fault direction is north-easterly with a complementary relief pattern existing to the north-west. There are undoubtedly more than one age involved in the fractures created since adjustment faults always follow major upheavals. The faults and fractures are those related to tension effects in this case.

The vein systems on surface are reflective of the fracture action and should, for this reason, be closely examined and mapped. Extrapolation to the underground workings will then be rendered more useful in delineating the ore occurrences.

Displacement on surface faults appears to be minimal and may be about 100 feet.

Faulting underground may be of an insignificant nature but work carried out so far is not sufficient to be definitive in this regard. There appears to be little doubt that the main faulting action may lie along the outer limits of the main stock with subsidiary faulting within the body of the stock. Only close detail work will establish this premise.

The fault pattern developed in the ore zone will in all likelihood tend to be erratic based on the competence and incompetence of the rock being traversed. This in turn is bound to create both horizontal and vertical irregularity in the ore bodies which appear to be controlled and an incipient part of the fault and fracture pattern.

MINERALIZATION

The mineralization consists of sphalerite, galena, pyrite, boulangerite, chalcopyrite, arsenopyrite and freibergite in a quartz matrix. Oxidation products are present on and near the surface. Yellow staining that may be attributed to cadmium or arsenic is commonly present. *

Leaching of mineral components in the surface veins is not uncommon and it is necessary to trench the rock surface to obtain a proper appreciation of the mineral potential.

The trend of mineralization in the vein exposures underground follows the typical pattern of tension fractures ranging from narrow to wide occurrences depending on the surrounding rock competence.

Fractures may range from narrow zones measured in inches to intensely fractured areas where general dissemination of the mineralization takes place, such zones range in multiples of feet. The rhyolite zones tend to be more prone to the latter pattern and this can be attributed to their high silica content and consequent brittleness.

There are indications from limited sample analysis that the sphalerite and freibergite content increase with depth in relationship to the galena. This can be considered as a favorable feature for depth continuity of the ore occurrences. I agree ✓ ✓

There are also indications that two and possibly three different ages of mineralization can be recognized. The first period introduced mineralization together with considerable quartz, this being a natural course of differentiation within the stock. This period of mineralization

appears to be more closely related to the hanging wall area. Apparent movement along the footwall created secondary openings which gave rise to passage for higher-grade mineralization and a diminution of quartz content.

The third period is one which occurs in separate veins and lenses on the footwall and largely contains boulangerite.

Again it must be re-iterated that the above conclusions require close detailed study over a broader base than now exists.

ECONOMIC CONSIDERATIONS

There appears to be little purpose served in repeating a series of economic facts relative to the ore that are present in the report previously submitted by Mr. J.M. Mitchell, P.Eng., on pages 18, 19 and 20 and dated November 6, 1972.

The ore is the same now as was then seen and any recent assays examined by the writer as in general accord with the results reported by Mr. Mitchell.

Surface samples are now being taken and assayed for greater control of the mineralized area that would allow a controlled diamond drilling program to test downward extension of the broader aspects of the potential ore body. Some recent samples from this program are as follows:

Location	Lead %	Zinc %	Silver oz/ton	Gold oz/ton	Copper %	Cadmium %
#1 15' of Wardell Vein	5.00	0.66	10.2	0.08	0.03	0.013
128' of fracture west of above	3.79	1.16	7.35	0.03	0.03	0.018
12' of Wardell Vein 60' N.E. of #1	52.2	8.95	110.00	0.10	0.11	0.135
3' of ore 35' N.E. of #1	18.9	12.5	121.90	0.06	0.41	0.170
Leached fracture 66' wide 460' N.E. of sample immediately above	6.84	3.01	7.51	0.01	0.44	0.051

Ore shipments and assay calculations in detail, relative to work up to the time of Mr. Mitchell's report, are also present in his report as appendices 2 and 3. Recent work has done little to alter the results reported.

High-grade ore continues to be a common occurrence in the mine workings.

VEIN SYSTEMS

Considerable surface exploration has been carried out over a broad zone comprising the surface exposures of the mineral bearing veins and fractures. The work has comprised shallow shafts, pits, bulldozer trenches and shallow stripping. It has been revealing of a large number of mineral exposures and has to a limited extent defined trend directions of fracture systems.

Frankly, unless one is highly conversant with the mineralized area the situation must be classed as very confusing. There are so many exposures that they have a tendency to obscure the primary and secondary trends. There is no particular doubt as to the basic reason for the fractures but it is imperative to establish the primary and the secondary fractures as entities, establish their trend direction, secure knowledge of their length and ultimately establish map control through which proper survey control will allow extrapolation of the systems into the lower levels of the mining operation.

Subsequent to obtaining the above information areas between the fracture systems should be examined for mineral dissemination since it remains to be established whether or not grounds exist for consideration of an open pit operation in the highly fractured surface area.

To date at least 30 veins and vein segments have been exposed in the main rhyolite stock.

Mr. Emil Livgard, B.Sc. P.Eng. who has been mine engineer at the Hallmark Resources property for the past three years has prepared a summarized version of the present information on vein trends, vein description and ore occurrences within the vein and fracture systems, both on surface and underground. I see no reason, without very comprehensive and detailed examination, not to accept the basic premises that he has advanced. His work has resulted from day to day observations over a period of time and will represent current conditions on surface and indicate the present work on varied levels of the mine.

Constructive mapping and surface control must be added to this information in order that forward planning is more likely to delineate ore bearing zones and thereby allow a more specific calculation of proven ore.

Present methods, while well meant, have tended to be disoriented in the establishment of "controlling" vein systems that will ultimately provide the main mill-feed for a successful operation.

Mr. Livgard's synopsis is being submitted as an exhibit to this report. The summary is of current date.

RESERVES

There is no specific purpose to be served in making reserve calculations at this point. Reports submitted by Mr. M. Mitchell, P.Eng. (November 6, 1972) and by Mr. Livgard in the synopsis mentioned immediately above, indicate that ore of consequence exists on the Hallmark Resource claim block. Portions of this may be classified as proven and probable ore but currently it is more to the point to carry out underground operations to the state where a feasibility study would indicate ore volume of sufficient quantity to warrant a mill whose capacity would exceed 200 tons per day. Location, transportation distance and general fluctuation within the metals market, and variations in ore grade require a tonnage of the above nature. Confirmation of surface pit operations would correspondingly demand a mill of larger capacity.

BUILDINGS

The mine is currently operated from a trailer camp set-up located

at the 3,750 foot elevation. This is satisfactory for present purposes and meets all mining and labour board requirements.

The company has been operating an antiquated mill at a capacity of approximately 40 tons per day. It has been fed with relatively high grade silver-lead-zinc ore and the concentrate was shipped to the smelter at Trail, B.C. Due to the recent strike at the smelter, milling operations at Hallmark have been suspended.

The mill at best can be classed only as a means to an end - it produced some revenue. The building, equipment and general operation could really do nothing but cost money and served to deplete the high-grade ore supply from the mine. Money spent on maintaining the mill could be spent to much better advantage in advancing the underground workings.

CONCLUSIONS

1. The mineralized zone under development on the property of Hallmark Resources Ltd. (N.P.L.) has excellent potential to become an economically profitable mine.

2. The multiplicity of veins and the silver-lead-zinc grade must be classed as well above average for a primary prospect.

3. Considerable work has been carried out both on surface and at various levels underground and while a great deal of information has been secured the most necessary operation now is co-ordination of this information so that more organized advancement can be made and consequent ore reserves and other pertinent data can be confirmed.

4. Management has done a very good job within the financial resources available to them.

5. The present mill should remain shut down since its cost of maintenance and its lack of efficiency far exceeds the monetary return it may contribute.

6. The road within a 5 or 6 mile distance of the mine buildings needs considerable attention before any major operation is carried out at the mine.

7. Adequate portals and other facilities should be established at the adit levels if work is to be carried out during winter months.

8. Considerable work and effort has been spent on the surface showings but this must be closely mapped and the work co-ordinated to a far greater extent than presently exists since this may well contain the structural answer and provide the necessary control to mine the potential ore body.

9. Ultimately a deep level tunnel should be driven at approximately the camp level (3,750 feet). This would eliminate many problems that would be inherent to operation on the mountain. Haulage, servicing and the general benefit of dropping ore by gravity methods would decrease mining costs by a considerable amount.

10. Alternate sources for concentrate marketing should be investigated.

RECOMMENDATIONS

1. A full and comprehensive survey be made of all vein and fracture zones within the surface mineralized area on Cronin Mountain. Spot assays to be made along the various trends and the intervening areas between fracture trends should be examined and where indicated sampling should be done.

2. In conjunction with the above a fracture and assay pattern map should be completed.

3. There should be an instrumental survey carried out which factually ties in surface points with the various adit levels and from such more precise extrapolation of vein and fracture zones can be made.

4. No general purpose can be served by keeping the present mill in operation.

5. Underground mining should continue and the resulting ore stock-piled either for direct shipment or for ultimate milling. More benefit is to be gained by advancing the workings of the mine at lower levels.

6. A minimum crew should be retained for mining purposes. One or at most two shifts should suffice for current operations.

An approximation of the finances necessary to initiate the program mentioned above would be:

Phase 1

Surface mapping and sampling of vein zones and ultimate correlation	$ 10,000
Drifting cross-cutting, raising embracing approximately 1,500 feet	150,000
Camp maintenance, transportation, etc.	20,000
	$180,000

Phase 2

Contingent on the success obtained from Phase 1 a full scale mining operation should be inaugurated. It is not reasonable or possible to place monetary figures on this situation until adequate knowledge exists but it can be said that major financing would be necessary to advance the underground development to a stage where daily mill-feed could be assured. In addition a new and adequate mill would be a primary necessity.

Respectfully submitted,

F.L. Croteau, B.Sc.
P.Eng. P.Geol.

Vancouver, B.C.
September 20, 1974

CERTIFICATE

I, F.L. Croteau, of 675 West Hastings Street, Vancouver, in the Province of British Columbia certify that:

1. I am a graduate of the University of Saskatchewan and hold the degree of B.Sc. in Mining Geology. Year of graduation was 1936.

2. I am a Registered Professional Engineer in the Province of British Columbia and in the Yukon Territory, a Registered Professional Geologist in the Province of Alberta and hold a licence to practice Professional Engineering in the Province of Saskatchewan.

3. I have practiced my profession in Canada, the United States, Mexico, Africa, the West Indies and carried out consultative opinions in Costa Rica and South America.

4. I carried out personal inspection of surface and underground facilities, staking and general aspects of the Hallmark Resources Ltd. (N.P.L.) property that was the subject of this report.

5. I have reviewed government, personal and other reports and maps relative to the operation and had personal discussion with mine personnel, prospectors, etc., acquainted with many years of history of the area.

6. I have no interest direct or indirect in Hallmark Resources Ltd. (N.P.L.) nor do I expect to receive any such interest.

7. Hallmark Resources Ltd. (N.P.L.) has full permission to use this report for any necessary corporate purposes.

F.L. Croteau
P.Eng. P.Geol.

Vancouver, B.C.
September 20, 1974

BIBLIOGRAPHY

1. Various B.C. Minister of Mines Reports.

2. Reports on Cronin Mine, Smithers, B.C. by J.M. Mitchell, P.Eng. dated November 6, 1972, and March 20, 1974.

3. Various reports by E. Livgard, P.Eng.
   - Feasibility Report, October 27, 1972
   - The Cronin Mine - undated
   - Hallmark Resources Ltd. (N.P.L.)
     Cronin Mine - Proposed development Program during 1974

4. Vein System, E. Livgard. Included as an appendix in Croteau report.

APPENDIX

Vein System - E. Livgard, September, 1974.

VEIN SYSTEM:

Some thirty (30) veins and vein segments have so far been located in the main Rhyolite stock. The large majority of these veins fall into one of four strike dip directions these are:

	ATTITUDE	VEINS
1.	N 40° E /45-50 NW	#2 vein, Wardell vein, 3 vein
2.	N 60° E /65-75 NW	#2 vein on 2 level, #1 vein segments B and C
3.	N 80° E /East-west / 55-65 N	#1 vein segment A, 2E vein, 2 cross veins at Wardell
4.	N 70° W /55 N (?)	#1 vein segment D, 6 cross veins at Wardell

VEINS:

#1 Vein

The #1 vein has been drifted on three levels for three hundred and eighty feet (380), one hundred and twenty (120) feet of this is ore for an ore frequency of 32%. The vein follows fracture "three" for most of its length in the centre and fracture "two" on each end. The centre dips sixty-five degrees North west and the other segments sixty-five to seventy-five degrees North-west. The vein has been exposed on three level, one level, surface and in a raise and stope (312) between one level and surface.

ORE:

Three Ore lenses have been found. The First Lense, 11, is exposed over sixty (60) feet near the portal. The Ore is narrow, 2.15 feet, and when taken over a minimum mining width of 2.5 feet, low grade. Judging by surface exposures in the cliff above the portal the Ore may

extend up for fifty (50) feet, forming an ore block with about seven hundred and fifty (750) tons. The ore control reasons for the location of this ore lens are unknown.

ORE LENS 13 has been exposed for sixty (60) feet on three level. It lies under a thirty-five degree dipping dyke which cuts the ore. It is not known if the ore continues as the drift has followed a different fracture on the other side of the dyke. The ore control placing the ore here may be a slight fold in the vein having caused an open space by movement along the vein and a possible damming effect under the dyke. The ore has been partly mined, three hundred (300) tons remain, or more if the ore extends up under the dyke for some distance.

THE THIRD ORE BLOCK, 12, lies above one level at the junction with an eighty degree dipping vein forming a wide high grade ore shoot. The ore control here is obviously the good open spaces having formed at the intersection of two veins. The ore continues north-east after the intersection and the ore control may be open spaces formed by folding and movement as well as vein intersection by numerous small fracture veins. Sixteen hundreed (1,600) to twenty eight hundred (2,800) tons of good grade should be available for mining.

ORE POTENTIAL:

The two ore lenses on three level go down below the level but have not been explored for on five level. Using the calculated ore frequency some sixteen thousand (16,000) tons is potentially present between the two levels. The vein projects down to five level one hundred and fifty (150) feet south-east of five level cross-cut. Two other potential ore zones lie

at each end of the vein where drifting has shifted from fracture "three" to fracture "two". Possible ore may continue along fracture "three" in each end, a distance of seventy (70) feet near the portal and two hundred (200) feet in the south-west end between the dyke and a projected junction with the #2 vein. The vein has never been explored between the two dykes cutting it at three level and one level. The distance between the dykes is about forty-five (45) feet.

#2 VEIN

This vein follows a "one" fracture on five level and three level dipping generally forty-five degrees, but to connect the vein through, between the levels it will need to shift to a steeper dip probably following a "two" fracture (Dip 65°) for some distance. Between three and two level this vein shifts from a "one" to a "two" fracture and a wide ore shoot is located at this point. On one level the vein is apparently back to a "one" fracture.

The vein is not exposed on six level, has been exposed on five level for two hundred and forty feet (240), on three level for five hundred and thirty (530) feet, on two level for two hundred and forty feet (240), on one level fifteen (15) feet, and on surface intermittently over three hundred (300) feet in cat trenches. This totals one thousand and twenty-five (1,025) feet of drifting on the vein, four hundred and forty-five (445) feet of which was in ore. The ore frequency is 43% which is high and very favourable.

ORE

THE 21 ORE LENSE extends from the junction between two vein

and two east vein for eighty feet on five level and one hundred feet on three level and on up to surface. The ore between five and three levels has been largely mined out except for some low grade hanging wall ore. Above three level about three thousand (3,000) tons remain between the level and surface. The ore control on this lense is obviously its junction with the 2E vein and the ore narrows down away from the junction.

THE 22 ORE LENSE starts above three level, it lies where two vein has shifted from a "one" fracture to a "two" fracture and the steepening of the vein caused open spaces on movement. In addition the movement fractured the hanging wall at the change of dip causing open space which filled with mineral and quartz in a wedge shaped ore body reaching a width of twenty to thirty (20 - 30) feet on two level. It becomes necessary to postulate two periods of movement, the first fracture the hanging wall and the fracture ore was emplaced, the second reopened the foot wall and the higher grade foot wall ore was introduced. The wide fracture ore apparently dissipates shortly above two level or about at one level as the vein dip returns to its normal forty-five degrees. The foot wall ore should also theoretically pinch out some distance above one level but mineralization in the scree slope on the vein above one level indicates an extension of the ore as does good surface exposures. The 22 ore lense extends over a length of one hundred and twenty (120) feet. It plunges down ten to twenty degrees toward the south-west following the theoretical junction of a "one" and "two" fracture. It terminates at a general area of weak faulting. The reason for its termination is not clearly understood.

THE 23 ORE LENSE is of the same shape and probably on the same intersecting fractures as lense 22. The two are separated by a thirty to forty foot waste section. Lense 23 is ninety (90) feet long. No reason can

be seen for its termination. The twenty degree downward plunge brings part of it below three level over a distance of twenty-five (25) feet. Theoretically the vein should flatten to forty-five degrees right at the end of two level. The flattening is not pronounced (fifty-eight degrees).

ORE POTENTIAL

Diamond drilling below six level has indicated down dip extension of the ore. The extent and amount is totally unknown. There should be an ore block between six and five levels as the vein shows eighty (80) feet of narrow ore on five level at its junction with the 2E vein. A possible extension of the two vein through its junction with the 2E should be checked. The vein between five and three level has ore possibilities other than the 21 ore shoot although neither level shows other ore. This is based on the fact that the vein has to steepen at some point between the levels to connect and this steepening should be favourable for mineralization similar to that in 22 and 23 ore shoots. Calculations indicate a rough maximum potential of ten thousand (10,000) tons. Between three and two levels the wide 22 and 23 lenses have been mined. Ore remains above two level but its extent and possible connection to surface is unknown but of considerable tonnage potential (maximum 32,000 tons).

The south-west extension of the two vein on three level past 23 ore shoot, a drifted distance of two hundred (200) feet does not give a clear picture and it is possible that the vein in the drift is not the proper two vein and that the two vein lies from zero to forty feet in the foot wall of the drift. There are two veins in the drift one dipping eighty degrees north-west and the other about fifty degrees. The eighty degree vein is mineralized though not sufficient to be ore. The silver to lead ratio is

4.2 oz. to 1% or twice as average. This makes the vein of special interest. Possibly the proper two vein shows at the very end of the drift and it will apparently intersect the eighty degree vein, fifty (50) feet ahead of the face and this junction has high probability of being ore.

THE 2E VEIN

The 2E vein follows a "three" fracture which forms a junction with a "one" fracture and the two vein. This junction has been followed below five level in an incline and six level established eighty (80) feet below. On six level the 2E vein has been drifted out East fifty (50) feet. The vein has been exposed for two hundred and fifty (250) feet on five level, half of which is ore. The vein has been exposed for ten (10) feet in a cross cut on three level. It is mineralized but probably too narrow to be ore. The vein has been cut by raises above the level and mined one and a half to two feet wide to surface.

ORE

The vein shows fifty (50) feet of ore on six level at its junction to the two vein. It possibly extends further east. It is about four (4) feet wide. On five level the ore shoot is one hundred (100) feet long and two (2) feet wide. The ore has been mined to thirty (30) feet above six level, but about fifteen hundred (1,500) tons remain to be mined between the two levels. The ore above five level has been partly prepared for mining and the stope has a maximum potential of seven thousand (7,000) tons to three level. It would be necessary to take some dilution as the vein is narrower than a minimum mining width of 2.5 feet.

The vein cuts through the two vein and forms another junction with

the three vein, fifty (50) feet in the hanging wall of the two vein. The vein has been mined at this junction but the stope is not accessible for examination.

The junction of the 2E vein and the three vein has only been exposed on five level and some ore potential exists on this junction from six level to surface. The junction has been projected to lie fifty (50) east of the end of 330 drift on three level. The eastern end of the vein intersects graphitic schist and no ore can be expected in the schist.

The vein shows an ore frequency of forty-eight per cent (48%). All ore frequency calculations will tend to be higher than their true value as drifting will be terminated in waste but generally not in ore.

THE #3 VEIN

This vein is parallel to the #2 vein, a "one" fracture, and lies fifty (50) feet in the hanging wall. A cross cut on six level has intersected the vein and it has been drifted on for forty (40) feet. The vein is exceptionally high in sphalerite on both six and five levels. Freibergite is found with the sphalerite and causes good silver values. The mineralization may have changed slightly at the six level due to depth zoning showing an increase of sphalerite and freibergite. Theoretically the best silver ore shoots should be at or below this bottom level.

The vein has been drifted on for eighty (80) feet on five level, showing twenty-five (25) feet of ore, and one hundred and fifty (150) feet on three level showing no ore for an ore frequency of twenty-four per cent (24%). The vein on three level is indistinct, it contains minor mineralization and show ten to twenty (10 - 20) feet of quartz filled fracturing with

minor galena and sphalerite. There is doubt about the veins continuity both between six and five level and five and three level. It is possible that the three exposures are three separate veins.

ORE POTENTIAL

An ore block with about one thousand (1,000) tons may be found between six and five levels. Minor stoping has been carried out above five level. The stope is not accessible and it is not known if ore remains in the back. The junction of three and 2E veins has not been exposed on three level and may contain ore.

Nothing is known about the three vein above three level except that the strong Wardell vein lies approximately in the right position to be an extension although a wide graphitic schist zone lies between the two.

SURFACE VEINS

#2 VEIN

The #2 vein has been exposed on surface from the vicinity of #2 shaft and four hundred (400) feet south-west where it terminates probably by faulting. The trenches on the vein indicate widths from ten to twenty (10 - 20) feet. The vein is very highly oxidized, more so than any other vein on the property, and apparently will carry very good grades in fresh material. The strong oxidation opens the possibility for secondary enrichment at depth. The measured dips and the location gives a projected connection to the forty-five (45^{o}) degree dipping 2 vein on #3 level but not to the sixty-five (65^{o}) degree dipping portions on #2 level without adjustment in the dip.

The ore potential on the vein above #2 level is considerable (in the order of fifty thousand tons), and as it is within easy reach of mine development, diamond drilling to determine the exact ore location and extent should have first priority.

WARDELL VEIN

The probable fault terminating the #2 vein may have shifted its south-west extension one hundred and twenty (120) feet north to what is named the Wardell vein. An old pit has exposed very good grade over ten to fifteen (10 - 15) foot width. It terminates to the north against graphitic schist (probable fault location) and on the south against a more westerly striking vein (Wardell south vein). The vein dips forty-five (45°) to fifty-three (53°) degrees northerly. Projections to possible connections with veins in the mine are very uncertain due to the distance between them and the intervening schist. A fifteen to twenty (15 - 20) foot dyke cuts the vein near the contact to the schist and apparently dips about thirty-five (35°) degrees westerly.

THE WARDELL SOUTH VEIN

This vein or vein segment has been exposed for two hundred (200) feet. It is narrower being two to eight (2 - 8) feet wide but shows strong fracturing on the hanging wall with a high percentage of mineralized quartz which may be ore grade. Some one hundred to one hundred and fifty (100 - 150) feet of the exposed vein may be of ore grade. The west end of the vein lies in sericite schist on both hanging wall and foot wall and the vein weakens on encountering the schist.

THE HOME STAKE VEINS

The south westerly extension of the vein system from the end of the Wardell South Vein is named the Home Stake Veins but is still part of the same main fault system.

From the end of the Wardell South Vein the vein traverses three hundred (300) of the sericite schist. It is poorly exposed in the road fifty to eighty (50 - 80) feet south of Wardell South Vein. For another seven hundred (700) feet it is intermittently exposed having generally a rhyolite foot wall and sericite schist hanging wall. Further south west the break goes entirely into sericite schist.

Where the vein has both hanging wall and foot wall walls the vein appears weak. Where it has hanging wall schist and footwall rhyolite it is strong in many places of undoubted ore grade. A large number of dykes cut the vein in this area and dykes following both hanging wall and footwall have been mapped. The dykes cut the vein into smaller possible mining segments. Of this total distance of one thousand (1,000) feet some three hundred to five hundred (300 - 500) feet is potentially of ore grade. The further south westerly extension is exposed only in the Eureka shaft, an old incline not now accessible, which from material on the dump followed a mineralized quartz vein. Mineralized float has been found for another one thousand (1,000) feet. The Home Stake workings consist of a forty (40) foot crosscut, a seventy (70) foot drift on the vein and a fifty (50) foot internal incline on the vein. The vein in the drift is irregular but shows some high grade lenses. The incline followed a four to five (4 - 5) foot wide quartz vein poorly mineralized.

CROSS VEINS

Some sixteen (16) cross veins have so far been located in the vicinity of the main break and with further trenching additional veins could be exposed. These veins strike roughly east-west and dip about sixty-five to seventy-five (65 - 75) degrees northerly. They are narrow being usually six (6) inches to two (2) feet wide but reach widths of twelve (12) feet at vein intersections (312 stope). Because they are narrow the ore frequency will be low. Intersecting veins appear to be favourable for ore deposition and when encountered is very good grade.

FRACTURE ZONES

Dense fracturing extends on both sides of the main break over a width of up to five hundred (500) feet in the rhyolite stock. The fracturing has been mineralized in varying degrees from ten per cent (10%) combined lead-zinc to no noticeable mineral. The mineralization is either pure sulphides (PbZn) coating hairlike fractures and up to two (2) inches wide or specks in a quartz stock work. The degree and extent of such mineralization is difficult to determine due to surface oxidation and over-burden cover. No trenching or other exploration has been carried out to specifically look for this type of mineralization.

On the footwall side of the end of the main break near #3 level portal surface mining has been carried out on this type of mineralization. A sample across sixty-six (66) feet assayed 6.84% Pb, 3.01% Zn and 7.51 oz. Ag per ton. This fracture zone appears to extend southerly for some four hundred to five hundred (400 - 500) feet. On the hanging wall side of the main break in this same area the rhyolite is stained as though having

been mineralized and minor sulphide (PbZn) fracture filling has been found.

On the hanging wall side of the main break at the Wardell and Wardell South Veins, a distance of four hundred (400) feet, the rhyolite has been strongly fractured. The rock contains a high percentage of mineralized quartz veining and sulphides coating fractures have been found. A sample across the best mineralized part of this fracture zone assayed 3.79% Pb, 1.16% Zn and 7.35 oz. Ag per ton across one hundred and twenty-eight (128) feet. The sampling also included three to four (3 - 4) one (1) foot wide mineralized veins. The total width of the fracture area including cross veins on the footwall side of the main break is about three hundred and fifty (350) feet.

The degree and extent of fracture type mineralization is such that the probability of finding a mineralized body of rock amenable to open pit mining is very favourable.

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