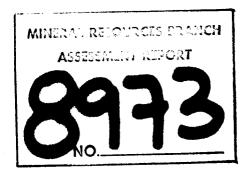
COMINCO LTD.

EXPLORATION

NTS: 94E/13

WESTERN DISTRICT



ASSESSMENT REPORT

1980 GEOLOGICAL AND GEOCHEMICAL REPORT

<u>ON</u>

THE BILL 1, 2 and 3 MINERAL CLAIMS

IN THE STIKINE RIVER AREA

LIARD MINING DIVISION, BRITISH COLUMBIA

LATITUDE: 57°45'N - LONGITUDE: 127°45'W

OWNER AND OPERATOR: COMINCO LTD. PERIOD OF WORK: JULY 17 - AUGUST 4, 1980

18 MARCH 1981

R.J. SHARP

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ATTACHMENTS

1.	Appendix	Α:	Exhibit	"A"	`-	Itemized	Cost Statement
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- 2. Appendix B: Author's Qualifications
- 3. Figure 1: General Location Map
- 4. Figure 2: Location Map 1:250,000 Scale
- 5. Figure 3: Claim Outline Map
- 6. Figure 4: Geology Map
- 7. Figure 5: Geochemistry Sample Locations
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- 10. Figure 8: Geochemical Results Cu
- 11. Figure 9: Geochemical Results Pb
- 12. Figure 10: Geochemical Results Zn
- 13. Figure 11: Geochemical Results As

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THE BILL 1, 2 and 3 MINERAL CLAIMS

IN THE STIKINE RIVER AREA

LIARD MINING DIVISION, BRITISH COLUMBIA

SUMMARY

- 1. The Bill claims are located 135 km southeast of Dease Lake, British Columbia and cover gold-arsenic anomalies in soils.
- 2. Work in 1980 consisted of geological mapping and soil geochemistry
- 3. This work confirms the presence of anomalous gold and arsenic values in soil overlying a metavolcanic-metasedimentary sequence of Mississippian rocks.
- 4. Volcanic and sedimentary rocks have undergone complex polyphase deformation (northernly and westerly trends).

INTRODUCTION

This report describes the geology and soil geochemistry at Cominco's Bill Claims 135 km southeast of Dease Lake, British Columbia (see figures 1 and 2). The report is based upon field investigations by R.J. Sharp and assistant A.D. Croft during the period July 17 to August 4, 1980. The work was supervised by R.Y. Watanabe.

The program this year consisted of geological mapping and soil geochemistry. Soil samples were collected along topographic contour lines on 200 m centers. Data are presented at a scale of 1:10,000.

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PROPERTY AND OWNERSHIP

The Bill Claim group is made up of three claims comprising 43 units, all owned 100% by Cominco Ltd. (see figure 3). This report files credit for all three Bill Claims which are listed below:

<u>Claim Name</u>	Record Number	Date Due
Bill 1	1199	March 6, 1981
Bill 2	1200	March 6, 1981
Bill 3	1201	March 6, 1981

Legal corner posts, identification posts and claim boundaries were located using air photos, chain and compass surveying and are plotted on a 1:10,000 scale topographic map.

LOCATION AND ACCESS

The property is situated in the Liard Mining Division at 57⁰45'N and 127⁰ 45'W, NTS: 94E/13, about 135 km southeast of the settlement of Dease Lake. Access is by helicopter either from Dease Lake or from the Sturdee airstrip, 70 km to the southeast.

The claims are situated in rugged terrain (1500 to 1900 m above sea level) in the Stikine Mountain Range. Most of the claims lie above treeline and are covered with grass and small shrubbery. North-facing slopes are steep cliffs while south facing slopes are moderately inclined and covered with overburden.

SUMMARY OF WORK

A preliminary geological map of the Bill Claims was prepared using air photos and a 1:50,000 claim sheet. All data was later transferred to a 1:10,000 scale topographic map. Total area surveyed to date is approximately 850 hectares. A total of 86 soil samples were collected and analyzed for Cu, Pb, Zn, Ag, Au and As; sample results are plotted in figures 6, 7, 8, 9, 10 and 11 with the ranges, geometric means and threshold values listed in Table I.

DETAILED TECHNICAL DATA AND INTERPRETATION

Regional Geology

The Bill Claims are underlain by an assemblage of metamorphosed volcanic and sedimentary rocks. Thorstad (1980) suggests a Mississippian age for these rocks. Upper Triassic rocks of the Takla Formation and Lower Jurassic rocks of the Hazelton Formation lie to the west and east of the claims. Lower Jurassic quartz monzonite and granodiorite underlie a large area to the north, east and south of the claims.

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Detailed Geology

The sedimentary and volcanic rocks which underlie the Bill Claims have been penetratively deformed and metamorphosed to lower greenschist grades. Intrusive rocks are absent except for two narrow dikes of diorite and dacite porphyry. Figure 4 shows the geological map of the Bill Claims. Outcrops have been classified into 9 mappable rock types. Each unit discussed in the following section appears in the legend of figure 4.

1. Chlorite Schist (unit 1)

The rock unit identified as chlorite schist is made up of chlorite, actinolite, albite, epidote and quartz. Boudins of quartz 1 cm thick and 5 cm long form as boudins in the schist. Calcite has infilled small tension gashes 5 mm wide and 10 cm long. Pyrite and chalcopyrite grains are present in trace amounts locally. Fresh surfaces of the chlorite schist are dark green and weather to a light green.

Foliation is pervasive, varying from weak to moderate. Faint pillow structures are apparent in some outcrops, this, together with the mineralogy suggests that the rocks are metamorphosed basalt.

Numerous outcrops of chlorite schist are found in the southeast portion of the claim group and in several places in the central area of the claims. An aggregate thickness of over 250 m is likely for this unit. Rocks of unit 1 appear to be the oldest on the claim group and are structurally overlain and conformable with the other stratified rocks discussed in the structural sequence below.

2. <u>Sericite-Quartz-Chlorite Schist</u> (unit 2)

Rocks of unit 2 are composed of over 60% chlorite, 20-30% quartz and 10-20% sericite. Strong foliation has produced a schistose texture in the rocks and small-scale isoclinal folds are visible in many outcrops. Sericite coats foliation surfaces and occurs as small clots 2-5 mm in diameter where relict feldspar crystals are visible. Milky quartz and iron carbonate veins are folded and sheared into boudins up to 2 cm thick and 10 cm long. Fresh surfaces are light green and weather light green to light brown depending on the amount (up to 2%) of iron carbonate present.

The total thickness of unit 2 is estimated at 200 m below beds 4 and 5 plus an additional 250 m above these beds where it has not been removed by faulting or erosion. The sericite-quartz-chlorite schist of unit 2 is the most abundant rock type exposed and underlies a large area in the central portion of the claims. Thin beds of chloritic quartzite, carbonaceous sediments, and limestone are interbedded with unit 2 and provide proof of a subaqueous depositional environment. Relict feldspar crystals, uniformity of composition and general penetrative nature of the foliation suggests a volcanic origin of the rocks which probably accumulated as a mixture of flows, tuffs and tuffite with an andesitic composition.

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3. Quartz-Sericite Schist (unit 3)

Rocks of unit 3 are made up of quartz and sericite with minor iron carbonate (5%), their fresh surfaces are white and weather to a buff brown colour. Chlorite is not a significant component of the rocks and, although present, is less than 5% by volume. The quartz-sericite schists of unit 3 form beds less than 10 m thick and are not laterally extensive. Unit 3 is interbedded with units 1 and 2, and probably represents metamorphosed beds of either rhyolitic tuffs or relatively pure quartzo-feldspathic sediments. The numerous outcrops of unit 3 reflect multiple beds of similar composition rather than one bed that has been extensively folded or highly dislocated.

4. Chlorite-Quartz-Sericite Schist (unit 4)

In this lithology sericite is more abundant than chlorite. The rock is composed of 40-60% sericite, 5-20% chlorite, and over 30% quartz. Fresh rocks are light grey and weather to a grey-brown colour. The schist unit is approximately 10 m thick and contains: calcite marble layers up to 1 m thick; quartzite bands 5 cm thick; carbonaceous material; quartz-eye rhyolite tuff. The rocks are strongly foliated and have a schistose texture.

Unit 4 outcrops in the south-central portion of the claim group and is intimately associated with graphitic schists described in the next section. The chlorite-quartz-sericite schist and graphite schist beds may be traced intermittently across the entire property; they outcrop mainly on ridges in the southern claim area and are traceable along a cirque floor in the north.

A quartz-eye rhyolite tuff bed, and other volcaniclastic lithologies preserved in this map unit, indicates a period of limited felsic volcanism punctuated by brief volcaniclastic, epiclastic and chemical sedimentation. Volcanism deposited mainly ash-size rhyolite to dacite tuffs.

5. Quartz-Graphite Schist, Crinoidal Limestone (unit 5)

A bed of quartz-graphite schist (unit 5), approximately 15 m thick, forms a distinctive marker unit. The lithology is made up of graphite, quartz, minor sericite, and calcite marble or crinoidal limestone beds up to 2 m thick. Fresh surfaces are grey to black and weather the same. Quartz and siderite form small veins and boudins several centimeters wide.

The crinoids are well preserved locally and indicate a shallow water depth during limestone formation. The carbonaceous material accumulated in a reducing basin and is suggestive of a period of quiet water conditions during a break in volcanism. Assessment Report/Bill 1, 2, & 3 Mineral Claims/ 18 March 1981/Page 5/

Unit 5 follows the same northerly trend of unit 4. It is the most reliable stratigraphic marker bed and appears to underlie the central and western portions of the claim group.

6. Chloritic Quartzite (unit 6)

A bed of chloritic quartzite (unit 6), approximately 5 m thick, outcrops in a cliff face in the southern portion of the claim group. This rock is composed of fine-grained quartz containing 10% disseminated chlorite and minor graphite; its fresh surfaces are medium green and weather to a grey-brown colour. Weak foliation is present and quartz boudins 1-6 cm thick and 3 cm to 0.75 m long have developed along foliation planes locally. The distinctly bedded nature of the quartzite unit indicates that it accumulated as a bed of siliceous epiclastic sediments probably derived from underlying tuff and tuffite rock units.

7. Chlorite-Sericite-Feldspar-Quartz Phyllite (unit 7)

Unit 7 is composed of fine grained quartz and feldspar with some sericite, chlorite, and minor graphite. Fresh surfaces are grey and weather brown. Bedding traces indicate a sedimentary origin of the rock unit which was a quartzo-feldspathic siltstone prior to metamorphism.

Erosion and faulting have removed the upper portions of unit 7, therefore the thickest section exposed is 200 m and is located west of the claims. A small outlier of unit 7 is exposed in the southern section of the claim group. Two small outcrops of unit 7 were mapped in the dominantly intermediate to mafic metavolcanic lithologies in the south-central portion of the claim group. These outcrops are lithologically similar to the bulk of the rocks composing unit 7, in the western part of the claims, but are probably not age equivalent to them.

8. Dacite Porphyry Dike (unit 8)

Unit 8 is an unmetamorphosed dike, approximately 0.5 m wide, containing fine-grained feldspar phenocrysts set in an aphanitic siliceous matrix. Fresh surfaces are light green and weather brown. Approximately 10% pyrite is disseminated in the matrix. Thin calcite veinlets 1-2 mm thick carry small pyrite grains.

The dacite dike outcrops in several locations in a cliff face near the central area of the claim group. The dike appears to be an isolated occurrence and has not been observed elsewhere on the claim group. Assessment Report/Bill 1, 2, & 3 Mineral Claims/ 18 March 1981/Page 6/

9. Diorite Dike (unit 9)

Unit 9 is a single occurrence of a 1 m wide, fine-grained diorite dike. It is dark green, weathers brown and contains up to 5% finely disseminated pyrite. The dike is undeformed and unmetamorphosed; it outcrops along a ridge in the south-central region of the claim group.

Metallic Minerals

Metallic minerals observed in the field consisted of mainly pyrite, occasional arsenopyrite, and local grains of chalcopyrite. The chalcopyrite, usually found with the calcite marble and chlorite quartz sericite schist of unit 4, occurs in trace amounts and is of no economic significance. Pyrite, and occasionally arsenopyrite, fills fractures in rocks of unit 2 and 4. These minerals locally compose up to 2% of the rocks over a 0.5 m interval but are commonly absent. Minor pyrite cubes appear in the graphite schists (up to 1%) and significant (up to 5%) pyrite is present in the two exposures of dikes on the property.

Structural Geology

Foliation and folding are two structural features evident in most outcrops on the property. Foliation pervades all rock types and varies from weak to intense. Isoclinal folds have been observed in outcrops on a centimeter scale but have not been recognized on a larger scale. Kink bands, observable in the mica schists, and folded quartz veins or boudins, indicate at least two stages of folding have occurred.

A major anticlinal fold has been defined by structural and lithologic studies; the strike lines of the best structural marker beds (units 4 and 5) run NE-SW in the northern half of the claims and NW-SE in the southern half. The graphite schist of unit 5 is folded into a small syncline located near the southern border of the claims. This feature is well exposed along a ridge.

Normal faults have been mapped along some of the cliff faces on the property. Displacements are small, only tens of metres. The meta-sedimentary rocks of unit 7 are in fault contact with the other rock units in the southern part of the claims. A large block of unit 7 also appears to be overthrust on the other rock units near the northwest boundary of the claim group.

A major lineament runs up a large valley on the western margin of the Bill property. Thorstad, 1980 mapped this lineament as a fault, however not enough evidence has been gathered by the writer to confirm it. Assessment Report/Bill 1, 2, & 3 Mineral Claims/ 18 March 1981/Page 7/

Geochemical Survey

1. Field and Analytical Techniques

The geochemical survey consisted of soil sampling on the Bill 1, 2 and 3 claims. All samples were taken from the B soil horizon at a depth of 15-25 cm below surface. Samples were collected along topographic contour lines of constant elevation; sample spacing was 200 m along contour lines spaced 50 m apart, that is, two lines were sampled on each overburden-covered hillside. Contour sampling provides a rapid yet systematic sampling pattern in areas of rugged topography.

The samples were dried, sieved to minus 80 mesh, and the fines retained for analysis. Copper, lead, zinc and silver contents were determined by atomic absorption spectrophotometry of solutions obtained by 20% nitric acid digestion of sieved material. Arsenic was released from the samples by pyrosulfate fusion and its concentration was estimated colorimetrically. Gold values were obtained by aqua regia digestion of sample material, followed by solvent extraction and atomic absorption spectrophotometry.

Results

The concentration ranges, geometric means, and anomaly thresholds for the elements analyzed are listed in Table I. Threshold values were estimated on the basis of probability plots and histograms. Soil sample sites are shown in figure 5, analytical results are shown in figures 6, 7, 8, 9, 10 and 11.

TABLE I

DATA DISTRIBUTION PARAMETERS

Element	Range	Geometric Mean	Threshold		
Au (ppb)	< 10 - 580	20	365		
Ag (ppm)	<0.4 - 2.2	0.3	0.8		
Cu (ppm)	5 - 199	26	148		
Pb (ppm)	< 4 - 75	5	29		
Zn (ppm)	17 - 667	62	163		
As (ppm)	6 -2440	129	1389		

BILL SOIL SURVEY

Gold anomalies occur in the north and south-central parts of the property. The northern anomaly is an isolated high while the southern ones comprise one strong anomaly and several weaker anomalies which occur within 400 m of each other. Arsenic anomalies correspond with two of the gold anomalies and tend to cluster near the high gold area in the south-central part of the claim group. Two arsenic anomalies also were found in the west-central portion of the claims; one is an isolated anomaly the other

Ectimated Anomaly

Assessment Report/Bill 1, 2, a 3 mileral claims/ 18 March 1981/Page 8/

is coincident with a copper-lead anomaly. Silver forms spotty anomalies in several places; in one sample, silver is coincident with a lead anomaly in the southern portion of the claims. Two zinc-anomalous soils were sampled in the northeast portion of the claim group, in addition one coincident lead-zinc anomaly lies in the west-central section of the claims.

CONCLUSIONS AND RECOMMENDATIONS

The claim group is underlain by dominantly metavolcanic rocks of basaltic to rhyolitic composition. Thin beds of metamorphosed felsic tuff, tuffite, quartzo-feldspathic sandstone and siltstone, carbonaceous siltstone, and limestone, are interbedded with the mafic and intermediate metavolcanic rocks. A thick assemblage of weakly metamorphosed quartzo-feldspathic siltstone and greywacke structurally overlies the rocks described above. Intrusive rocks are limited to several exposures of dacite and diorite dikes.

Foliation is pervasive and ranges from weak to strong. Metamorphic grade is lower greenschist. The penetrative nature of the deformation has resulted in small scale isoclinal folding and the development of schistose textures in the micaceous rocks.

Metallic minerals are seldom present in amounts over 5%. Pyrite is the most common sulfide; arsenopyrite and occasionally chalcopyrite are observed. No economic concentrations of metallic minerals have been found on the property to date.

An anomalous gold-arsenic zone 600 m in diameter was discovered in the south-central portion of the Bill Claims, in addition one isolated goldarsenic anomaly was found in the north-central area. Lead, zinc and silver anomalies have a random distribution and do not correlate well with gold anomalies.

It is recommended that follow-up work on the gold anomalies be undertaken. Additional soil samples should be collected on a grid laid out over the gold anomalies. Sampling should be done at 25 m centers.

Report by: R.J. Sharp Geologist Endorsed by: R.Y. Watanabe

Senior Geologist

Approved for Release by:

6. Haffen, Manager Exploration, Western District

RJS/skg

DistributionMining Recorder(2)Administration(1)Western District(1)

Assessment Report/Bill 1, 2 & 3 Mineral Claims/ 18 March 1981/Page 9/

REFERENCES

1.	Sinclair,	A.J., 1974.	Selection of threshold values in geochemical data using probability graphs; Journal of Geochemical Exploration, volume 3, pp. 129-149.
2.	Thorstad,	L., 1980.	Upper Paleozoic volcanic and volcaniclastic rocks in northwest Toodoggone map area, British Columbia; <u>in</u> Current Research, Part B, Geol. Survey of Canada, Paper 80-1B, pp. 207-211.

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APPENDIX "A"

EXHIBIT "A"

STATEMENT OF EXPENDITURES

ON THE BILL 1, 2, 3 MINERAL

CLAIMS FOR 1980

<u>GEOLOGY</u> Salaries	
R.J. Sharp - July 17 - August 4, 1980 (19 days @ \$148.72/day). Report writing and drafting (10 days @ \$101.20/day)	\$ 2,831.00 1,012.00
A.D. Croft - July 17 - August 4, 1980 (19 days @ \$80.96/day)	1,539.00
Expense Accounts Accommodation and food for crew in Smithers	405.05
<u>GEOCHEMISTRY</u> 86 soil samples x \$10.65/sample	915.90
TRANSPORTATION Helicopter Fixed Wing Truck Fuel	1,852.00 1,152.30 58.89
DOMICILE AND CAMP SERVICES Food, radio, tent and camp gear	599.86
EXPEDITING	160.00
GEOLOGICAL SUPPLIES sample bags, hammers, tent, flagging, notebooks	243.01
TOPOGRAPHIC MAP Pencil manuscript base map for Geology - Geochemistry on Bill Claims	1,650.00
FREIGHT (Rock samples to Lab) TOTAL EXPENDITURE:	\$ <u>52.25</u> 12,471.26

APPENDIX "B"

STATEMENT OF QUALIFICATIONS

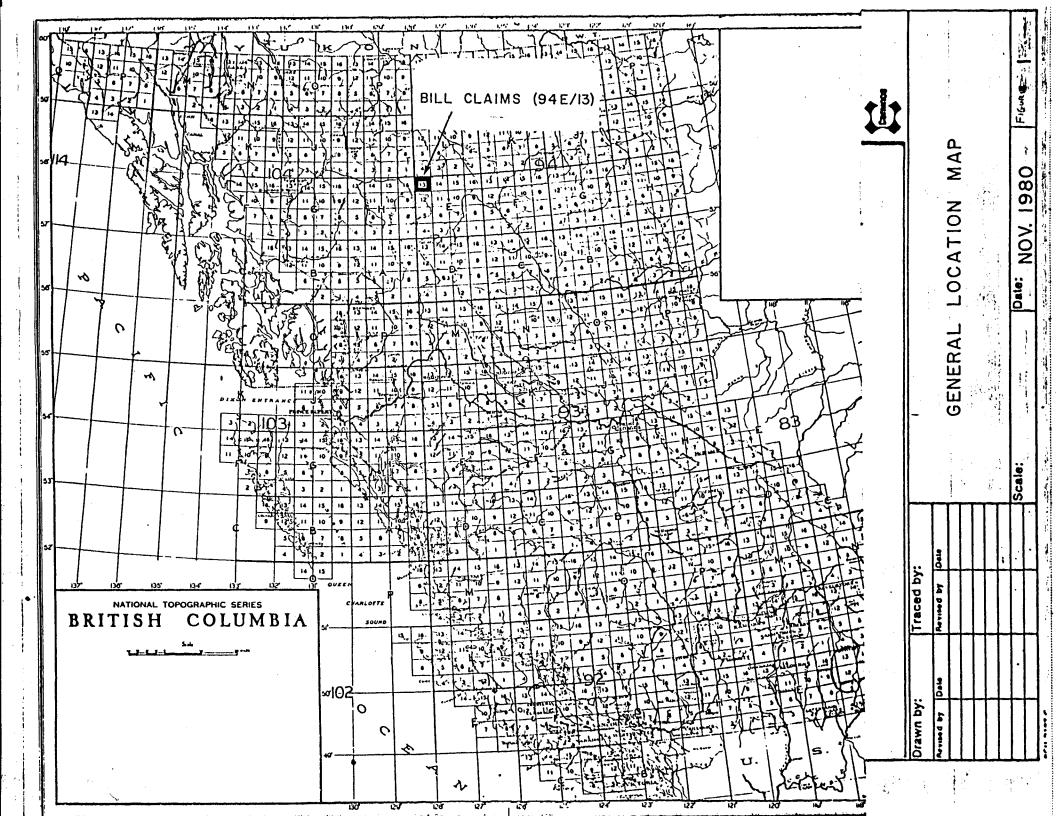
I ROBERT J. SHARP, OF THE CITY OF VANCOUVER, BRITISH COLUMBIA, HEREBY CERTIFY:

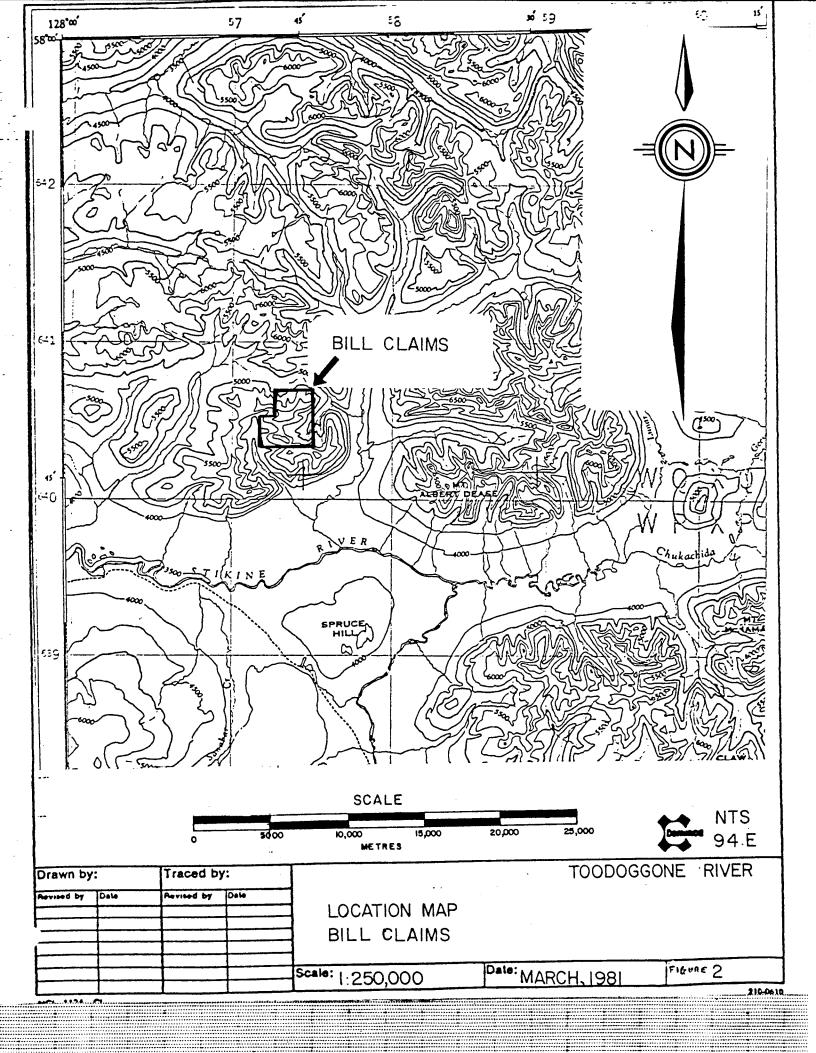
- THAT I AM A GEOLOGIST RESIDING AT 2764 WEST SECOND AVENUE, VANCOUVER, BRITISH COLUMBIA WITH A BUSINESS ADDRESS AT 700-409 GRANVILLE STREET, VANCOUVER, BRITISH COLUMBIA.
- 2. THAT I GRADUATED WITH A B.SC. DEGREE IN MINERAL ENGINEERING FROM THE UNIVERSITY OF ALBERTA IN 1975.
- 3. THAT I GRADUATED WITH AN M.SC. DEGREE IN GEOLOGY FROM THE UNIVERSITY OF ALBERTA IN 1980.
- 4. THAT I HAVE PRACTISED GEOLOGY WITH THE UNION OIL COMPANY OF CANADA LTD., MINERALS DIVISION, IN CALGARY ALBERTA FROM 1978 UNITL 1980.
- 5. THAT I HAVE PRACTISED GEOLOGY WITH COMINCO LTD. FROM 1980 TO 1981.
- THAT I AM REGISTERED AS AN ENGINEER-IN-TRAINING WITH THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS AND GEOPHYSICISTS OF THE PROVINCE OF ALBERTA; MEMBER NUMBER 18311.

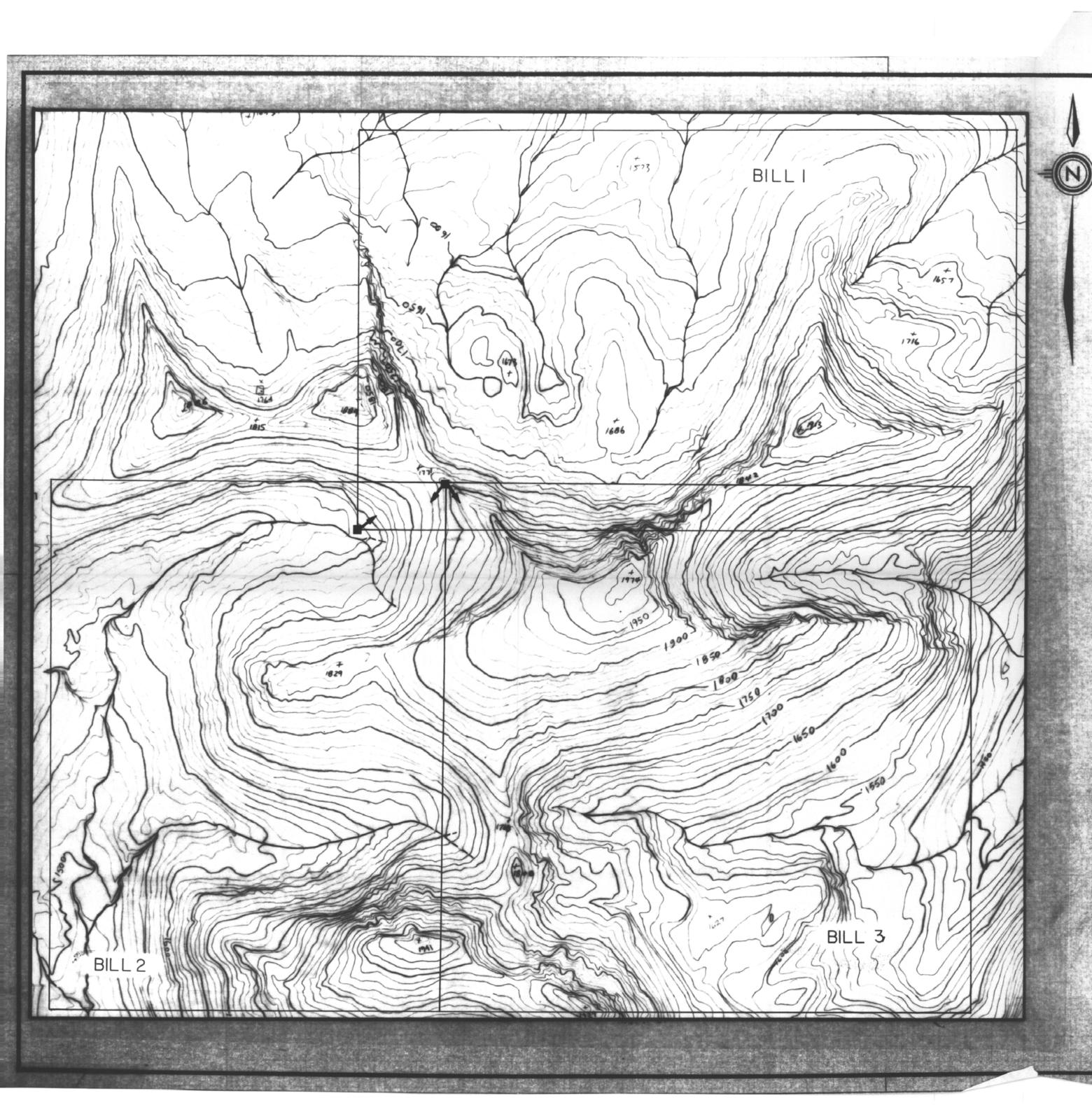
DATED THIS 20th DAY OF MARCH, 1981, AT VANCOUVER, BRITISH COLUMBIA.

Signed: Last Shard M.Sc.

20 MARCH 1981









LEGAL CORNER POST CLAIM BOUNDRY

(LEGAL CORNER POST POSITIONS ESTABLISHED BY CHAIN AND COMPASS SURVEYING, AIR PHOTOS, AND TOPOGRAPHIC MAPS)

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