REPORT

OF

PRELIMINARY EXAMINATION

OF THE

PARADISE MINE

INVERMERE, B. C.

For Goldfield Cons. Mines Expl. Co.
San Francisco, Cal.

By: Charles C. Starr,
July 30, 1928

INTRODUCTION:

This report is based on a one day inspection of the mine accompanied by Dr. O'Neill, the Consulting Geologist of the Company, and a study of the Company's maps covering about an equal time. The intent of the examination was not to finally decide as to the value of the mine, but to determine whether a more thorough examination was justified by the showing, when balanced against the price asked for the property.

SITUATION:

The property is located in the Golden Mining Division, eighteen miles by road west of Invermere. A branch of the C.P.Ry. is about a mile beyond Invermere and the station is knows as Athalmer.

TOPOGRAPHY:

The mine is situated near the bottom of a basin, just at timber-line, the tunnel portals being on the S-E slope of a bare ridge, the lower one at an elevation of about 7800 feet.

The camp and mill are 300 feet lower near the lip of the basin. In the vicinity of the mine portal and camp, the hill slopes are steep but smooth, but many parts of the area are very rough and precipitous.

WATER TIMBER & POWER:

Springs in the basin supply water for the camp and are believed to be sufficient for the 50 ton mill also. There are splendid sites for waterpower development on Toby Creek, along the road, at an airline distance of 3½ miles

from the mine.

The power used at present is internal-combustion engines.

Since the mine is at timber-line, all timber must be hauled up. The Company have a sawmill on the road three or four miles from the mine, where they cut and saw all their timber, which they state costs $20 per M., delivered

PROPERTY: There are eight or ten claims in the group. The principal ones are Crown Granted; two others are held under lease and bond as being of possible later value if the ore pitches beyond the lines of the claims owned. The Property is held under lease and bond by the Victoria Syndicate (the British Columbia organization of the Mond Nickel Co.) from the Honorable Randolph Bruce, Lieutenant Governor of the Province. The price asked by the Victoria Syndicate is $310,000; $110,000 cash to clear the claims of Mr. Bruce; the purchaser is then allowed to operate the mine for two years paying 15% royalty, to apply on purchase price, on all concentrates produced; the remainder of the purchase price ($200,000) is due at the end of 2 years. The General Manager of the Company is Colonel H.H.Yuill, Victoria Syndicate, Kaslo, B.C.

TRANSPORTATION: The branch of the C.P.Ry. at Athalmer runs two trains weekly in each direction. From this station a good mountain road leads for 12 miles up Toby Creek to Jackpine, a teamsters camp, thence up Spring Creek over several switch-backs six miles to the mine.

An aerial tramway can be built to the valley of Toby Creek, having a length of about three miles, at an estimated cost of $60,000.

Ore and concentrate is now being hauled down for about $6 per ton; this figure includes hauling back the necessary supplies. For an up haul only, the charges are from $15 to $18 per ton. Hauling is now being done largely by trucks in the summer and by caterpillar tractor in the winter.

Snow did not prove any great handicap to the work last winter although there was intermittent trouble from drifting.

HISTORY: The mine has been worked for many years by Mr. Bruce, who took out the high grade parts of the carbonate ores and shipped them direct to the smelter. He is said to have made a net profit of not less than $350,000. The high-grade carbonates being practically exhausted, he offered the property for sale and it was taken over by the Victoria Syndicate about two years ago. They have done a considerable amount of development, and built a 50 ton flotation mill to be used as a pilot plant.

DEVELOPMENT: The mine has been developed by three tunnels at elevations of 8100, 8000 and 7800 feet, and by numerous intermediate blind levels. Most of the upper levels have caved; disregarding these entirely and considering only the 7800 ft level (the lowest), and the now active intermediate levels between it and the 8000 ft level, there is approximately the following footage:-

Drifts and crosscuts on the	7800	ft level	4300 ft.
do	7819	"	900 "
do	7900	"	800 "
Raises on all of above levels			600 "
Winze below the 7800 level			100 "

It should be noted that the 7819 level is 90 feet vertically above the 7800 level, and that the 7900 level is 120 feet vertically above the 7800. The face of the 7800 tunnel is 2100 feet in from the portal

GEOLOGY: The mine is in gray, silicious, magnesian limestones of the Mt. Nelson formation of the Purcell Series of the late Pre-Cambrian age. The limestone is overlain by schists and massive white quartzites belonging to the same Series. Unconformable shales outcrop above the quartzite high up on the mountain.

The known ore all occurs in the upper 60 feet of the limestone beds, and its location seems to be entirely governed by intersecting folds in the strata.

Folding has taken place along three separate axes, as follows: The axis of the major fold, which is a rather gentle one, strikes nearly north and south and pitches down to the north at an angle of approximately 55°; on this anticline, possibly before its formation, a small fold or wrinkle having a curved axis averaging N 70° W has been formed, this passes over the top and down the flanks of the major anticline, showing a flat bow shaped form in either horizontal or vertical projection. This "wrinkle" contains the orebodies of the mine, but they are somewhat localized by the presence of small folds or corrugations whose axis is more or less parallel to that of the main fold. Ore was first discovered at the apex of the major anticline where it is crossed by the east-west wrinkle, and has been followed downward to the south-east and downward to the north west to near the portal, and near the face, respectively, of the 7800 level, in almost continuous ore. Viewed

in a broad sense the orebody might be said to be a "pipe" bent in a plane striking N 70° W and dipping 50° northward, with both ends pointing downward (see maps). In the swells formed by the fold intersections ore almost invariably occurs; in the squeezed parts it is usually absent.

At the top of the ore-bearing limestone there is a thin shale bed, or parting; below this parting there are two other thin shale beds; the distance between them varies from a few inches up to twenty or thirty feet. During the folding they have acted as a plastic material and flowed, so that their present thickness varies from a mere line to six or seven feet. The ore forms underneath these shale bands, sometimes under one, sometimes under all three.

Sometimes ore extends from one shale band to the other but more often the downward sequence is, shale - ore - barren lime - shale.

All dips and strikes in the lower levels of the mine have been platted on the geological maps, from both sides of the workings at 5 foot intervals, thus showing the detailed structure quite plainly.

ORE: The ore is a replacement of favorable parts of the upper limestones by sulphides of lead, zinc, and iron; it contains about one ounce of silver to each percent of lead.

In the upper levels of the mine the galena had changed to carbonate and nearly all of the zinc had been removed. Near the portal of the 7800 tunnel the ore is still largely exidised, but there is some mixed ore, and a little

clean sulphide. At the western end of the tunnel, oxidation stops at the eastern end of the 7900 Intermediate, while over the center and western end of this level it stops considerably higher. All ore-bodies are extremely krratic in size and shape, although nearly continuous along their rake; the maximum horizontal length is about 400 feet, and the maximum width of a single orebody, normal to the dip, is about 30 feet; often two orebodies parallel each other a few feet apart for short distances.

The ore is comparatively soft and easy to drill and break.

ORE DEVELOPED: It is practically impossible to arrive at any really accurate figure for the tonnage and value of the ore developed on account of the irregularity of the deposit.

A metal content of 6 oz. silver, 6% lead, 12% zinc has been determined as the average of the block of sulphide ore above the 7800 and the 7900 levels at the west end of the mine, by the officials of the Syndicate, and a study of their assay plans (without making an independent average) would indicate that this is a reasonable figure. The ore now being milled out of storage from past development, and one sill floor on the 7819 level, checks this very closely. Tonnage estimates made by the different officials show a variation between 75,000 tons and 130,000 tons, being influenced greatly by the "personal equation". My own figures for tonnage of positive and probable ore show 85,000 tons, inclusive of the ore removed during development; these figures include an extension of 30 feet vertically below the 7800 level. In addition to this, there is a small tonnage of sulphide ore in the east end of the mine. The available tonnage of

oxidised ore is estimated at 60,000 tons averaging a little below shipping grade.

ORE TREATMENT: There is a 50 ton pilot mill near the mine which was completed this Spring, employing straight flotation. There has been difficulty in getting a sufficiently high grade of concentrate, a clean separation of the lead and zinc, and a low zinc tailing, and experiments to improve the treatment are still underway.

The following is the average of the milling results for the month of July:

	Oz. Ag	% Pb	% Zn
Feed	6.4	6.5	13.0
Lead Concentrates	27.0	54.2	5.8
Zinc Concentrates	10.0	5.0	44.5
Tailings	2.7	0.4	4.3

It is stated that for the duration of a single shift results are sometimes very good, but that they are unable to maintain such results.

COSTS: Costs as given by the Syndicate are as follows:

Hauling concentrate to the railway and returning with part load	$ 6.00 per T
Drifting, direct labor cost	4.68 " ft
Crosscutting do	4.60 " ft
Raising do	3.36 " ft
Sinking winze (worked on one shift and some water to be pumped) labor & Supplies	11.50 " ft
Production from sill-floors tons per man shift	45
Powder cost on ore, the most of the ore being from development	$0.30 " T
Direct cost over 225 tons of ore from sill-floor	.60 " T
Fuel oil per Imperial gal. at Invermere	.10½ " gal
Total direct charges for drifting	7.00 " ft
Average advance in drifting per machine shift (about)	4.25 " ft

It would appear that nearly all of the above costs are incomplete, and that some items properly to be charged are omitted. Milling costs in the present plant might be estimated at from $2.50 to $3.00 per ton.

NET VALUE OF DEVELOPED ORE:

Based on the reported cost of 60¢ per ton direct cost of mining ore on a sill, the stoping cost for ore should not exceed $1.00 per ton, although this would seem rather low. If milling charges are assumed at $2.50 per ton, and overhead charges at $0.50 the cost of concentrate at the mill from one ton of ore will be:

Mining cost	$1.00	per ton
Concentrating cost	2.50	" "
Overhead cost	0.50	" "
	4.00	

On the basis of the July milling results given above, a ton of feed will produce approximately 210 lbs. of lead concentrate and 420 lbs of zinc concentrate. Applying the Consolidated M. & S. Co. smelting schedules to this, deducting $2.00 railway freight, and $6.00 hauling charges, the concentrate from a ton of ore will have a net value at the mill of $4.53 assuming silver at 60¢ per ounce, and lead and zinc both at 5¢ per pound. This leaves a profit of $0.50 per ton.

In a larger, more economical mill, the concentrating cost might drop to $1.50 per ton, leaving a balance of $1.50 to apply on profit and to cover development charges.

With the present mill the net value of the 85,000 tons of developed ore is indicated to be $42,500; with a larger mill and allowing for further development, its value will be about $85,000. Possibly these figures are a little optomistic.

POSSIBILITIES OF FUTURE DEVELOPMENT:

The ore thus far found at the west end of the 7800 foot level is much shorter than on the two levels above, it is not believed, however, that this has any serious indications for the future

since it is to be expected that some further ore will be found on the level, although the structure indicates that it will not extend very much further westward. There is every indication that ore will be found to extend to further depth substantially as above. Deeper development on the west leg of the orebody will necessitate the driving of very long tunnels, or else sinking.

The winze sunk below the 7800 level encountered a small flow of water a few feet below the level, and a greater flow must be expected a depth is attained. A crosscut tunnel from the side of the hill opposite the present portals would reach the west orebody in about half the distance that would be required for a tunnel started below the 7800 tunnel portal, but its portal would be located in an almost impossible situation for surface construction or winter work.

The east leg of the orebody offers chances of developing small amounts of sulphide ore above the tunnel; below the tunnel level parts of the orebody might be expected close to the surface in an oxidised condition, although the bulk of the ore may likely be sulphide. The east leg of the orebody has been less productive than the western and there is some reason to believe that this condition will persist to further depth. To a very considerable extent the future of the mine depends on the discovery of entirely new orebodies. There are no definite indications that there are other orebodies, but it would seem rather surprising if there were not other "wrinkles" where the conditions of the known one are duplicated; development has not been done in such a way as to show such a wrinkle if it were present.

The obvious way to prospect for such a wrinkle below the known one, is to crosscut north from the center of the 7800 tunnel to the top contact of the limestons and then raise along it. To prospect for a wrinkle above the known one, a long raise should be run along the top contact of the limestone in the extreme west end of the mine. A narrow replacement vein in the bedding of the limestone has been followed for about 1000 feet on the 7800 level; (See Mine Plan - north side drift from co-ordinate 13600 to 12600) it is from a few inches to two feet wide and shows good ore in places. It is 60 feet or more distant from the top of the limestones, measured normal to the dip, and should be further explored by raising, on the possiblilty that it may encounter favorable structure and form ore.

A study of the assay plans of the mine suggest that it should be possible to figure a smaller tonnage of ore of better metal content than that given under "Ore Developed", and which would return a slightly greater profit.

SUMMARY OF CONDITIONS: The favorable and unfavorable features of the mine may be briefly summarized as follows:

Favorable:

1. The mine is a going concern.
2. Some 85,000 tons of sulphide ores carrying 6 oz. silver, 6% lead and 12% zinc is developed.
3. Higher grade ore could be mined at the expense of tonnage!
4. The mine is dry and well ventilated
5. The rock and ore are soft and easily mined.
6. Less than half the drifts and crosscuts require any timber and the stopes are not heavy, although they must be timbered
7. There is a small, new mill on the ground.
8. Prospects for the continuation downward of the west leg of the orebody are excellent.
9. Prospects for the continuation of the east leg of the orebody are indefinite but fair.
10. There is reason to hope that important new orebodies may be found by proper exploration, although there are no very definite indications.

Un

Unfavorable

1. The mine is probably now making little if any profit.
2. The profit to be expected from the present ore reserves is small
3. The present mill is too small for economical operation and can not very conveniently be added to.
4. Deeper development of the known orebody must be by very long tunnels or sinking.
5. Water will be found below the 7800 level in the west end of the mine.
6. The ground may be much heavier in the water zone.
7. Future development will be more expensive than in the past.
8. Thorough exploration will entail considerable work and expense, with uncertain results.
9. The mine is badly situated as regards transportation.
10. The ore treatment is not yet satisfactorily worked out.

CONCLUSION: At present metal prices there does not seem to be any expectation of recovering from the ore developed mbre than a small part of the cash payment asked for the mine, and with the grade of ore now developed, prifits per ton even with a larger plant will probably be rather small. The future possibilities of the mine from a geololical standpoint are rather good, both as to the continuation of the present orebodies, and the finding of new ones, but there is no reason to expect any increase in the metal content of the ore, although better ore could be mined at the expense of tonnage.

It seems improbable that a more thorough examination will alter any of the statements made in this report sufficiently to change general conclusions materially for the better. I therefore believe that no further examination is justified and that the property should be refused unless the purchase price be cut at least in half.

Respectfully submitted,

Chas. C. Starr