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D. A. CHAPMAN AND ASSOCIATES LTD.

SAN JACINTO EXPLORATION LTD.

Vancouver, B. C.

PRELIMINARY FEASIBILITY REPORT

on

EXPLORATION CONDUCTED

on the

NORTH PHOENIX GOLD LEASE

FOR HIGHLAND LODE MINES LTD.

May, June, and July, 1973

D. A. Chapman J. H. Kruzick, Geo.

Vancouver, B. C.

D. A. CHAPMAN & ASSOCIATES LTD. 3513 West 31st Ave., Vancouver 8, B. C.

AUGUST, 1973

To: Mr. J. Elwell, P. Eng., Mining Consultant for Highland Lode Mines Ltd.

Dear Sir:

A work program consisting of a boundary survey of the lease, geophysical surveys, and sampling of the gold showing was carried out on the North Phoenix Gold Lease optioned by Highland Lode Mines Ltd., from San Jacinto Explorations Ltd. The work was done during the months of May, June and July, 1973, by the writer and Mr. J. Kruzick, Geologist.

The property is located directly north of the open pit operated by Zapata Ganby Mining Co. Ltd. about 6 miles east of Greenwood, R. C. An excellent all weather road provides easy access to the showings. INTRODUCTION:

This writer has been associated with the property since 1966, during which time a number of shipments of raw ore has been made to the Lead Smelter at Trail, British Columbia. The tonnage of these shipments totalled 272 tons, averaging 1.4 oz/ton gold, and significant amounts of silver, lead and zinc. Copper was also present in the ore but no payment was made for this metal by Trail.

This ore contained heavy suphides detrimental to the smelting processes and the penalties on the undressed ore were prohibitive to the continued hygrading of the ore zone. The smelter reduced the raw ore with little or no grinding, crushing or concentrating of the ore, thus achieving the most efficient recovery of the gold from the sulphides but resulting in extremely high smelter penalties.

The consistent gold values in the bulk shipments were not achieved from assays of the drill sections to date although many intersections of heavy sulphides have been noted throughout the drill cores. The primary object of this study was to determine the metallurgical nature of auriferous sulphides if present in the ore, and to determine if possible an efficient and economical method of sampling and evaluating the ore zone.

COMMENTS:

It should be noted that when one was being removed from the pit, the surface zone was assayed using a plugger and an erratic high assay zone was laboriously hand sorted to produce a small costly tonnage of 2.5 oz/ton gold. The broader limits of the sulphide zone was then removed with a backhoe and loader to produce cheaply more tonnage of 1.8 oz/ton gold but the sulphide penalties were much higher in the latter.

In a comparison of drill core assay results with bulk shipment assays it seemed to this person that the form of the gold was not clearly understood. It was thought that the black breccia associated with the walls of the massive pyrrhotite veins might contain the gold values in a free form and retrieved successfully in bulk removal but difficult to recover in the drill sections. If the gold was interlocked with the sulphides then sections of core heavy in sulphides should have returned higher assay values.

By comparison, the consistent higher assay value obtained per ton of bulk ore removed retrieved constant lower assay values from drilling the same zone directly underneath. In twenty feet of depth the ore

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zone does not appear to be pinching out, i.e. the sulphides present in the drill core are roughly equal but assay about 1/10 shipped ore values.

I believe the most puzzling and difficult aspect of the prospect would be how to accurately sample to depth and thus to evaluate the probable inferred tonnage available without first removing each ton of ore to find its economic value.

ORE SAMPLING PROGRAM:

To acquire material for investigative study of the ore, a percussion drill was moved over the zone and a series of short, shallow cross sections spaced at 20 foot intervals down the strike were drilled. These holes were within the known zone of ore and were not intended to enlarge the tonnage possibilities, rather it was hoped that the short draw for the core chips would enable an accurate and efficient recovery with adequate flushing for each five foot length.

Prior to the preparation of a drill platform over the ore zone, samples across the surface zone were taken. These samples were chipped across the veins in two places; one from the glory hole at the north end in the face and the floor of the vein, and a second zone which had been tested previously using the plugger method described to hygrade. This zone did not produce the assay values the previous leassees required to encourage ore removal. Of five holes one foot apart, one hole ran better than 1 oz/ton gold, two less than 0.10 trace gold and two around 0.5 oz/ton gold. We proceeded to blast the holes and our assay from the vein ran 1.3 oz/ton and chip sampling across 50 feet ran 0.52 oz/ton gold, indicating the difficulty in evaluating the ore zone. Grab samples of massive ore from the veins were taken for metallurgical study and analysis.

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METALLURGICAL STUDIES:

Two analytical reports by Dr. Chamberlain, P.Eng. were done on polished sections of the grab samples using an atomic probe to detect the presence of crystalline gold interlocked with the other sulphide crystals and very anomalously failed to indicate a gold metal on the polished surface or intersticed with the sulphide crystals present. A possible explanation for it's absence from the smoothed polished surface would be if the metal were a soft, friable substance removed from the micro-surface by polishing. The control half of the polished sections assayed excellent gold values.

A second report of a preliminary metallurgical investigation by C. K. Ikona, Mining Engineer, was prepared from the assay rejects. These were combined and split into 8 samples with 2 random samples chosen for the tests. These assayed 0.85 oz and 0.90 oz per ton gold respectively.

In a discussion of his results, Mr. Ikona observes that most of the gold is probably associated with a minor undetermined mineral which <u>floats</u> under the same conditions as the chalcopyrite. He notes that this mineral may be the soft black, easily slimed material he produced in the cleaner concentrate. His panning results indicate minor if any free gold, and the copper, pyrrhotite/gold ratios indicate the majority of the gold is not associated with either of the two minerals, but a gold concentrate is produced by flotation under the same conditions that prevail for chalcopyrite flotation. Recovery of the gold was 32.5% in the concentrate but can probably be greatly improved by better comminution. This low recovery of the gold is probably due to comminution problems inherent in batch work, for assaying for most values report in screen

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sizes larger than the optimum for flotation.

As a result of this study I panned some of the tailings that concentrates at the base of each setting for the percussion drill. They were heavy in the black slime he observed, and the slime floated just back of the tail of heavies in the pan. A rare Tellerium Compound which is black, soft and friable may account for the gold present, <u>Nagyagite</u> \rightarrow (Au₂, Pb₁₄, Sb₃, Te₇, S₁₇). The specific gravity of this compound is around 7.0 with a hardness of 1.5.

It is possible that much of the values were washed through the mechanical separator and much of the slime lost in the drilling waste.

Since the material may be flushed from the hole quite readily in the water, this fact can be utilized for an efficient economical use of the percussion drill rather than a large bore diamond drill. By placing a large drum in front of the mechanical separator containing a flour sack suitably supported within the drum, and adding a flocculent to congeal the slime the waste water could be efficiently sifted. MAGNETOMETER SURVEY:

The existing 200 foot spaced grid lines were resurveyed and rechained at 100 foot intervals. Readings were taken every 25 feet using an Elsec Proton Precession Magnetometer. This instrument is sensitive to 0.5 gammas and measures the intensity of the total magnetic field.

At each station two readings at each level were taken and were within one gamma or a third reading for that level was taken. If they still did not check a new setting for the instrument was used. This is necessary for steep magnetic gradients over adomalous zones.

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Two maps of the results are presented. Map No. 1 is the Total Field Intensity from a station 5 feet above ground surface. It is the Total Field Magnetic Map commonly used for geological purposes. Map No. 2 is the vertical gradient determined from the difference in the readings of the top and bottom setting. By taking two separate readings at different vertical heights at each station a first derivative of the Vertical Magnetic Gradient is accomplished mechanically and the result is mapped in gammas per foot. This method defines the point source of the magnetic pull directly over the contact and has been used to successfully delineate the strike and shape of magnetic structures.

The magnetic gradient is contoured in negative and positive form with the O isogradient at the contact of the point source. Thus a sulphide zone containing magnetic minerals such as magnetite, pyrrhotite, etc., would be indicated by the change in the magnetic gradient as the contact is passed over laterally by the magnetometer.

A copy of the field note reductions accompany the report.

Without exception wherever mineralization was noted in the field an instrument reaction occurred. This reaction was imperceptible from one reading in some cases but always showed a definable difference between the two readings.

RECOMMENDATIONS:

A detailed map of the Vertical Gradient over the ore zone area was produced at a scale of 1" = 20' (Map No. 3). 7 percussion holes 200 feet in length have been laid out to test the anomaly and the indicated extensions of the known gold zone.

These holes should all show good sulphide intersections of

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considerable widths, and if the sampling procedure is followed rigorously the gold content if present should be recovered. If economic values exist the property warrants an intensive feasibility study to determine tonnage potential and to prepare for a mill.

Exploration of the other zones indicated by the gradient survey would also be warranted, but in view of the option payments to San Jacinto Exploration Ltd. expenditures for further exploration zones should be done only if the recommended drill program above proves the existence of a mineable economic ore zone.

Respectfully submitted,

haxman

D. A. Chapman, President D. A. Chapman & Associates Ltd.

DAC: jp