

LOG NO: 28-01	RD.
ACTION:	
FILE NO:	

GEOLOGICAL MAPPING
ON THE
GNAWED MOUNTAIN PROPERTY

Highland Valley Area, B.C.
Kamloops Mining Division
LAT: 50° 26' LONG: 120° 59'
NTS 92 I/7W

Prepared for:

ROBAK INDUSTRIES LTD.
2520 Ashurst Avenue
Coquitlam, B.C. V3K 5T4

by:

Gower Thompson & Associates Ltd.
#201 - 615 8th Street
New Westminster, B.C.
V3M 3S3

January 15, 1991

Stephen C. Gower,
B. Sc., F.G.A.C.

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STATEMENT OF COSTS

Wages	S.C. Gower, Geologist, July 6 - 23, 1990 16 days @ \$300.00/day	\$ 4,800.00
	E.M. Thompson, Field Technician, July 6 - 23, 1990 16 days @ \$150.00/day	2,400.00
Support	32 man days @ \$50/day	1,600.00
Vehicle rental,	16 days @ 70/day	1,120.00
Gasoline		176.89
Flagging		39.70
Sample Bags		15.80
Drafting & Processing		378.40
Report Preparation		<u>750.00</u>
	Total	\$11,280.79
Amount claimed for assessment		\$ 7,800.00

SUMMARY

The Gnawed Mountain property is situated contiguous to the Highmont open pit mine on its south side. Sulphide zones which formed the Highmont reserves trend southwest around Gnawed Mountain. Copper content in the zones is higher than at Highmont and Molybdenum content is lower. This is due to metal zoning in the area with the top of the high grade copper zone situated above the top of the molybdenum zone.

The claim area is underlain by Skeena granodiorite, which has been cut by a southeasterly trending dyke referred to as the Gnawed Mountain porphyry. This dyke averages about 200 metres in thickness and appears to follow the Skeena-Bethsaida contact with a dip of about 75° north. Offshoots of the Gnawed Mountain porphyry extend up to 250 metres into the surrounding rock.

Breccia bodies occur within the Gnawed Mountain porphyry. In outcrop, these bodies range in size from 5 to 75 metres and appear pipelike in form. These breccias consist of rounded clasts of granitic rock with a matrix of tourmaline, hematite and quartz.

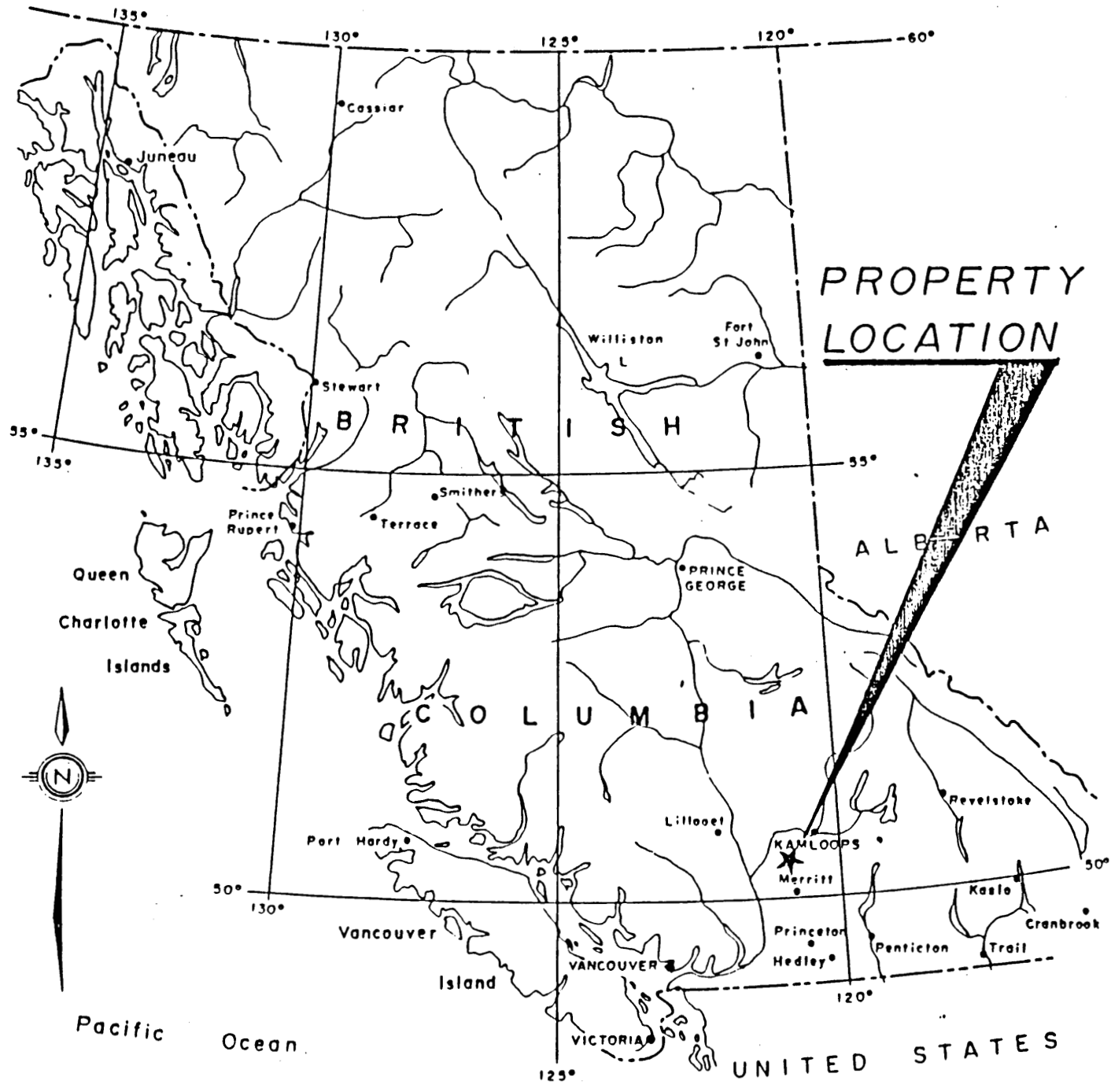
Drill core stored on the property was logged in a cursory fashion to aid in the preparation of the geology map. A temporary grid was established on the property with flagging to plot outcrop locations.

INTRODUCTION

Terms of Reference

Gower Thompson and Associates Ltd. was contracted by Robak Industries Ltd. to carry out detailed geological mapping on the Gnawed Mountain Property. The field work was carried out by S.C. Gower geologist, and E.M. Thompson blaster/pro prospector during the period July 6 to July 23, 1990.

This report discusses the geology observed during the field program and draws from published data and from previous reports written by the author.



**PROPERTY
LOCATION**

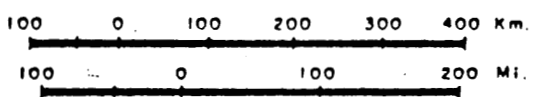
**PROPERTY LOCATION
KAMLOOPS MINING DIVISION**

DRAWN BY: BDS

FIG. 1

GOWER THOMPSON & ASSOC. LTD.

BRAD'S DRAFTING SERVICES



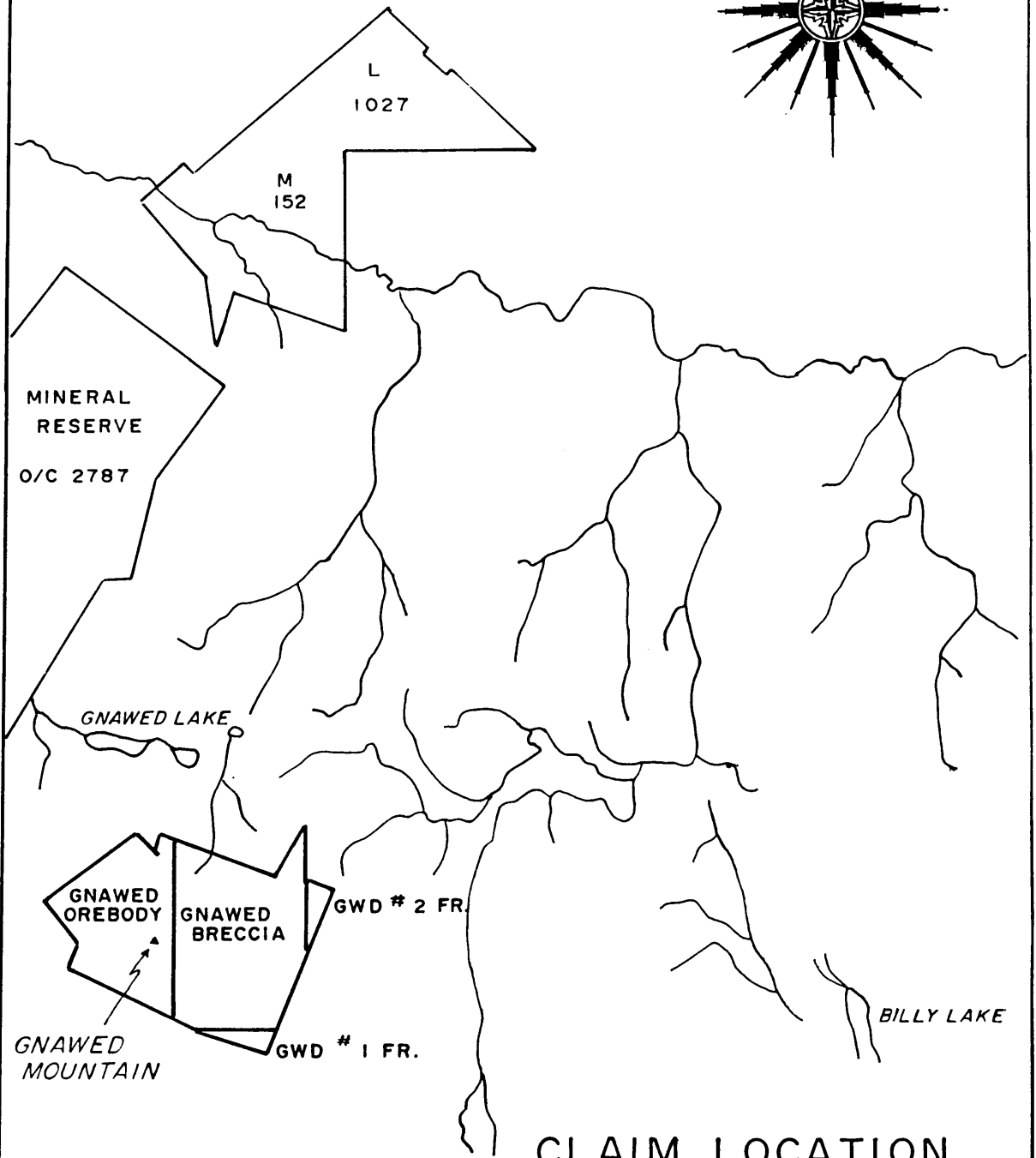
LOCATION AND ACCESS

The Gnawed Breccia, Gnawed Orebody, GWD #1 FR and GWD #2 FR are located in the Highland Valley of B.C. at Lat: 50° 26' Long: 120° 59'. The centre of the property is situated 56 kilometres southeast of Ashcroft at Gnawed Mountain.

Access to the property is from Logan Lake to the Lornex - Highmont turnoff then 10 kilometres (6 miles) by gravel roads through the Highmont pit area past Gnawed Lake and to Gnawed Mountain. A series of mine roads which traverse the property have been trenched at specific points by Valley Copper staff to prevent access to the Valley Copper mine facilities and open pits.

The property is easy to traverse on foot or by trail bike. The terrain is mostly park like except for steep slopes along the east flank of Gnawed Mountain.

50° 30'



CLAIM LOCATION

92 I / 7 W

1 : 50,000

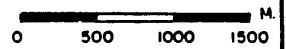


FIG. : 2

CLAIM STATUS

The property consists of the following claims:

TABLE I - Owner: Robak Industries Ltd.

Claim	Units	Anniversary date	Expiry	Record #
Gnawed Orebody	6	October 28	1993*	123
Gnawed Breccia	6	October 28	1993*	124

TABLE II - Owner: John Lepinski

Claim	Units	Anniversary date	Expiry	Record #
GWD #1 FR	1	July 14	1994*	9514
GWD #2 FR	1	July 15	1994*	9515

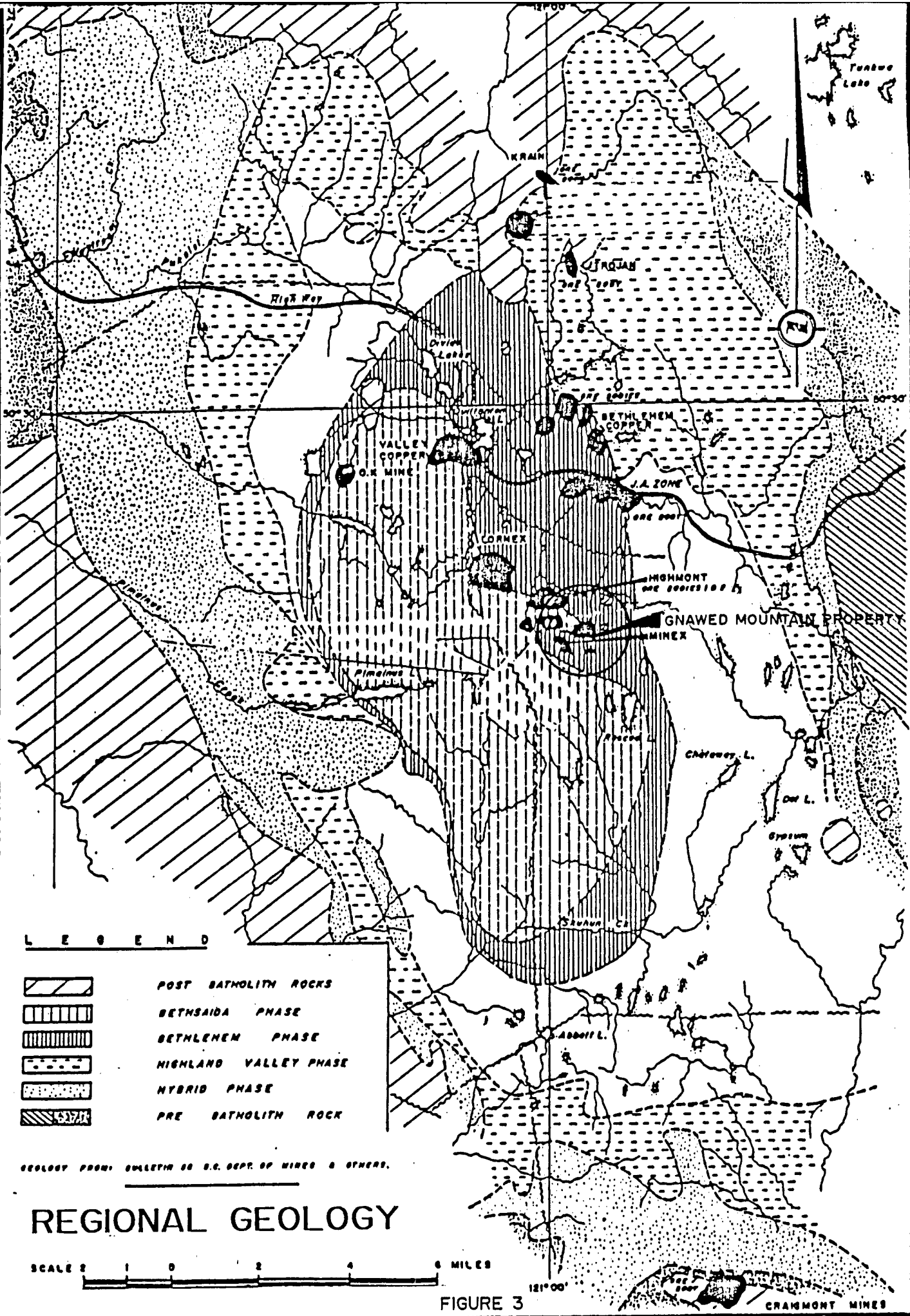
* Pending acceptance of this report.

The legal corner post for the Gnawed Orebody and Gnawed Breccia claims is believed destroyed by Highmont during pit construction. The south post for these claims was verified as was the legal posts for the GWD #1 and 2 FR's. The legality of the claims is the responsibility of the owners.

HISTORY

1957 - 1958	American Smelting & Refining	Geological Mapping
1958	Kennco Explorations (Western) Ltd.	Geology, Geochemistry
1964 - 1965	Anaconda Brass Ltd.	Geology, Geochemistry, Geophysics & Diamond Drilling
1969	Trojan Consolidated Mines Ltd.	Diamond Drilling
1970	Canadian Superior	Drilling
1975 - 1977	New Minex	Drilling
1979	Lacana Mining	Geology & Geochemistry
1984 - present	Gower Thompson & Associates Ltd.	Geology & Geochemistry

Some compilation of this earlier work is available in the public record. Most of the detailed reports have been lost.



GENERAL GEOLOGY OF THE GUICHON CREEK BATHOLITH

The batholith has been divided into phases based on textural and compositional parameters. Northcote, K.E., established the formal names in 1969 which have been adhered to by subsequent geologists. These phases are progressively younger towards the core of the batholith.

1. The outermost border phase which carries inclusions of country rock is referred to as the HYBRID phase. Its composition ranges from amphibolite to monzonite.
2. The Highland Valley phase consists of the Chataway and Guichon varieties. The Chataway variety consists predominantly of granodiorite which contains about 12 percent mafics with hornblende predominating over biotite. The Guichon variety consists of quartz diorite to granodiorite which contains about 15% mafics evenly distributed between biotite and hornblende.
3. The bethlehem phase consists of granodiorite which contains approximately 8% mafics. The characteristic criteria of this phase is grains of fine to medium mafic crystals enclosed by coarse grained hornblende crystals. This poikilitic texture can be clearly observed with a microscope and with practice seen with a hand lens.
4. The Bethsaida phase varies from granodiorite to quartz monzonite. It generally is in gradational contact with the Bethlehem phase. It contains about 6 percent mafic minerals. Biolite is the predominant mafic mineral in the northern half

5. The Skeena variety consists of the border phase of the gradational contact between the Bethlehem and Bethsaida phases. The composition is generally granodiorite. The mafic textures are similar to the Bethlehem phase however the grain size is larger, the mafic content lower and the quartz is coarse grained.

6. A porphyry dyke swarm extends northward from the Bethlehem zones and encloses the South Seas, Krain and Transvaal deposits. A strong zone of hydrothermal alterations accompanies the dyke swarm. Feldspar minerals are altered to sericite, carbonate and clay. The mafic minerals are altered to chlorite, carbonate and epidote.

DETAILED GEOLOGY - GNAWED MOUNTAIN PROPERTY

The Gnawed Mountain porphyry dyke is an offshoot of the Bethsaida phase. The Highmont and Ann mineral deposits are related to the Gnawed Mountain porphyry dyke. The tourmaline quartz bodies which cut the Gnawed Mountain porphyry dyke appear to be largely post mineral. The dyke consists of quartz porphyry with younger cross cutting quartz plagioclase porphyry dykes and aplite dykes. The dyke has a width of about 200 metres and possess steeply dipping sides. Deposition of sulphides occurred after the emplacement of the dyke but prior to the emplacement of the younger breccia bodies. Mineralization adjacent to the dyke is zoned with bornite occurring mainly in and adjacent to the porphyry dyke and chalcopyrite and pyrite occurring at greater distances.

DETAILED GEOLOGY - VEIN TYPES

Four types of veins or fracture fillings were observed on the property.

Type I - The veins range in width from 2 to 25 mm (one inch) in width and are mineralized with quartz, chalcopyrite, bornite and molybdenite. The quartz commonly displays a vuggy texture with the mineralization occupying the central part of the vein. The vein is enclosed in an alteration envelope consisting of sericite, orthoclase and tourmaline.

Type II - The veins range in width from 2 to 100 mm (4 inches)

- Type II - The veins range in width from 2 to 100 mm (4 inches) and are mineralized with pyrite, chalcopyrite and minor molybdenite. The quartz is massive and the mineralization is scattered throughout the vein.
- Type III - The veins range in width up to 1.0 metre (3.3. feet) and are mineralized with quartz, molybdenite and clay minerals. The quartz is greyish, brecciated and seamed by molybdenite and clay minerals. These veins are younger than Types I and II.
- Type IV - These veins range in width up to 0.3 metre (one foot) and are generally barren. They consist of greyish white, sugary quartz.

No attempt has been made to differentiate these vein types on the property. The quartz veins are simply noted on the geology map. (Fig 4)

DETAILED STATION NOTES - 1990 MAPPING (Fig 4)

- Station 1 Bleached and jarositic Skeena granodiorite. Argillic alteration, malachite along fractures. Appears to be related to fault zone.
- Station 2 Float fragments of Gnawed Mountain breccia. Tourmaline and quartz present, rimming rock fragments and as fine grained matrix.
- Station 3 Gnawed Mountain breccia mineralized with coarse grained specular hematite. Vicinity of old adit which appears to have explored the mineralization.
- Station 4 Grid point 0 + 00 for 1990 stations. Survey pin A-713 coincident. Well Developed breccia exposed on glaciated outcrop. Rounded clasts evident generally 4- 8 cm in width. Rounded to subangular clasts of Skeena Granodiorite and subangular clasts of Gnawed Mountain porphyry up to 25 cm in length are present. Polymictic breccia. Tourmaline and quartz are present as veinlets and as fine grained matrix. Tourmaline and quartz veinlets generally strike 030° and dip 80° - 90°.
- Station 5 Old bulldozer trench about 75 metres long exposes Gnawed Mountain porphyry rock. Outcrop oxidized and is cut by numerous 280° - 300° striking quartz stringers 1 to 2 cm in width which the trench follows. Cross cutting quartz stringers are present which trend 305°. The porphyry has been weakly to moderately argillically altered. Quartz veins are

present ranging in size up to 2 cm. The porphyry is generally low in mafics. Minor malachite is present along fractures at the west end of trench where the contact zone between the Skeena granodiorite and Gnawed Mountain porphyry is exposed. Localized breccia at contact. Bull quartz present 1 + 85 W in a small trench adjacent to road. Quartz carries malachite and specks of bornite.

Station 6 Contact zone between Gnawed Mountain porphyry and Skeena granodiorite. Abundant quartz stringers at disjointed and random orientations. Malachite along fractures striking 220° are common.

Station 7 Skeena Granodiorite, oxidized, occasional speck of bornite and malachite along fractures. Weathering of ferromagnesian silicate minerals. Chloritized biotite. Slight pervasive argillic alteration throughout. Mineralized fractures generally strike 295° - 300° . Just north of station across road a 020° trending fracture zone carries malachite. A long trench at this station shows fractures trending NNE, NNW and E/W orientations in jarositic granodiorite. At 68 metres N/S trending fractures carry bornite.

Station 8 Core Shack location. Outcrop here consists of oxidized Skeena granodiorite. Malachite along fractures strike 060° and dip 060° W. Quartz stringers strike 110° and dip 090° .

Station 9 Argillic altered Skeena granodiorite. Blebs of chalcocite and bornite rimmed by malachite.

Mineralization associated with quartz porphyry contact.

- Station 10 Strong seam of bornite in quartz vein just west of DDH 69 - 2. Mineralization adjacent to dyke which has a trend of 250° - 270°.
- Station 11 At contact of Gnawed Mountain porphyry and Skeena granodiorite a quartz stringer zone up to 2 meters in thickness occurs. A thin skin of Gnawed Mountain porphyry follows outcrop of Skeena granodiorite south down the gulley for 15 metres. A quartz zone follows fractures NW and NE with E and S dips. Minor malachite is observed along fractures.
- Station 12 Specks of bornite occur in quartz float.
- Station 13 A series of discontinuous quartz stringers with a strike of 40° trend along the breccia contact. Trace malachite occurs along veins of tourmaline. Maximum width 0.6 m.
- Station 14 Oxide copper zone accompanied by shattered quartz veins. Copper minerals include chrysocolla, malachite, azurite and chalcocite.
- Station 15 Aplite dyke along fracture zone striking 190° and dipping 090°. Second fracture zone 25 metres east striking 065°.
- Station 16 Shaft zone. A large quartz vein mineralized with blebs of molybdenite and bornite has been explored by a shaft and a drill hole. The vein is zoned with

bornite and malachite occurring along the centre of quartz veins. The host rock is a slightly argillically altered Skeena granodiorite. Drill Hole #77 - 3.

Station 17 A zone of concentric fractures 30M across sparsely mineralized with MoS_2 . Requires further exploration.

TABLE III - ROCK DESCRIPTIONS

<u>Station</u>	<u>Type</u>	<u>Oxidized</u>	<u>Malachite</u>	<u>Bornite Chalcopyrite</u>	<u>Alteration</u>	<u>Notes</u>
1	Skeena	X	X		Clay	Muscovite
2	Gnawed Mountain Breccia		X			Breccia Float
3	Gnawed Mountain Breccia					Specularite
4	Gnawed Mountain Breccia					Tourmaline, Quartz
5	Gnawed Mountain Porphyry	X	X	X		Tremolite
6	Contact Zone		X			Quartz Stringers
7	Skeena	X	X	X	Slight	Quartz Stringers
8	Skeena	X	X			Quartz Stringers
9	Quartz Porphyry		X	X		
10	Dyke Associated			X		Quartz Vein
11	Contact Zone		X			Quartz Stringers
12	Quartz			X		Float
13	Gnawed Mountain Breccia		X			Tourmaline
14	Gnawed Mountain Porphyry	X	X		Supergene	Chrysocolla
15	Aplite Dyke	X				
16	Quartz Vein, Skeena		X	X	Slight	MoS ₂
17	Skeena					MoS ₂ Fracture Zone

SULPHIDE MINERALIZATION

The Ann zone mineralization appears to join up with the sulphide orebodies at Highmont. The mineralization generally is hosted in Skeena quartz diorites except which it crosses the Gnawed Mountain porphyry. Mineralization consists of chalcocite and bornite with sparse chalcopyrite and molybdenite. The sulphides appear to be superimposed on a younger system of quartz veins. Sulphide mineralization is directly related to fracture density and is of highest grade where fracturing, jointing and shearing is most dense.

STRUCTURE

Mineralization is located in fracture zones probably related to the emplacement of Bethsaida granodiorite porphyries and breccias. These zones form a stockwork mineralized by quartz which is generally oval in shape, centred around the peak of Gnawed Mountain. The mineral zone appears to be enriched with MoS_2 on the south and east sides of Gnawed Mountain. The Ann Zone (west side of Gnawed Mountain) is hosted in a strong quartz stockwork which forms striking bluffs for hundreds of metres along the west flank of Gnawed Mountain. A third zone of mineral potential is situated east of Gnawed Mountain on the east side of the property. This zone consists of a zone of shattered quartz diorite mineralized with bornite, chalcocite, malachite and molybdenite which possesses significant potential for tonnage and grade. In addition, some of the veins are carrying significant credits in silver and trace concentrations in gold. This zone appears to intersect a major north trending structure in the vicinity of highly anomalous concentrations of copper and molybdenum in soil, silt and water.

ECONOMIC GEOLOGY

Indicated reserves in the Gnawed Mountain area consist of the following estimates. Good potential exists to increase these tonnages at surface and to increase grades at depth.

<u>ZONE</u>	<u>TONNAGE</u>	<u>GRADE % Cu</u>
ANN	45,000,000	0.26
IDE #2	unknown	Same range as above
AM #32 FR	12,656,000	0.27

These mineral reserves amenable to open pit mining occur in a north south trending zone on the west side of the Gnawed Mountain. The zone comes to surface and is a dip slope deposit following the topography downslope to the west. Sulphide mineralization consists of bornite and chalcocite with malachite at surface. The sulphides are totally fractured controlled and occur with quartz or along dry fractures. This zone has a length of approximately 1500 metres, an average width of 150 metres to 250 metres and a pitiable depth of 150 metres. This volume of rock would yield approximately 100,000,000 tonnes. A reasonable estimate eliminating inpit waste would yield 80,000,000 tonnes of 0.26% Copper.

This grade of copper in a dip slope deposit with a favourable stripping ratio could be viable if the copper can be recovered by heap leaching. The bornite chalcocite mineralogy is favourable to produce high copper recoveries from a dump through the mechanics of leaching. Column tests would be required to determine the actual recoveries attainable.

TABLE IV ANN ZONE DIAMOND DRILL DATA
(Includes NW & SE extensions off property)

<u>DDH#</u>	<u>BEARING</u>	<u>LENGTH FT.</u>	<u>DIP</u>	<u>H & V FT.</u>	<u>LINE</u>	<u>STATION</u>
M-1-69	145°					
69-1	East	612	-45	433	85 + 10N	21W
69-2	East	617	-45	435	72N	17 + 85W
69-3	East	639	-45	452	72N	11 + 85W
69-4	East	517	-45	366	72N	7 + 95W
69-5	East	637	-45	450	68N	8 + 75W
69-6	East	624	-45	441	68N	12 + 40W
69-7	West	269	-45	190	68N	12 + 40W
69-8	East	608	-45	430	64N	12 + 90W
69-9	East	608	-45	430	"76N"	10 + 10W
69-10	East	605	-45	428	"76N" ^{377N}	18 + 25W
A-1	North					
A-2	350°					
A-3	350°					
A-7	260°					
CS19	145°					
CS20	145°					
CS21	145°					

ASSAY RESULTS

<u>DDH#</u>	<u>Footage</u>	<u>Length Ft</u>	<u>%Cu</u>	<u>%MoS₂</u>
69-1	14-560	546	0.24	.002
	560-612	52	0.08	.006
69-2	17-617	600	0.23	.002
69-3	16-510	494	0.304	.002
	510-639	129	0.08	-
69-4	22-410	388	0.298	-
	410-517	107	0.139	-
69-5	5-370	365	0.178	.001
	370-637	267	0.104	.002
69-6	30-490	460	0.262	.005

<u>DDH#</u>	<u>Footage</u>	<u>Length Ft</u>	<u>%Cu</u>	<u>%MoS₂</u>
69-7	40-110	70	0.07	-
	110-190	80	0.014	-
	190-200	10	0.20	-
	200-240	40	0.03	-
	240-250	10	0.13	-
	250-269	19	0.03	-
	69-8	31-50	19	0.095
50-590		540	0.211	0.007
590-608		18	0.133	0.006
69-9	20-160	140	0.043	-
	160-190	30	0.015	-
	190-270	80	0.032	-
	270-608	338	<.01	-
69-10	7-80	73	0.145	0.002
	80-450	370	0.30	0.002
	450-510	60	0.125	0.002
	510-605	95	0.407	-
A-1		520	0.23	
		120	0.17	
A-2		432	NS	
		397	0.12	
A-3		280	0.29	
		450	0.06	
A-7		248	0.04	
		597	0.17	
CS 19		165	0.16	0.006
		70	0.09	0.008
CS 20		50	0.25	0.01
		170	0.50	0.18
CS 21		96	0.10	0.005
		140	0.25	0.04
M-1-69		50	0.37	0.25

EXPLORATION POSSIBILITIES

The main sulphide body on the west side of Gnawed mountain (Ann Zone) requires further infill drilling and drilling along strike and down dip. The deposit appears to thicken and increase in grade with depth. It appears that the sulphide mineralization on the Ann Zone currently tested by drilling lies in the upper copper phase and deeper drilling should intersect the rich copper molybdenum overlapping phase.

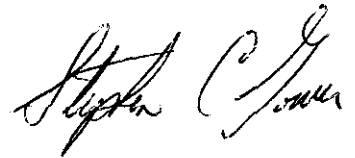
A copper-molybdenum porphyry deposit of typical Valley Copper grades could underlie the known mineralization on the Ann Zone. A possible mining scenario would be to heap leach the 0.26% Copper mineralization at surface and utilize conventional milling and flotation for an underlying higher grade reserve.

CERTIFICATE

I, STEPHEN C. GOWER, of 985 Gatensbury Street, Coquitlam, B.C., do hereby certify that:

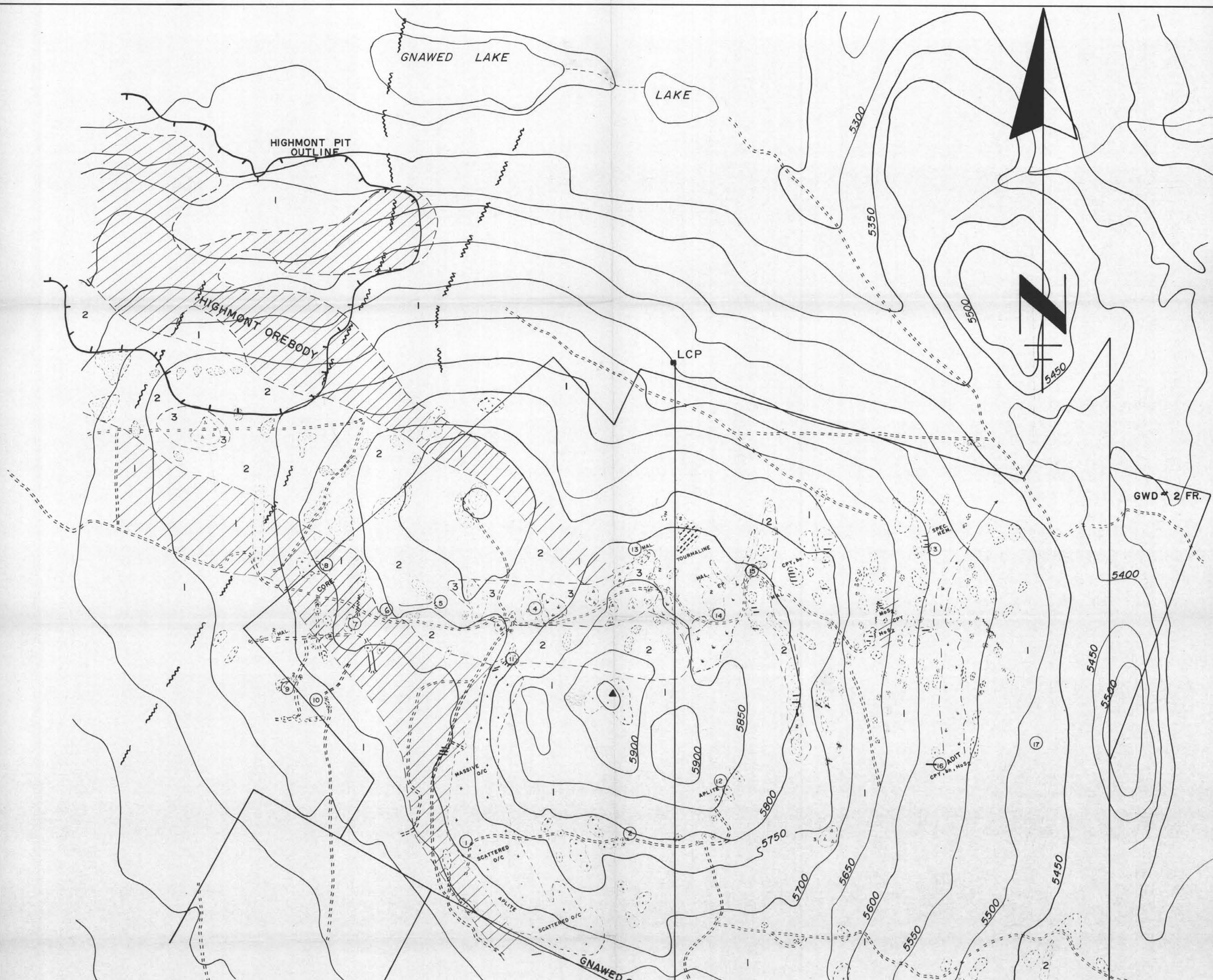
1. I have been practising as a geologist for a period of approximately 21 years for mining exploration and consulting companies.
2. I obtained a B.Sc. in geology from U.B.C. in 1970 and have completed Masters courses at U.B.C. in property evaluation and exploration.
3. I am a fellow in the Geological Association of Canada.
4. The exploration work in this report was carried out by S.C. Gower and E.M. Thompson during the period July 6 to July 23, 1990. The report was written during the period January 10 -18, 1991.

Stephen C. Gower
January 15, 1991



REFERENCES

- DIROM, Gavin A.; Summary Report on Diamond Drilling Program 1969 on Gnawed Mountain Property (Ann Group) of Trojan Consolidated Mines.
- GOWER, S.C.; Intercompany Report Lacana Mining 1979.
A Report on Property Examination of the Gnawed Mountain Claim.
- McMILLIAN, W.J.; Preliminary Geological Map of the Highland Valley, B.C.D.M.; 1971.
- NORTHCOTE, K.E.; Geology and Geochronology of the Guichon Batholith; 1969.
- PHENDLER, R.W.; DELANE, G.D.; MURTON, J.W.; Report on the Minex Development Ltd. Claim Group.
- STEVENSON, R.W.; Geological, Geochemical and Geophysical surveys on the Gnawed Mountain Group Assessment Report, 286.



ROBAK INDUSTRIES LIMITED

GNAWED MOUNTAIN COPPER PROPERTY

GEOLOGY, TOPOGRAPHY, ROADS & CLAIM BOUNDARYS

DRAWN BY: S.GOWER, E. THOMPSON DATE: JANUARY, 1991

FIG. : 4 SCALE: 1:5000 1cm = 50 M.

GOWER THOMPSON & ASSOCIATES LTD.

GEOLOGICAL BRANCH ASSESSMENT REPORT

20,866

APPROX. GEOLOGICAL CONTACT

PORPHYRY COPPER ZONE

MAL. - MALACHITE
 CPY - CHALCOPYRITE
 bn. - BORNITE
 SPEC. HEM. - SPECULAR HEMATITE
 MoS - MOLYBDENITE

▲ ▲ ▲ ▲ 3 ▲ GNAWED MTN. BRECCIA

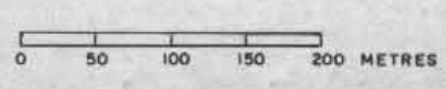
2 GNAWED MTN. PORPHYRY (DYKE)

* * * * * SKEENA VARIETY GRANODIORITE

QTZ STRINGERS

OUTCROP BOUNDARY

TRENCH



CONTOUR INTERVAL 50 FEET (15.5 M.)