

82KNE009-07 Ruth Verh.

104

PROPERTY FILE

RUTH-VERMONT MINE
Golden, B.C.

ORE RESERVE POTENTIAL
Geological Report

T. R. Tough, P. Eng. March 16'72

T. R. TOUGH & ASSOCIATES LTD.

Consulting Geologists

519 - 602 WEST HASTINGS STREET
VANCOUVER 2, B. C.

36.

687-2922

PROPERTY FILE

**GEOLOGICAL REPORT
RELATING TO THE
ORE RESERVE POTENTIAL**

of the

RUTH-VERMONT MINE

for

COLUMBIA RIVER MINES LTD (NPL)

March 16, 1972

Vancouver, B. C.

Thomas R. Tough, P. Eng.,

Consulting Geologist

INTRODUCTION

The following report is based on information obtained by the writer during the period between December 1965 and August 1967 while employed as a geologist at the minesite and in various consulting capacities to the present date.

PROPERTY GEOLOGY

The Ruth-Vermont property is underlain by rocks of the Horsethief Creek series of late Proterozoic Age. Polymictic quartz pebble conglomerates grade locally to grit and impure quartzite which in turn grade into slate or argillite and argillaceous limestone.

The conglomerates contain blue and white quartz pebbles, are sericitic, chloritic and contain scattered pyrite. Locally they are limey. Deformation of the beds has produced an elongation of the pebbles. The finer grained character of the grit and quartzite is the only discernible difference between them and the conglomerate.

Argillite beds are locally slaty, phyllitic and limey and vary from 1/8 inch to several feet in thickness and are black, green and grey. Porphyroblasts of ankerite are present within all the argillite members. Syngenetic pyrite, as euhedral and elongated cubes and pyritohedrons, occurs parallel to the bedding. Minor drag folding is common.

The argillaceous limestone units are conformable to overlying and underlying slaty argillite members. They are bluish grey, aphanitic, exhibit minor drag folding, and are the most significant host rocks in the area.

The main unit is 20 to 50 feet thick with individual beds varying from a fraction of an inch to several feet in thickness.

All members of the series are intercolated with readily discernible facies changes both along the strike and dip.

Structurally, the units have been folded to an anticline approximately 600 feet from crest to trough. The fold plunges gently to the southeast. To the east of this, the Ruth Anticline, lies a series of synclines and anticlines of varying amplitudes which culminate near the eastern extremity of the Charlotte crown grant, into the Charlotte Anticline which is overturned to the west. The main workings are along the limbs of a southeast plunging syncline, immediately east of the Ruth Anticline.

Three sets of quartz-calcite fissure veins occur obliquely, transversely and parallel to bedding relative to the fold structures. The oblique veins strike southeast and have an average dip of 65° to the southwest. They are well mineralized and cut at an angle of 15° to the strike of the beds. The transverse veins are poorly mineralized and are representative of fissure fillings along a series of near vertical and parallel shears. Tension gashes are generally related to such veins. The veins parallel to the bedding normally mark concordant contacts between the argillite and argillaceous limestone. Sulphide content in the veins is low. Scheelite occurs in varying amounts in the three sets of veins.

Some of the veins have been traced underground for some 2000 feet and where they intersect the limestone beds, replacement bodies have formed. The oblique veins occur in swarms which produce bulges and the irregular shape of such replacement zones. Diamond drilling has shown that the veins tend to widen at depth. The vein system has been traced intermittently on surface for some six miles. On the property they vary from 1/2 inch to eight feet in width.

MINERALIZATIONVein Type

Two veins of particular importance are the Pine Tree Vein and the Blacksmith Vein. The Pine Tree Vein has been traced underground for a length of some 1200 feet and it plays a significant role as the main feeder for the replacement zone of the Nelson Orebody. The underground work and diamond drilling have proven a vertical extension of 500 feet to the vein. The surface trace of the vein, in a southeasterly direction, is approximately 2600 feet. The average grade of the vein over a length of some 1200 feet is 12.27 oz Ag/ton, 7.0% Pb and 6.06% Zn across a width of 5.0 feet.

The Blacksmith Vein has been developed by four drifts over a vertical height of 400 feet and along a horizontal distance of 500 feet. The vein is almost parallel to the Pine Tree Vein and it has a surface trace of some 2600 feet to the southeast. The average grade of the vein in the area covered by underground development is 10.00 oz Ag/ton, 5.20% Pb and 3.10% Zn across 4.0 feet.

Assays from channel samples cut on the extensions of both the Pine Tree and Blacksmith veins were only done for silver and lead in 1928 as zinc was an undesirable metal for direct shipping to a smelter.

The average grade over a length of 65 feet of the Pine Tree Vein extension across a 4.0 foot width is 3.68 oz Ag/ton and 6.75% Pb. The Pb-Zn ratio in the area of the vein recently developed is 1:0.87, hence the probable zinc content of the above portion of the vein would be 5.81% Zn.

The Blacksmith Vein extension was sampled over a length of 90 feet and averaged 2.59 oz Ag/ton and 6.74% Pb across 4.0 feet. The Pb-Zn ratio

of the reserves developed underground is 1:0.6 thus the zinc content could well be 4.05% Zn.

During the course of underground diamond drilling two other significant veins were intersected. They are the South Vein and the North Vein.

The South Vein has an average grade of 8.28 oz Ag/ton, 5.68% Pb and 6.78% Zn across a width of 5.25 feet, whereas the North Vein averaged 15.26 oz Ag/ton, 10.74% Pb and 5.16% Zn across a width of 5.1 feet.

The minerals present in the veins are pyrite, galena, sphalerite, arsenopyrite, boulangerite, freibergite, chalcopyrite and scheelite. Gold occurs generally associated with arsenopyrite and pyrite.

Replacement Type

The most important replacement zone developed is the Nelson Orebody. The zone has been delineated for a length of 1180 feet and varies from 20 to 110 feet in width. Silicification accompanying sulphide replacement has taken place where the mineralizing veins have intersected the argillaceous limestone beds. Minerals which occur in the replacement body are pyrite, galena, sphalerite, arsenopyrite, chalcopyrite, boulangerite, and freibergite. Scheelite is also present as fine disseminations. The replacement, depending on the intensity of the mineralizing veins, is represented by a mineral halo emanating from the veins and extending in all directions.

The extent of the replacement mineralization varies directly with the size and number of the feeder veins. A plunge to the zone is effected by the oblique intersection of the veins across the limestone. The mineralization of the zone exhibits lineations both parallel and normal to the bedding; the latter coincides with slaty cleavage, or axial plane cleavage of small drag folds. The average grade of the replacement ore presently blocked out is 5.5 oz Ag/ton, 4.4% Pb and 6.1% Zn.

*Copper/ve. 20,000 Tons
Average Ag - 5.02 Pb - 3.69, Zn 5.08*

ORE RESERVES

Mr. John W. Hogan, of L. J. Manning & Associates Ltd has recently re-assessed the mineable ore reserves at the Ruth-Vermont Mine. The following is a breakdown of his reserves:

Nelson Ore Body (Replacement Ore)

209,491 tons grading 5.50 oz Ag/ton, 4.40% Pb and 6.10% Zn.

Pine Tree Vein

48,400 tons grading 12.27 oz Ag/ton, 7.00% Pb and 6.06% Zn.

South Vein

8,300 tons grading 8.28 oz Ag/ton, 5.68% Pb and 6.78% Zn.

North Vein

11,500 tons grading 15.26 oz Ag/ton, 10.74% Pb and 5.16% Zn.

POTENTIAL ORE RESERVES

1) Blacksmith Vein

The grades calculated for this vein have been derived from channel sampling done on a total of five drifts varying from 35 feet to 130 feet in length. The drifts are spread out over a vein strike length of some 2600 feet. The surface trace of the vein is known for approximately 5,000 feet within the property. Based on the underground mining and diamond drilling it appears that approximately 30% of the vein should make ore. The vein should therefore have a potential ore reserve of:

$$\frac{4.0 \times 5,000 \times 1 \times 30\%}{10} = 600 \text{ tons/vertical foot}$$

at a probable average grade of 6.30 oz Ag/ton, 5.33% Pb, and 3.19% Zn.

2) Pine Tree Vein

The dimensions of the Pine Tree Vein are similar to the Blacksmith Vein but of higher grade. The potential ore reserves could be:

$$\frac{4.5 \times 5000 \times 1 \times 30\%}{10} = 675 \text{ tons/vertical foot at a probable}$$

grade of 8.45 oz Ag/ton, 6.89% Pb, and 5.95% Zn.

3) South Vein

Little is known of the actual or potential limits of the veins and projections at this time are difficult. The vein averages 5.25 feet wide and utilizing a vertical depth of approximately 500 feet the vein should have a potential of:

$$\frac{5.25 \times 500 \times 1 \times 30\%}{10} = 79 \text{ tons/horizontal foot of}$$

advance grading 8.28 oz Ag/ton, 5.68% Pb, and 6.78% Zn.

4) North Vein

A similar situation exists for the North Vein as does for the South Vein regarding the possible strike and dip dimensions. The vein is 5.1 feet wide and using a 500-foot vertical depth the potential tonnage would be:

$$\frac{5.1 \times 500 \times 1 \times 30\%}{10} = 77 \text{ tons/horizontal foot of advance grading}$$

15.26 oz Ag/ton, 10.74% Pb, and 5.16% Zn.

The system of veins is known to extend northwesterly from the property for several miles and the acquisition of the adjoining properties may provide a similar or greater potential ore reserve.

Other veins are known to exist within the Ruth-Vermont property and are yet to be explored.

6) Replacement Deposits

The potential of increasing ore reserves appears excellent as geologic structures in the immediate area may provide a repetition of replacement zones similar to the Nelson Orebody. Wherever the feeder veins cut folded limestone units, replacement bodies may exist.

A relatively unexplored replacement zone further up-dip from the Nelson Orebody may provide potential ore. To the southwest, and at a much higher elevation from the Nelson Orebody, another limestone unit is known to exist. Veining has also been noted in this area.

A replacement zone of unknown dimensions has been examined by the writer on the Syenite Bluff crown grant immediately north of the Ruth-Vermont property on the north side of Vermont Creek. The property is presently held by Beverley Mines Ltd of Montreal. The company also holds a property at the headwaters of McMurdo Creek, some 10 miles to the northwest which contains vein and replacement deposits which have been partially developed by underground workings and diamond drilling.

Several veins have been traced some four miles northwest of the Ruth-Vermont property on Carbonate Mountain. The vein system there has been traced for over two miles between Malachite or Copper Creek and Bobbie Burns Creek.



March 16, 1972

Vancouver, B. C.