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HIGHMONT'S COPPER-MOLYBDENUM DEPOSIT - HIGHLAND VALLEY

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INTRODUCTION

The Highland Valley area is located in south-central British Columbia some 125 air miles north-east of Vancouver.

The nearest towns are Ashcroft, 30 miles to the north-west, and Merritt, some 45 miles to the south-east. A paved road connects Highland Valley with Ashcroft, while an all-weather gravel road ties the area to Merritt.

The area consists mainly of rolling uplands some 4,000 to 6,000 feet above sea level. The valley floor is open countryside with light timbered areas, occasional swamps and small lakes with interfeeding creeks. It rises through gradual slopes to mature, well rounded summits seldom more than 1,000 feet above the valley floor. Its drainage pattern rolls to the east into the broad, shallow valley of Guichon Creek and to the west into the highly-eroded valley of the Thompson River.

HISTORY

Copper deposits in the Highland Valley area have been known and intermittently explored since the turn of the century. The earliest producer in the area, the O.K. Mine, developed, mined and milled during the First World War some 10,000 tons of copper ore running to a grade slightly under 4%. Further surface investigation of this property is underway at the time of this report. The only producer presently operating in the Valley, Bethlehem Copper Mines Ltd., dates back to 1915-16, when some 130 tons of better than 20% copper were mined and shipped by Wagon Train to Ashcroft and from there by train to both the Tacoma and Trail Smelters.

With the developments of the early sixties that saw the Bethlehem put into production, the area received an impetus which has not slackened. The Trojan and

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Jericho properties carried out further underground operations. The south side of the valley was given closer attention, with many small companies now instituting diamond drill programs. The senior companies wheeled and dealed. In 1963, Anaconda optioned the ground of 5 adjacent companies and carried out a 2 year program of exploration. Rio Tinto acquired the Lornex and Skeena claims in 1965. Japanese interests, which had played a most prominent part in the Bethlehem operation, were also in strong evidence at many properties.

WORK PROGRAMME

In April 1966, Highmont Mining Corp. Ltd. acquired the 34 claim block from Torwest Resources for the consideration of 1,000,000 shares of escrowed Highmont stock.

At that time, emphasis was laid on the possibility of economic mineralization existing in the vicinity of the claims adjoining the Kennco ground. Basis for this was the fair mineralization exposed in several pits on the mutual boundary. During the month of June 1966, a soil sampling program was carried out across the two suspect claims. Despite the 300 odd samples taken and run for copper and molybdenum, no strong pattern nor heavy concentration of either metal was found. Subsequent drilling in this area bore out the weak surface indication.

The months of July and August 1966 were taken up with the mechanics of organization of the Highmont company. During this period, Rio Algom carried out localized I.P. work with some 2,750 feet of percussion drilling on an option basis. When the option was not picked up, Highmont started out on its main program. The 1962 diamond drilling of Torwest's had indicated a mineralized area in the eastern portion of the claims. Following the old saying "Stick with ore into unknown ground," a grid pattern was laid out over the mineralized area. With drill centres at 200 feet, the grid covered a 1200' x 2200' section. Percussion drilling was chosen as the probing medium. In several early test holes, rotary drilling had proven expensive and slow. All holes were to be taken down to a 250 ft. depth using a 2-1/4" core bit. Automatic sample splitters were installed at the return vent of the hole with a thirty-second cut being taken from each 10 ft. sample. The samples were dried, weighed and shipped to J.R. Williams & Son in Vancouver for assaying. Here, they were run for copper on the 10 foot sections, while composites of 50 feet were assayed for molybdenum sulphide.

The program started Sept. 8th, 1966 with one truck-mounted percussion machine. A second machine was added in late November. Each machine was normally capable of drilling off a 250' hole, moving 200 feet and setting up on a new hole each shift. Two 10-hour shifts were carried per machine.

At the completion of the grid drilling, an expansion drill program was swung into with holes being located on a 400' spacing and offset from each other. Lateral movement of the program was controlled by claim boundaries on the east and consistently weak results to the north. In all, an area roughly 7800' x 5500' was probed by means of 262 percussion holes, totalling 61,116 feet.

On November 15, 1966, McPhar Geophysics of Toronto began carrying out an I.P. survey over the western portion of the claim. Percussion drilling at this time was still confined to the eastern sector. 15.4 miles of line were run with the line spacing being 400 feet. Several anomalous conditions were exposed through the survey. Resultant percussion drilling on these anomalies outlined what is presently known as the West Zone.

Simultaneous with the initiation of the I.P. survey, diamond drilling was started. 16 holes for an aggregate total of 8,278 feet were directed to depth along longitudinal and cross sectional areas of the East Zone. The BQ-size machine, save for a vertical 1000 foot hole, checked results to a vertical depth of 500 feet only. In all, save one hole, complete core plus sludge was sent for analysis.

To further aid geological evaluation, seven trenches covering some 8,160 lineal feet were bulldozed.

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The program was completed April 18, 1966 and all data was turned over to Chapman, Wood & Griswold Ltd., Consulting Engineers, for evaluation. At the same time, bench tests on the amenability of the ore was conducted by Brittan Laboratories of Vancouver.

GENERAL GEOLOGY

The Highland Valley is almost totally underlain by the Guichon batholith, an eastern segment of the Coast intrusive complex. This quartz-diorite formation has been dated by Duffel & McTaggart in their GSC Memoir 262 as between early Upper Triassic and early Middle Jurassic time, most probably during the Lower Jurassic.

Following the general trend of the invaded host rocks, the batholith has its long axis trending a little west of north. It extends from just north of Merritt almost to Ashcroft. Its eastern boundary is confined by Guichon Creek, whereas the volcanic-sedimentary formations lining the Thompson and Nicola River valleys limit its western extent.

The Guichon batholith has produced a complexity of differing phases. On the Highmont ground, we are concerned primarily with the Skeena Quartz Diorite and the Bethsaida granodiorite.

LOCAL GEOLOGY

One of the distressing aspects of the Highmont property, and this can be related to the whole Highland Valley, is the large extent of glacial debris. Almost 90% of the property is covered by glacial topography with bedrock being covered by up to 35-40 feet of overburden material. Only on the eastern claims, where the slopes reach to Gnawed Mountain peak, are there sufficient exposures to correlate the geology. Data from the central and western claims are assembled from drill holes. Little trench work was done in these areas.

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In a broad sense, the Highmont property can be said to be underlain by the Skeena Quartz diorite with a wide band of Bethsaida granodiorite trending on a rough north-west lineation across the central claims. The Bethsaida locally forms an inner segment of quartz porphyry which culminates in a core of breccia material. The mineralized zones of the property lie along the Bethsaida and Skeena contact within the latter formation.

The Skeena quartz-diorite, which forms better than 80% of the exposed formation on the property, derives its name from its type occurrence in the nearby Skeena Silver Claims.

In all respects, this formation is similar to the Bethlehem quartz diorite. It is a light-grey, medium grained, fresh-appearing rock composed of hornblende, biotite, quartz, plagioclase and potassium feldspar. The mafic minerals are of less abundance in the Skeena than in the Bethsaida formation. An alteration phase that the Skeena undergoes is a mild kaolinization, which gives the rock surface a whitened effect. Chlorite alteration, again of minor intensity, is also distributed through the Skeena exposures.

In comparing the Skeena alteration on the Highmont property with that of the adjoining Lornex property, a great difference is noted. On the Lornex property, intense alteration accompanied by strong shearing and fracturing extends from the Bethsaida-Skeena contact outwards for some 1500 - 2000 feet with progressive weakening. On the Highmont, no such broad alteration zone has been noted.

The Bethsaida formation, appearing as an 800' wide dyke, cuts across the Skeena quartz diorite. The rock appears as a coarse-grained, occasionally porphyritic, dark colored formation with biotite taking preference to hornblende. The large euhedral crystals of quartz often reach a diameter of 1/4", giving the formation the porphyritic structure previously mentioned.

A phase of the Bethsaida, and intimately related to it on the Highmont property, is the quartz diorite porphyry. This rock is made up of numerous rounded

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quartz phenocrysts averaging 1/8" to 3/16" in diameter, set in a light colored, exceedingly fine grained matrix of feldspar-quartz material. Mafic minerals are notably light with biotite being the most common. Specular hematite often appears as radiating clusters in the quartz veins that are fairly numerous in this formation or as an occasional filling in some of the tight fractures.

Breccia formations are the least commonly exposed rocks on the property but a well defined, almost circular, zone has been outlined at one point on the Highmont-Minex boundary. This formation, which plays a most important part in the localization of ore on the Bethlehem property, is of slight importance in the Gnawed Mountain area mineral-wise.

The Breccia fragments, which vary up to as large a size as 3 inches, are set in a dark, very fine grained matrix. These angular fragments appear to be mostly of the ~~Skeena~~ BETHSAIDA quartz diorite variety. Mineralization, predominately specularite with some of the copper minerals, lies close to the boundaries of this breccia extending out into the surrounding rock.

In addition to the above rock types, several other formations have been encountered. These include feldspar porphyry and aplite dykes. Both of these formations, cut in diamond drilling, appeared as occasional dykes of small dimensions and unassociated with mineralization.

STRUCTURE

As mentioned earlier, the Highmont claims are underlain by the Skeena Quartz diorite. This formation is exposed in roughly 80% of the outcroppings. Intrusive into this formation and appearing as a narrow dyke of some 800' width are Bethsaida formations of granodiorite and quartz porphyry. Strike of the structure is N70 - 80W with an as yet undefined dip. The dyke is exposed on the Highmont claims for some 3000 feet before dipping under the extensive overburden of the central and western claims. Its point of surface origin is near Gnawed

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Mountain summit, where rather weak evidence indicates an easterly dip under the intruded Skeena. Associated with a breccia formation, called the Gnawed Mountain Breccia, the structure trends almost due west for some 2000 feet where it suddenly terminates. The extension of the dyke appears a few hundred feet north where it adopts its N70 - 80W strike into the Highmont property. The breccia, which had been an integral part of the dyke to this point, is absent in the offset extension. The terminating force is thought to be a fault, although there is little surface evidence for this theory. A point against this fault abutment possibility is the extension of several fingers of breccia beyond this point. In the absence of the breccia zone within the offset portion, thin and irregularily-shaped dykes of quartz porphyry appear, culminating some 2000' further to the west as the major rock material within the dykes. In many locations, this contact between the porphyry and granodiorite is remarkably well defined; in other exposures, a gradational zone is most evident. The porphyry zone is predominate through the dyke for some 1500 feet before horse-tailing into narrow dykes that gradually die. Located almost centrally within this porphyry zone is a roughly circular plug of breccia material. The plug, of 400' diameter, has, in most cases, strong contacts with the adjoining formations.

Little evidence is available of the westward progress of this dyke. It is evident that a major change in strike occurs between the last known surface exposure on the Highmont ground and the drill outlined contact on the Lornex ground. On the Lornex ground, some 4500 feet further to the north-west, the Skeena-Bethsaida contact has assumed a north-south attitude following a major fault zone.

Two sets of fracture systems are evident. The first and predominating system tends N 20° - 30° W with vertical to steep south westerly dips, the other set varying between N 50 - 70 E with an attitude between the vertical to 60° north. A third joint set, considerably weaker, dips 20° - 30° to the north. Little displacement has been noticed but in several instances the N-S set has offset the E-W system by as little as 1/2 inch. Mineralization tends to favour the stronger north-south set, although the east-west group is noticeably mineralized. The horizontal structures show little affinity for the metals.

Fracturing is strong throughout the property but in no way can be compared with the intense rock disruption on the adjoining Lornex ground. Localized heavy fracturing results in chloritized shear zones that tend to concentrate the mineralization.

No strong fault structures are exposed through geological mapping, trenching nor implied from surface lineation. However, diamond drilling in hole #66-3 cut a 46 foot fault zone whose attitude has not been delineated.

MINERALIZATION

In keeping with the Highland Valley, the Highmont mineralization is chiefly copper with minor to moderate molybdenum metals. The copper mineral is primarily chalcopyrite with noticeable concentrations of bornite. Chalcocite, although evident in the area, has not been identified as yet in the Highmont operation. Molybdenite is the only molybdenum metal. Pyrite is weak to absent through the property.

The copper minerals are normally of a disseminated variety but tied in to the fracture system. Chalcopyrite will often line the slip planes of the fractures and will emanate from here to the surrounding rock. Bornite normally appears as a fine pin-point mineral, finely disseminated throughout the rock. The molybdenite is present as heavy blobs within a quartz structure or as lining for the quartz veinlets. There has been no evidence to date of disseminated molybdenite. Strong concentrations of bornite, often intimately associated with the molybdenum, frequently appear in the siliceous veins. These veins, which appear to have no set pattern, vary from 1/4" up to several inches in width,

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and are most erratic in their distribution.

The mineralization apparently occurs in all rock types on the property, although there is some rude correspondence to the contact of the Skeena and intrusive Bethsaida. The concentration of metal within the Skeena Quartz Diorite decreases with distance from this contact. The Bethsaida, although mineralized, carries weak values. At the Highmont, it is only the north side of this Bethsaida-Skeena contact which is mineralized to possible commercial values. It is understood that at the adjoining Lornex similar conditions prevail.

There are two large areas of mineral accumulation on the Highmont ground. Both these areas present possible commercial extractive zones.

The first zone labelled the east zone, lies elongated along the Skeena-Bethsaida contact for some 4000 feet. It extends back from the contact, to the north, for 1200 feet. At its highest surface elevation, 5766', it projects some 255 feet higher than its lowest levels. With all values calculated to only a vertical depth of 250' below bedrock, the zone presents a tonnage figure of 48.187 million tons grading .298% copper and .076% molybdenum disulphide.

Some 400 feet to the north west and almost an extension of the previous section is the west zone. It has equal dimensions of 1000 feet in both lateral directions. With a tonnage figure of 9.618 million it represents a grade of .150% copper and .153% molybdenum disulphide.

In total then the two zones carry 57.805 million tons of a grade .275% copper and .086% molybdenum disulphide to a depth of 250 feet. Reference should be made to Appendix I which simplifies these figures.

DRILLING

As has been stated earlier, the testing of this mineralized area was carried out primarily by percussion drilling. At the adjoining Lornex property, extensive drilling of this nature was also introduced only to be abandoned because of bad ground with its resulting erroneous returns. The more competent nature of the formations on the Highmont claims were considered more reliable for this type of drilling.

Extreme sample care was taken in every department from the flushing of the hole after every 10 foot section, through the collection and drying of the samples, to the preparation and shipment of the final product.

All assays on the Highmont are based on the percussion results alone.

To check out the validity of the percussion holes, diamond drill holes were put down on a similar dip within 5 feet of the percussion hole collar. The results are tabulated in Index II. It will be noted that, although individual pairs of holes vary somewhat, the overall average of drill core to percussion is within reasonable proximity. A disparity exists between the moly grade of core and percussion results. In the normal underground checking out of surface diamond drill sections, the drilling results are usually on the low side. If, in our case, an equal split of sludge and core results are made, the diamond drill combination approaches the percussion results with both sets of figures running within a 10% allowance. However, the present underground sampling program will provide a more accurate formula.

UNDERGROUND PROGRAM

On August 13th, 1967, Nippon Mining Co. Ltd., our partner in the operation, signified their willingness to proceed to Stage II, the underground bulk sampling. A quarter of a million dollars has been provided for this program, which entails 1,345 feet of adit cross cutting and 340 feet of raising. It is expected that this program will be expanded.

To the closing out date of this report, October 21st, 1967, the adit has advanced 310 feet from the portal. The mineralized zone is not expected until around the 500 foot mark.

Each round of muck is deposited in a separate concrete bin, tagged with a number and eventually put through an 18" x 24" jaw crusher. The product size of this initial crushing is 1-1/2 inch. From the jaw crusher, the rock is carried through large 20" x 30" rolls which grind to 5/8". The first cut taken from this material by a Denver Cutter type sampler is 1/120th or between 400 to 450 lbs. to the round. The smaller amount is then put through a 12" gyratory crusher resulting in a 5 to 10 mesh product. The final sample, 1/20th of these fines, is then cut out by a Vezin sampler. This sample, weighing between 20 to 23 lbs., is sieved into 2 samples on the ratio of 3 to 1. The larger sample is sent for assaying, whereas the smaller one is put in an open cardboard container and stored in the sample preparation room. At a later date, this sample will act as an oxidizing test sample when mill tests are run from the larger rejects.

The initial reject, roughly 22 tons, is stockpiled and marked for future mill tests. The smaller reject from the cone crusher is placed in 2' x 2' x 3' wooden containers for bench tests.

To date, the underground contractor has been averaging 26 feet per day. We have been able to keep pace with only a day shift on the crushing and sampling plant. Occasionally, a night shift is required.

FACTS & FIGURES

1. Bench scale metallurgical tests made on two 100 ft. NQ drill holes showed a possible minimum copper recovery of 87% in a concentrate assaying 25% copper and 80% in a concentrate assaying 91.7% molybdenite.
2. Diamond drilling down to the 500' horizon showed no variation in mineral content. A single vertical hole (#66-1) was bored to 1000' with similar results.

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3. Geochemical surveys run by Highmont over some of the western claims and by a senior organization over the east zone showed poor correlation. The survey over the eastern zone did predict a falling off in copper content to the north.

4. Geophysical surveys showed weak associations between anomalous situations and mineralization. It is true that the west zone falls within a large anomalous area which extends further to the south. This south section has not been drilled to a depth greater than 250' and the possibility exists that the west zone might run below this depth.

5. Analysis of drill results section by section shows no apparent relationship nor pattern distribution between the copper and molybdenum minerals.

6. The presently outlined deposits are open for extension both in depth and laterally. Certain lateral limits are established on the east zone to the north and south.

R E F E R E N C E S

1. DUFFEL & McTAGGART - Memoir 262, G.S.C. "Ashcroft map - Area, British Columbia."

2. CHAPMAN, WOOD & GRISWOLD LTD - "Preliminary Feasibility Study, Gnawed Mountain Mineral Deposits, Highmont Mining Corp. Ltd."

3. WHITE, THOMPSON & McTAGGART - "The Geology and Mineral Deposits of Highland Valley, B.C."

4. ANACONDA AMERICAN BRASS LTD., WESTERN EXPLORATION DIVISION "South Sheet, Geological Map, Gnawed Mountain."

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APPENDIX I

	Cu. %	MoS2 %	Tons x 10^6
EAST ZONE			
Indicated and Inferred Ore *	.298	.076	48.187
Waste			12.456
Peripheral Waste			9.67

Ratio of Waste to Ore = .46/1
Overburden = 2,300,000 cubic yards.
Average depth of overburden = 12.2 feet

	Cu. %	MoS2 %	Tons x 10^6
WEST ZONE			
Indicated and Inferred Ore *	.150	.153	9.618
Waste			2.797
Peripheral Waste			2.36

Ratio of Waste to Ore = .54/1
Overburden = 740,000 cubic yards
Average depth of overburden = 13.6 feet

	Cu. %	MoS2 %	Tons x 10^6
ALL RESERVES			
Indicated and Inferred Ore *	.275	.086	57.805
Waste			15.253
Peripheral Waste			12.03

Ratio of Waste to Ore = .47/1
Total Overburden = 3,040,000 cubic yards.

* Indicated ore = delineated by a maximum lateral influence of 100 feet from drill hole

* Inferred ore = delineated by a maximum lateral influence of a further 100 feet beyond "indicated ore."

D.D.HOLE	ANGLE	CORE Cu.	CORE MoS2	DEPTH	SLUDGE Cu.	SLUDGE MoS2	DEPTH	PERC. HOLE	DEPTH	Cu.	MoS2
66-1	-90°	.209	.052	245'	.277	.083	240'	P-20	241'	.437	.105
66-3B	-45°	.208	.028	275'	.360	.072	270'	P-242	284'	.170	.035
66-4	-45°	.167	.027	382'	.354	.041	370'	P-243 A (P-243	392' 380'	.242 .242	.051 .056)
66-5	-45°	.311	.055	390'	.632	-	380'	P-241 A (P-241	390' 396'	.309 .192	.080 .062)
66-6	-45°	.153	.043	192'	.136	.018	180'	P-240	191'	.121	.012
66-7	-90°	.136	.041	244'	.191	.048	240'	P-40	240'	.245	.039
66-8	-90°	.279	.020	250'	.422	.096	240'	P-33	240'	.262	.044
66-9	-90°	.220	.021	240'	.323	.086	230'	P-19	230'	.351	.083
66-10	-90°	.374	.010	232'	.454	.041	232'	P-5	234'	.421	.036
66-11	-90°	.287	.140	238'	.323	.214	238'	P-134	235'	.214	.154
AVERAGE		.236	.043		.368	.077				.278 (.264)	.064 (.063)

COMBINED AVERAGE (50%-50%)   Cu. - .301%   MoS2 - .059%