

MEMO TO: M. A. Taschereau

DATE: June 5, 1979

861969

FROM: G. S. W. Bruce

SUBJECT: Carolin Mines Limited--Hope, B. C.

Kilborn have completed a feasibility study of this gold prospect. I understand that they are recommending a 1500 ton per day plant and are forecasting a 2-3 year payback period assuming gold between \$250 and \$300 Canadian. I had previously made arrangements to receive a copy of this feasibility study and I now have a copy.

I am not sure if there is a place for Dome in this venture but after glancing at it you may wish me to find out.

GSWB:RN

c.c.: C. H. Brehaut✓

WB

PROJECT HISTORY (Cont'd)

In the fall of 1977, it was decided to commence underground exploration by driving a decline along the general trend of the Zone.

This ultimately reached a length of 360 m. Because the location and attitude of the ore lenses had not yet been accurately defined, the decline remained, for the most part, outside of the main mineralized parts of the Zone but these were explored by four cross-cuts and by 120 AQ diamond drill holes aggregating 6,926 m.

Metallurgical testing of the ore has been carried out by Britton Research Ltd.

Land Status

The property comprises eight Crown-granted and 39 located mineral claims, situated in the New Westminster Mining Division of British Columbia. The following list has been supplied by Carolin Mines Ltd.:

Crown Grants:

<u>Name</u>	<u>Lot No.</u>
Idaho	1234
Tramway	1235

PROJECT HISTORY (Cont'd)

Aurum No. 1	1236
Aurum No. 2	1237
Aurum No. 3	1238
Aurum No. 4	1239
Aurum No. 5	1240
Aurum No. 6	1241

Located Claims:

<u>Name</u>	<u>Record No.</u>	<u>Expiry Date</u>
Gold Star 1 - 4 inc.	11365 - 11368 inc.	28/07/84
Home Gold 5	14727	21/08/84
Home Gold 7	14729	21/08/84
Home Gold 10	14732	21/08/84
Home Gold 12	14734	21/08/84
Home Gold 14	14736	21/08/84
Home Gold 15	14737	21/08/84
Caro 8	28621	29/06/84
Caro 10	28623	29/06/84
Caro 12 - 17 inc.	28625 - 28630 inc.	29/06/84

PROJECT HISTORY (Cont'd)Located Claims: (Cont'd)

<u>Name</u>	<u>Record No.</u>	<u>Expiry Date</u>
Caro 24 - 27 inc.	28637 - 28640 inc.	29/06/84
Caro 29 - 30 inc.	28641 - 28642 inc.	29/06/84
Caro Fr. 1 - 3 inc.	28643 - 28645 inc.	29/06/84
Caro Fr. 5 - 6 inc.	28646 - 28647 inc.	29/06/84
Cabin 8	11910	21/07/84
Cabin 10	11912	21/07/84
Cabin 12 - 14 inc.	11914 - 11916 inc.	21/07/84
Cabin 20 - 21 inc.	11917 - 11918 inc.	21/07/84
Sylvia Fr.	13364	20/07/84
PCR 1	89	08/03/83
PCR 2	43	28/07/84

SECTION 5

GEOLOGY & ORE RESERVES

CAROLIN MINES LTD.  
LADNER CREEK PROJECT  
FEASIBILITY STUDY

GEOLOGY & ORE RESERVES

Geology

The following brief description of the geology of the deposit has been drawn from various reports prepared by the Company's consultants and staff who have, in turn, made use of older publications of the Geological Survey of Canada.

Physiographically, the area is located toward the northern margin of the Cascade Mountains. The underlying rocks range in age from late Paleozoic to early Tertiary and comprise a thick series of sedimentary and eruptive beds, more or less metamorphosed, and intruded by numerous igneous bodies of various compositions. The general trend of the formations is northerly to northwesterly.

The claim group straddles the northerly-trending Coquihalla serpentine belt which lies along the Hozameen fault. This fault, and auxiliary faults, striking northwest and with a nearly vertical dip, may constitute an important structural control.

GEOLOGY & ORE RESERVES (Cont'd)

The oldest rocks, lying to the west of the fault, belong to the Hozameen Group of probable Carboniferous age, comprising interbedded cherts and shaley beds. They are succeeded by the serpentine belt proper, consisting of serpentine, and serpentized and otherwise altered diabase, and then by the Ladner Group consisting predominantly of slates and argillites. Between the serpentine belt and the Ladner Group is a discontinuous unit of extrusive greenstone of unknown age.

The Idaho Zone, in which the mineralized lenses occur, is contained within a sequence of sediments believed to be near the base of the Ladner Group. These have been ruptured by a system of normal faults probably related to the Hozameen fault which lies about 250 m to the west. The sediments, originally greywackes, have been altered in the vicinity of these faults to a quartz-carbonate-chlorite-albite host rock.

The Zone strikes at  $335^{\circ}$  and plunges into the mountain at an angle of  $20^{\circ}$ . It has been explored over a strike length of 350 m, ranging

GEOLOGY & ORE RESERVES (Cont'd)

up to 45 m in width and 80 m in depth. It is open down-plunge to the north. Related to the shearing along some of the fault branches, chlorite and/or graphite have been developed and minor argillic alteration also occurs. No offsetting structures to the system of normal faults have been identified.

The sulphide content of the Zone is estimated at two percent by volume. The principal sulphides, in decreasing order of abundance, are pyrrhotite, pyrite and arsenopyrite. Also present are traces of chalcopyrite, magnetite and sphalerite. Microscopic work has indicated that almost all of the gold is free, but very fine-grained.

Scattered gold values occur throughout the zone but the more intensely mineralized areas form lenses whose attitudes roughly parallel those of the zone proper. The dimensions of these lenses, which constitute the ore bodies, are discussed below. Except where cut off by faulting, there are no sharp boundaries but rather the intensity of mineralization tends to diminish toward the edges of the lenses. Thus mining will be carried to an assay wall.



GEOLOGY & ORE RESERVES (Cont'd)

Ore Reserves

Drill-indicated ore reserves, based on a cut-off of 0.08 ounces per short ton, and applying anticipated mining dilution, are estimated at approximately 1,500,000 metric tonnes, grading 0.14 ounces gold per tonne. In summary:

	<u>Metric Tonnes</u>	<u>Ounces Gold per Tonne</u>	<u>Total Ounces Gold</u>
In situ	1,275,000	0.165	210,375
10% dilution @ 0.05 oz/tonne	127,500	0.050	6,375
10% dilution @ zero grade	127,500	--	--
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<u>MINEABLE RESERVE</u>	<u>1,530,000</u>	<u>0.141</u>	<u>216,750</u>

GEOLOGY & ORE RESERVES (Cont'd)

The basic ore reserve calculation was carried out on behalf of Carolin Mines Ltd. by Messrs. W. E. Clarke, P. Eng., D. Griffith, B. Sc., and D. R. Cochrane, P. Eng. and summarized by them in a report dated January 31st, 1979. We have considered the methods employed and the parameters applied and believe them to be reasonable. We have carried out an independent calculation of the reserves over approximately 25% of the total and agree with the original estimate to within  $\pm 5\%$ . We have also investigated the Company's program of check assaying and believe that grades have been established within normal limits of accuracy.

As will have been noted in the geological description above, there is frequently no sharp boundary limiting the ore zone. Gold values of diminishing tenor may persist into the walls. How much of this material to include as ore in reserve estimations is a matter of judgement. A decision as to "cut-off" grade, that is, the lowest grade of material on which it is probable that a reasonable profit may be realized requires an estimate of both market price and cost. In the January 1979 report cited above, the authors actually made two calculations, one at a cut-off of 0.05 ounces per short ton and

GEOLOGY & ORE RESERVES (Cont'd)

one at 0.08 ounces per short ton. As a result of discussions between ourselves and Company officials, it was resolved to make use of the latter figure for the purposes of this report. With actual experience in mining of the deposit, it is possible that a different standard may be adopted.

After consideration of cross-sections across the ore lenses and probable stoping methods, it is our opinion that a total mining dilution of 20% may be anticipated. It appears, however, that about half of this falls within the zone of the 0.05 cut-off material, while the remainder will be barren. This data has been incorporated into the table at the head of this section.

The basis on which the ore reserve was calculated is as follows:

Information was derived from 43 surface and 120 underground diamond drill holes with an aggregate length of 13,837 m, muck-sample information from one crosscut across the zone, and chip-sample information from four such crosscuts. All of the data were interpreted in the light of the known geological settings.

GEOLOGY & ORE RESERVES (Cont'd)

Cutting of high erratic assays was considered, but it was found necessary to do this in only one instance. A minimum mining width of 3 m was used and, where necessary, lower-grade material adjacent to an ore block was included to achieve this target.

Drill hole and crosscut assays were weighed by normal engineering methods and results combined on sections which are, on an average, 30 m apart. Ore was considered continuous between sections unless such continuity was contra-indicated by geological considerations. Where insufficient continuity could be assumed, a lower probability of reserve, denominated Category Two, was set up. However, as this material constitutes less than 4% of the total, it has been ignored in the summary above.