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Memo To: R.H. Pinsent

cc: E.T. Kimura
B. Barde

From: D.G. Mallalieu

Date: 89-08-16

Subject: Standard Massive Sulphide Property Proposal

Synopsis

The Standard property is located about 40km north of Revelstoke, B.C. The property contains a 0.1 mT pyrrhotite-pyrite-chalcopyrite-rich Besshi-type massive sulphide hosted in massive mafic volcanic rock within the dominantly sedimentary Lower Paleozoic Lardeau Group. The stratigraphy has been recumbently folded such that all units dip moderately to the east. The fold axes plunge shallowly to the north. The west limb contains a sheet of sulphide mineralization that is traceable over a strike length of at least 40m and over a vertical distance of 60m. The sulphide layer locally attains a thickness of 7m. The east limb has a sulphide horizon that is traceable for about 1500m.

The Standard property is currently "owned" by a syndicate of three individuals who have a verbal agreement of co-operation with one another.

The syndicate should be approached with the intention of making an option agreement.

Introduction

The Standard property was given a brief examination by D.G. Mallalieu on August 7, 1989.

The Standard prospect is located at about the 2100m elevation at the head of Standard Creek, about 40km north of Revelstoke, B.C., and about 8km northeast of Highway 23. Gerald Rayner of West Vancouver, B.C. currently has title to the 19 crown grants covering the known mineralization. The crown grants are encompassed by the Trim claims of D. Blann of Vernon, B.C.

The crown grants cover about 900m of tunnels and shafts which were driven between 1900 and 1906.

Geological Setting

The claims in the vicinity of Standard Peak overlie Lower Paleozoic Lardeau Group sedimentary and subordinate volcanic rock. Hughes *et al.*, (1976) indicate that the stratigraphy has been recumbently folded into an antiform and synform. The fold axis trends north-south and is reported to plunge gently to the north at about 3-4^{o}.

Local Geology

Please note that in the following descriptions no detailed maps or figures are available for reference.

Hughes *et al.*, (1976) and Høy *et al.*, (1984) indicate that the stratigraphy in the Standard area is dominated by limestone and dark graphitic and calcareous phyllite in the hinge of the antiform while the "limbs of the antiform are believed to be stratigraphically underlying greenstone, limestone, and phyllite..." (Figure 1). The stratigraphy dips 25-45^{o} to the east. Massive sulphide is reported by Hughes *et al.*, (1976) to be located on both the west and east limbs of the antiform. The most prominent massive sulphide occurs on the west limb within greenstone (mafic flow) and a coarse grained ultramafic pod which has been altered to a chlorite-serpentine-dolomite assemblage. Most of the workings have been driven on the west limb. Massive sulphide on the east limb has been reported to be traced over a distance of 1500m. The massive sulphide has been described by Høy *et al.*, (1984) as consisting of a series of layers and lenses of massive pyrrhotite and pyrite that contain minor chalcopyrite and sphalerite.

The best description of the massive sulphide is from reports by Superintendant Rumens in 1906 and by Gunning of the Canada Department of Mines in 1928. Rumens indicated that the massive sulphide on the west limb (Figure 1) was intersected by three adits over a vertical distance of about 60m. The lowermost adit (Tunnel No. 5) intersected the sulphide sheet where it was 1.5m in thickness. A drift north from this intersection followed the sulphide for about 40m. Thicknesses varied from 0.3m to over 7m. Rumens reported that four distinct seams of talc were followed for 80m in the drift.

Gunning (1928) described the mineralization in the raise from the middle adit to the upper adit as consisting of "several lens-shaped bodies, from 6 inches to 1 foot wide, of pyritic copper ore, across the width of the raise which follows the dip of the mineralized zone."

Rumens (1906) noted that while drifting in a southerly direction from the lowermost adit (Tunnel No. 5) and the middle adit (Intermediary Tunnel) the sulphide sheet was truncated by a steeply dipping fault. Hughes (1977) intersected the fault plane with selected drill holes during the 1977 field season. He interpreted the fault as being subvertical, north-south trending and indicated that the east side was down dropped relative to the west.

Two "bulk" samples (36kg and 41kg) sent to smelters in 1906 returned aggregate values of 3.1 g/T Au, 32.6 g/T Ag and 6.95% Cu. Høy (1979) indicated that zinc content for samples of fine grained pyrite-chalcopyrite was usually below 1%.

Rumens (1906) estimated that the Standard property could conservatively host 100 000 Tonnes of shipping ore.

Exploration Adequacy

Exploration/development in the early 1900's was carried out under the premise that the sulphide mineralization was vein-like. There was no concept of stratigraphic control. As a result, all workings were driven on known mineralization. Workings were likely not carried much farther than where the sulphide sheet "pinched". Noranda Exploration Co. Ltd. recognized the similarity between this property and their Goldstream deposit to the north in 1976. Noranda carried out an adequate mapping and soil geochemical survey over the property. A CEM survey was carried out; however the graphite content of the sedimentary rocks, frequency of changes of lithologies and excessive coil separation may have combined to render results less than satisfactory. Diamond drilling was concentrated around the old workings and around the southern part of the mineralized "east limb" of the hypothesized antiform. In total 1074m of drilling was carried out in 11 holes.

In 1982 Preussag Canada Ltd. carried out an airborne EM and MAG survey over claims immediately to the north of the Standard property. This was followed up by a limited VLF EM-16 survey and an insignificant soil geochemical survey. Geophysical anomalies were mostly generated in black phyllites and schists.

Current Status

G. Rayner of West Vancouver, B.C. currently has title to the 19 crown grants covering the known showings in the vicinity of Standard Peak. The crown grants are surrounded by D. Blann's Trim claims. Expiry date is May 11, 1990. Donald McLeod of Northair Mines Ltd. reportedly has staked claims adjoining the north and east sides of the Trim claims. These claims have not yet been recorded.

Rayner, Blann, and McLeod have an agreement in principle that if PDI considers an option all ground will be involved in the proceedings. McLeod has suggested that $50 000 be the first years payment for an option.

Discussion

The Standard property has many of the characteristics one would expect to be associated with stratigraphic successions developed adjacent to tectonic boundaries. In this case, the margin of an ocean trench and an island arc or an ocean trench and a continent. Besshi-type massive sulphide deposits formed in this setting consist of elongate to tabular zones of pyrite, chalcopyrite and lesser sphalerite. The zones are generally 0.2 to 2.8m in thickness with individual beds locally attaining thicknesses of 10-20m. Typical Besshi-type deposits are about 1-10 mT in size and have grades of 1-5% Cu and less than 1% Zn.

The Standard massive sulphide was generated in a shallow, submarine, sediment dominated environment. There was at least one period in which there was rifting and concomitant extrusion of mafic lavas. During periods of volcanism sulphide-rich brines were generated. Two scenarios are possible for

the actual sedimentation of the resulting sulphide precipitate.

1) If there was a well developed rift with an associated series of hydrothermal vents the sulphide brines may have been generated and deposited uniformly over a specific lithology or horizon. In this case there could be an alteration signature in the footwall lithology.

2) In the case where there was only a limited number of vents that produced sulphide-rich brines. Sulphide precipitate could accumulate as unstable mounds which were susceptible to slumping; alternatively the sulphide precipitate may have accumualted on the margin of a paleobasin and have suffered gravity flowage. In this case one would expect that there would be very limited alteration in the footwall lithologies.

The author "feels" that the massive sulphide in evidence on the Standard property was formed in a restricted area and was then transported to its current position through fluidized sediment flow processes. The massive sulphide layer will cover a much more limited area than its encompassing strata.

Discovery of additional sulphide mineralization within the Standard Peak area will be difficult. Many geophysical techniques will be ineffective. The high graphite content of many of the host lithologies will effectively mask the presence of relatively narrow massive sulphide layers (<3m). Gravity surveys may generate ambiguous results because of the intensity of topography. Soil geochemistry will be effective in recognizing known near surface mineralized zones but will be ineffective in assisting in the recognition of mineralization at depth. Lithogeochemical techniques could be used to focus exploration efforts if the mafic volcanic rocks were altered syn the mineralizing episode; however this latter scenario may prove to be unfounded.

Conclusions and Recommendations

The Standard property hosts a small tonnage pyrrhotite-pyrite-chalcopyrite-rich Besshi-type massive sulphide hosted within a dominantly sedimentary succession of rocks. The most spectacular mineralization has been examined through underground and surface methods. Lack of blatant geophysical or geochemical anomalies has meant that much of the Standard property has not been adequately explored.

The Standard property should be optioned from a syndicate composed of G. Rayner, D. Blann and D. McLeod for about $20 000 - $30 000.

Exploration for further mineralization will likely require large amounts of diamond drilling along the known mineralized horizon.

REFERENCES

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