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REPORT ON GEOLOGY AND GEOCHEMISTRY

ON THE

JOE ANNE II AND JOE ANNE 6 CLAIMS

JOE ANNE II 1839 (8)  
 JOE ANNE 6 2574 (3)

NANAIMO MINING DIVISION

N.T.S. 92F/11

49°44'N 125°21'W

**GEOLOGICAL BRANCH  
 ASSESSMENT REPORT**

**17,096**

Owner : Noranda Exploration Company, Limited (no personal liability)  
 1050 Davie Street  
 Vancouver, B.C.

Operator : Noranda Exploration Company, Limited (no personal liability)

Date : February 8, 1988

Authors' : R.G. Wilson/C.D. Frew/D. Bull

FILMED

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## 1.0 INTRODUCTION

The work performed on the Joe Anne II and Joe Anne 6 claims described herein was conducted by Noranda Exploration Company, Limited (no personal liability) - hereinafter called "Noranda" - during the year 1987.

### 1.1 Location and Access

The Joe Anne II and Joe Anne 6 claims are located twenty-seven kilometres west-northwest of Courtenay, British Columbia, on Vancouver Island. The Joe Anne II claim encompasses all of Divers Lake, the southern two-thirds of Rossiter Lake plus the western and north-western slopes of Mount Brooks. The southern boundary of this claim is a Strathcona Provincial Park border.

The Joe Anne 6 claim is northeast of the Joe Anne II claim and includes a portion of Piggott Creek plus several creeks which drain the west-southwest flanks of Mount Washington. The southeast corner of this claim is included in the newly annexed Strathcona Recreation Area. The approximate centre of this claim group is at latitude 49°44'0"N and longitude 125°21'0"W.

The greatest portion of the workable area within these claims is above 900 metres a.s.l., and the Mount Brooks portion of Joe Anne II rapidly rises to 1380 metres a.s.l., the highest point of this claim block.

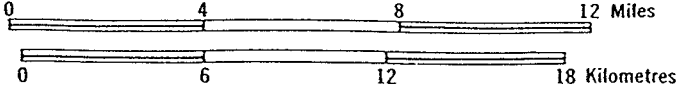
This claim block can best be reached from Courtenay via the Mount Washington main road, travelling to the Mount Washington Cross-Country Ski Lodge. From here, roads previously installed by Crown Forest Industries Ltd. provide excellent access throughout the Joe Anne 6 claim and provide access to the foot trails on the Joe Anne II claim. There is one main trail along the southeast shore of Divers Lake and the soil sampling grid installed as part of this work ties in with it in several locations; there are no roads on the Joe Anne II claim.

### 1.2 Topography and Physiography

Topographically, much of the Joe Anne II claim consists of Divers Lake and its surrounding flat, marshy areas, on either side of the lake. Mountains rise rapidly, especially Mount Brooks which has extremely steep and hazardous slopes. The Joe Anne 6 claim is entirely on the relatively gentle-sloping southwestern flank of Mount Washington.

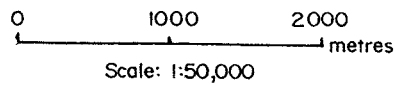
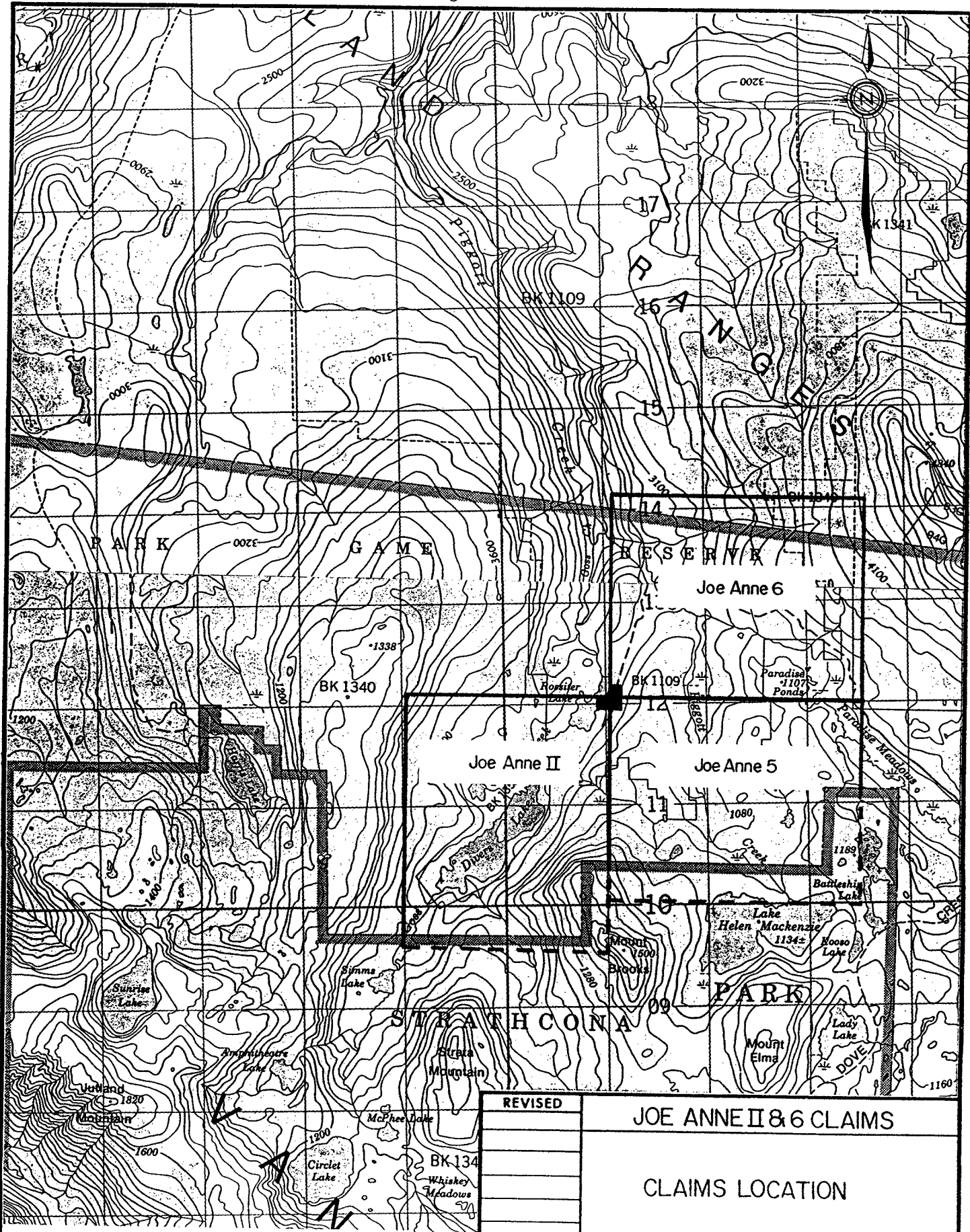


Scale 1:250,000



REVISED	<b>JOE ANNE II &amp; 6 CLAIMS</b>	
	<b>LOCATION MAP</b>	
PROJ. No. 167	SURVEY BY: R.G.Wilson/C.D.Frew	DATE: February, 1987
N.T.S. 92E/11,4	DRAWN BY: C.D.Frew	SCALE: 1:250,000
DWG. No. 1	<b>NORANDA EXPLORATION</b>	
	OFFICE: Vancouver	

VANCAL 11927



REVISED	JOE ANNE II & 6 CLAIMS	
	CLAIMS LOCATION	
PROJ. No. 167	SURVEY BY: C.D.Frew / R. Wilson	DATE: February 1988
N.T.S. 92F/114	DRAWN BY: C.D.Frew	SCALE: 1:50,000
DWG. No. 2	<b>NORANDA EXPLORATION</b>	
	OFFICE: Vancouver	

VANGAL 11927

This claim block lies within the Vancouver Island Ranges section of the Vancouver Island Mountains subdivision of the Insular Mountains physiographic zone.

### 1.3 Previous Work

The Joe Anne claims were staked and prospected by D.P. Berkshire and R.A. Hunter during 1984 and 1985; concurrently, K.E. Northcote initiated geologic mapping. Results of this work are described in an unpublished company prospecting report by D.P. Berkshire (September 18, 1984). Geological Reports on the Joe Anne Group of Mineral Claims by K.E. Northcote may be found within Energy, Mines & Petroleum Resources Assessment Reports numbered 13,952, 14,595 and 15,116.

Selco Division - B.P. Resources Canada Limited conducted a reconnaissance geological/soil geochemical programme on the Joe Anne Group in 1985, focussing primarily on the Joe Anne II claim. Results of this work are contained within an Energy, Mines and Petroleum Resources Assessment Report numbered 14,889.

The 1987 field programme as conducted by Noranda is the first comprehensive investigation (involving extensive geochemical, geological and geophysical surveys) carried out on the Joe Anne II and Joe Anne 6 claims.

### 1.4 Owner - Operator

Currently, the Joe Anne Group of claims is held under option from Iron River Resources, Limited with Noranda being the sole owner and operator.

## 2.0 SUMMARY OF WORK DONE

### 2.1 Geology

Geological mapping was conducted at a scale of 1:5,000 along 28.3 kilometres of grid line; several creek traverses, traverses paralleling contours and traverses along trails, all of which covered an area of approximately 3.0 square kilometres.

The mapping programme - although extensive - is incomplete in some parts of the claim block due to difficult terrain. A complete examination of the geology will result from subsequent field studies.

### 2.2 Geochemistry

A geochemical survey which included soil, silt and rock chip sampling was carried out on the Joe Anne II and Joe Anne 6 claims. Each of the samples listed below was analyzed for arsenic, silver, gold and copper.

758	Soil Samples
48	Rock Samples
28	Silt Samples.

### 2.3 Geophysics

Between December 1986 and January 1987, a total of 713 line kilometres of Geophysical Airborne survey was flown for Noranda Exploration under contract by Apex Airborne Surveys, Ltd. of Vancouver, B.C. The helicopter borne survey recorded the Total Field Magnetics and the active (Geonics 33-2) Electromagnetic signature of the area. Of this survey 54.3 line kilometres was flown over the Joe Anne II and 6 claims.

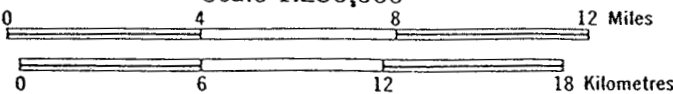
### 2.4 Linecutting

A grid was established on this claim block using flagged compass lines marked every 25 metres with wooden pickets. This grid was slope-corrected and totalled 28.3 line kilometres of grid establishment.





Scale 1:250,000



REVISED	JOE ANNE II & 6 CLAIMS
	REGIONAL GEOLOGY
PROJ. No. 167	SURVEY BY: R.G. Wilson / C.D. Frew DATE: February, 1988
N.T.S. 92 F/11	DRAWN BY: T.J. McIntyre / C.D. Frew SCALE: 1:250,000
DWG. No.	NORANDA EXPLORATION
3d	OFFICE: Vancouver

VANCAL 11927

LEGEND

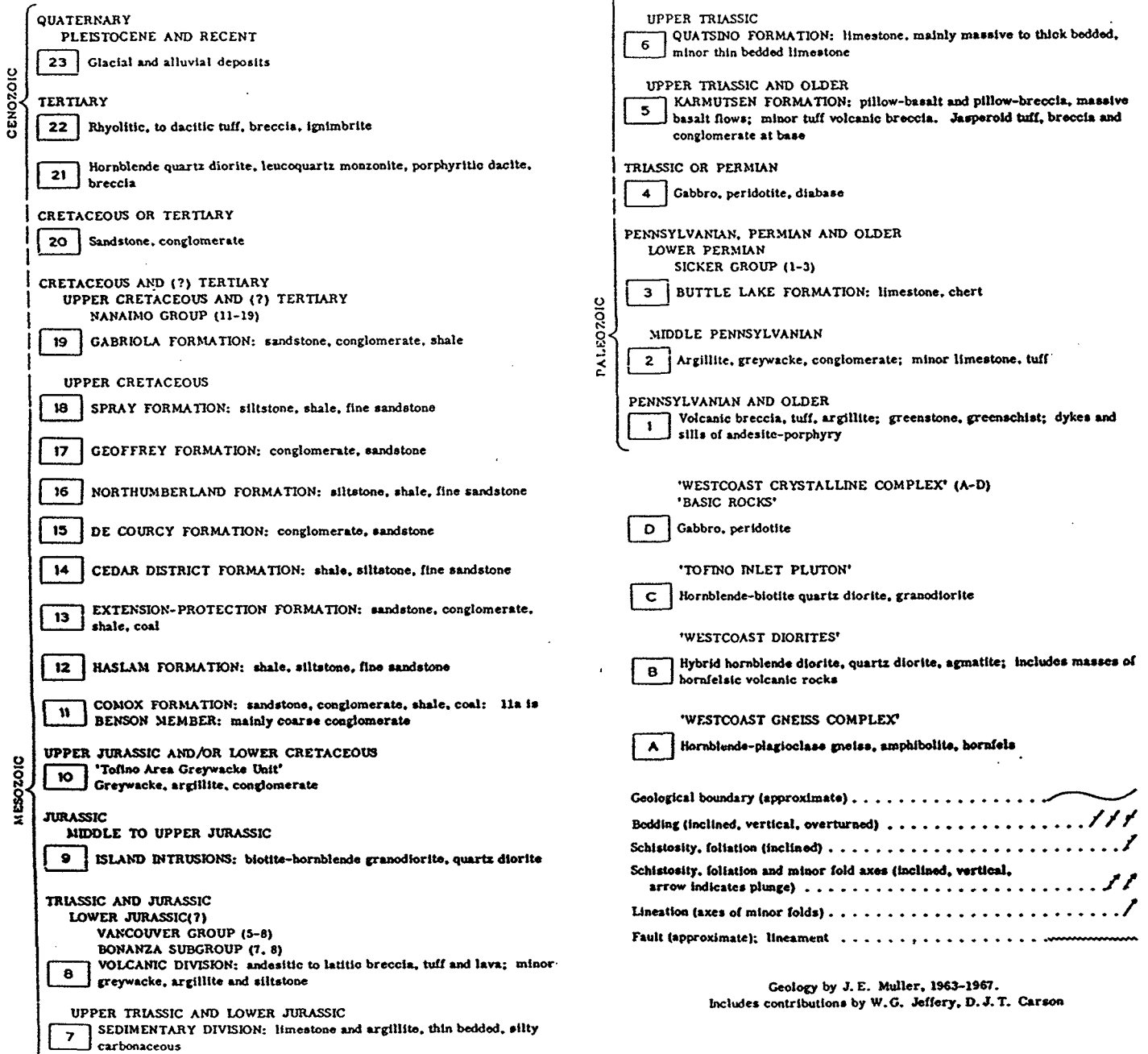


Figure 3b: Legend for Regional Geology

## 2.5 Claims Worked

The established grid which provided control for the geological and geophysical surveys lies mostly within the Joe Anne II claim although portions are included in the Joe Anne 5 claim. None of the grid lies within the Joe Anne 6 claim and surveys here were conducted along the extensive road system which traverses the claim.

## 3.0 DETAILED TECHNICAL DATA

### 3.1 Geology

#### 3.1.1 Purpose

Geological mapping at 1:5,000 scale was performed in conjunction with the geochemical sampling in order to continue a 1:5,000 scale geological investigation started by K.E Northcote for Iron River Resources Limited in 1985. This initial investigation was limited in scope, consequently, the mapping done by Noranda is the first comprehensive geological examination of this claim block.

#### 3.1.2 Regional Geology

The area has been mapped at 1:250,000 scale by Muller (1968) of the Geological Survey of Canada to be underlain by the Upper Triassic Karmutsen Formation; the Haslam and Comox Formations of the Lower Cretaceous Nanaimo Group and Tertiary Intrusives.

The Karmutsen Formation consists of pillow-basalt and pillow-breccia, massive basalt flows and minor tuff volcanic breccia. The Comox Formation includes sandstone, conglomerate, shale and coal; the Haslam Formation is predominantly shale with siltstone and fine sandstone.

The Tertiary Intrusives are composed of hornblende quartz diorite, leucoquartz monzonite, porphyritic dacite and breccia.

#### 3.1.3 Property Geology

Geological mapping at 1:5,000 scale was conducted along grid lines, creek traverses and traverses paralleling topographical contours on Joe Anne II, whereas it was conducted along roads on Joe Anne 6. Outcrop locations and geological rock types are displayed in Figure #4a.

The claim block is dominated by Karmutsen basalt. This is especially true on the Joe Anne 6 claim, upon which all of the mapped outcrop was Karmutsen, save for a small amount of Nanaimo Group sediments found on the southwest corner of the claim.

The Karmutsen consists of mostly massive basaltic flows, up to 5 metres thick, interbedded with lesser amounts of pillow basalts and minor pillow breccia. The massive and pillow lavas are usually fine-grained to aphanitic, dark grey to greenish-grey in colour (weathering buff to rusty brown). They are mostly equigranular but occasionally porphyritic with phenocrysts of plagioclase feldspar up to 4 millimetres in length, often amygdaloidal (with fillings of zeolite, quartz, chlorite and carbonate) and occasionally vesicular. Pillow structures are generally ovate in cross-section averaging 20 x 75 centimetres in size with chilled margins. These basalts are frequently chloritic, epidote is common in fractures and Mn staining is pervasive.

The Nanaimo Group sediments found within this claim group consist of Comox Formation medium-grained feldspathic sandstones, sub-quartzose sandstones and lithic sandstones - all with minor interbeds of mudstones and siltstones. These sediments are variably cemented with silica, calcium carbonate and clays, demonstrating moderate induration and probably moderate permeability. However, on Joe Anne II, the flanks of Mount Brooks and the hillside west of Divers Lake (hereafter known as "West Hill") the sediments appear to have been affected by thermal metamorphism and hydrothermal activity; processes which have left the sediments silicified, harder and less permeable than those unaffected. These sandstones have been hornfelsed to biotite grade, the metamorphism and metasomatism believed to be due to Tertiary dioritic intrusions, described below.

Sulphide mineralization within the hornfelsed Comox sediments is mostly pyrite and pyrrhotite with minor chalcopyrite. This mineralization averages 2-3% of the rock but ranges as high as 10%.

The Tertiary intrusives only occur on the Joe Anne II and Joe Anne 5 claims, and only in sparse, sporadic outcrop on the flanks of Mount Brooks and West Hill and in places along the south shore of Divers Lake and the shore of "Discovery" Lake (the small lake to the west-northwest of Divers Lake). On the flanks of Mount Brooks is a light grey, medium-grained porphyritic diorite, approximately 500 metres across. It may be a small stock or sill but, no contacts with surrounding rocks were found in outcrop. The diorite at the south end of Divers Lake is medium-coarse grained equigranular hornblende-biotite diorite. The distribution of outcrops found in this area suggests a body of approximately 0.3 square kilometres.

The northwest boundary of this body is possibly contiguous with the Karmutsen Basalt, although no contacts have been found in outcrop. The southern boundary is in contact with hornfelsed Comox Formation sediments. This contact is only visible in one location and its orientation is somewhat poorly defined, however, the available evidence suggests that it is a sill, approximately 100 metres thick, lying at the (unconformity?) boundary between the underlying Karmutsen Basalt and the overlying hornfelsed Comox sediments.

In the Discovery Lake area, several outcrops of medium grey, medium-grained porphyritic diorite are exposed around the lake shore and immediately to the west of the lake. As can be seen in Figure #4a, the pattern of these outcrops would indicate a small diorite stock or plug (approximately 400 m across) within the by Karmutsen basalt.

On the east flank of West Hill, medium-coarse grained pinkish white hornblende-biotite bearing quartz diorite forms cliffs ranging in height from 2 metres to 20 metres. In places, these cliffs have a columnar appearance caused by subvertical, uni-directional jointing. This diorite is in approximate horizontal contact with overlying and underlying hornfelsed Comox sediments; this combined with the jointing pattern would suggest that this body is a sill, approximately 100 metres thick, with a strike-length of 700 metres.

Finally, in three principal locations on Joe Anne II are breccias, all of which are thought to be related to the Tertiary intrusives. There are three distinct breccias, varying from each other in fragment and matrix lithologies as well as in the type and amount of mineralization which they contain. Their physical and temporal relationship - both with the intrusive and with each other - are, at present unclear.

Each breccia has been named in accordance with it's location on the Joe Anne II claim. The Cliff Breccia outcrops for approximately 1000 metres along the northwest flanks of Mount Brooks, between elevations of 990 metres and 1200 metres. It is by far the most arealy extensive breccia body found on this claim and forms cliffs up to 20 metres high. It consists of angular to sub-angular, pebble to cobble sized fragments of hornfelsed and silicified Comox Formation sandstones and siltstones, as well as fragments of diorite. These fragments are contained within a light to dark green siliceous matrix which has minor vugs containing euhedral quartz crystals up to 5 millimetres in length. The matrix also contains approximately 1% sulphides, mostly fine-grained pyrite with very minor chalcopyrite. This breccia is approximately 85% fragments and 15% matrix. Geochemical analyses of rock samples of the Cliff Breccia yielded slightly elevated values for copper, silver and gold. (Refer to Section 3.2 and Appendix II).

The Summit Breccia occurs in three outcrops on the lower summit of Mount Brooks and spatial relationships between these outcrops indicate a breccia body of at least 200 metre diameter. This breccia consists of angular pebble to cobble-sized fragments of silicified fine-grained sandstones and siltstones. The matrix is very fine grained, siliceous and tight with minor disseminated very fine grained pyrite. The mineralization is generally quite sparse although, in places, it is as high as 10%. Geochemical analyses of the Summit Breccia indicate slightly elevated values for copper, silver and gold (refer to Section 3.2 and Appendix II).

The Shirley Island Breccia occurs on Shirley Island, in Divers Lake. It is a mixed lithology breccia consisting of angular to sub-angular pebble to cobble sized fragments of silicified Karmutsen basalt as well as silicified Comox sandstone and siltstone. The ratio of Karmutsen to Comox fragments is approximately 2:1.

The matrix (approximately 15% of the rock) is a medium to coarse grained mixture of quartz and carbonate with small vugs containing euhedral quartz crystals. Although the matrix is quite rusty, no sulphides were visible and geochemical analyses of the breccia yielded no anomalous results (refer to Appendix II).

## 3.2 Geochemistry

### 3.2.1 Purpose

Soil geochemical sampling was completed at four different scales along the grid network. Property sampling at 100 x 25 metre sample spacing was conducted to provide coverage of the Mount Brooks area; 50 x 25 metre sampling was employed to follow-up anomalies found by the 100 x 25 metre sampling; 100 x 50 metre regional sampling was completed on the east flank of West Hill and at 200 x 50 metre on the north slope of Mount Brooks (which is on the Joe Anne 5 claim). As well, soil geochemical sampling was performed along several compass-bearing traverses; 100 metre sample spacing along two traverses on the western slope of Mount Brooks in a direction of approximately 085°, and 25 metre sample spacing along four unevenly spaced, approximately north-south lines installed on Shirley Island.

### 3.2.2 Techniques

Soil, rock and silt samples were collected during this geochemical survey. "B" horizon soil samples were taken from 30 to 50 centimetre deep shovel-dug holes and placed in brown Kraft bags. These bags were partly air-dried prior to being packed for shipment. Silt samples were collected where possible from various drainages throughout the claim block and also placed in brown Kraft bags which were also partially air-dried prior to packing. Rock samples were collected as either whole grab samples or rock chip samples across a measured width and placed into 6 mil poly bags for shipment.

A total of 758 soil samples, 48 rock samples and 28 silt samples were collected from this claim block and sent for analysis to Noranda's geochemical laboratory at 1050 Davie Street, Vancouver, B.C. Appendix I is a brief summary of the analytical analysis technique used by the Noranda laboratory. Appendix II is a list of all rock samples collected together with their rock type and geochemical analysis results.

### 3.2.3 Results

#### Gold

All samples taken were analyzed for gold (Figure #5). The lower limit of detection for gold is 10 ppb. The background threshold was taken to be 10 ppb, with any values greater than 10 ppb considered to be anomalous. On the west flank of Mount Brooks the initial grid soil sampling yielded Au anomalies which were somewhat spotty. The highest Au value in soil was 130 ppb, found at two locations. Au results were double checked by independent laboratories with similar but generally higher results being reported. The subsequent 50 x 25 metre follow-up soil survey outlined one area with three linears, subparallel anomalies. Gold results ranged from 20 to 200 ppb with highest values of 490 and 910 ppb.

The 200 x 50 metre reconnaissance soil grid on the Joe Anne 5 claim yielded a 50 x 300 metre anomalous gold zone (trending approximately north-south). Anomalous soil geochemical values range from 20 to 410 ppb.

The 100 x 50 metre reconnaissance grid on West Hill yielded only five anomalous, widely scattered Au values.

### Arsenic

All samples were analyzed for Arsenic (Figure #7), with anomalous thresholds being selected by inspection. Background is considered to be less than 40 ppm, with threshold, first, second and third order anomalies being greater than or equal to 40, 100, 300 and 500 ppm As respectively.

On the north slope of Mount Brooks there are two main anomalous areas, one of 300 x 300 m<sup>2</sup> size (centered at 213+50N, 306+00E) and one of 300 x 400 m<sup>2</sup> size (centered at 215+00N, 311+50E). These anomalous zones correspond well with anomalous values for Ag and Cu and it was on the basis of these anomalous zones that the detailed follow-up of 50 x 25 metre sampling was conducted. The As anomalies from this latter survey were consistent with those found in the initial grid sampling.

The 200 x 50 metre reconnaissance sampling on Joe Anne 5 yielded only a few widely scattered anomalous samples with the maximum anomalous As value being 58 ppm.

The 100 x 50 metre sampling on West Hill resulted in widely scattered, low As anomalies.

### Copper

All samples were analyzed for copper (Figure #8), with anomalous thresholds being selected by inspection. Background is considered to be less than 200 ppm Cu, with threshold, first, second and third order anomalies being greater than or equal to 200, 500, 1000 and 5000 ppm respectively.

On the west slope of Mount Brooks, the initial 100 x 25 metre grid soil sampling yielded the anomalous areas mentioned in the preceding section, with Cu being strongly anomalous, several values >1000 ppm Cu. This anomalous pattern was borne out by the subsequent follow-up 50 x 25 metre sampling.

The 200 x 50 metre reconnaissance sampling on Joe Anne 5 yielded no Cu results above background.

The 100 x 50 metre reconnaissance sampling on West Hill resulted in scattered low Cu anomalies.



## Silver

All samples were analyzed for silver (Figure #6) with anomalous threshold being selected by inspection. Background is considered to be less than 1.0 ppm Ag, with threshold, first, second, third and fourth order anomalies being greater than 1.0, 2.0, 3.0, 5.0 and 8.0 ppm Ag respectively.

The initial sampling on the west slope of Mount Brooks show that Ag anomalies are relatively lower and widespread with highly anomalous values concentrated in small areas, a fact which is borne out by the subsequent follow-up sampling.

The 200 x 50 metre reconnaissance sampling on Joe Anne 5 resulted in no anomalous silver values.

The sampling on West Hill showed no anomalous Ag values.

### 3.2.4 Interpretation

An examination of the soil geochemistry indicates that the principal area of interest is the north and northwest slope of Mount Brooks, the reconnaissance survey having found only sporadic anomalous concentrations of any of the four analyzed elements on West Hill, south of Divers Lake or on Joe Anne 5.

On the north/northwest slope of Mount Brooks there are several areas strongly anomalous in Ag, As and Cu, including one area with three linear, subparallel Au anomalies. Also, there is good correlation between the Ag, As and Cu anomalies. Copper and silver show the best such correlation, whereas, in places the highest arsenic concentrations are displaced a short distance downslope, suggesting minimal migration of the elements.

There are soil anomalies on both steep slopes and relatively level areas which show only minor fan displacement patterns, indicating that most of the soil anomalies are in place. Considering this in conjunction with the lack of outcrop would suggest that further investigation could best be performed by trenching and drilling. As well, further soil sampling surveys to the north of the area so far investigated and further up the slopes of Mount Brooks would be valuable.

The lithogeochemical analyses and silt geochemistry analyses show a similar pattern to the soil anomalies in that only samples from the north/northwest slopes of Mount Brooks show strong anomalous concentrations. This would suggest that mineralization in this area may be associated with the development of the Cliff Breccia and Summit Breccia. Further mapping and sampling would be required to investigate the relationship more thoroughly.

The initial reconnaissance on Joe Anne 5 indicated a relatively narrow, approximately north-south trending zone with anomalous gold values. Further sampling and mapping of this area is needed to define the source of the anomaly.

### 3.3 Geophysics

A helicopter borne Airborne Geophysical survey was flown for Noranda Exploration by Apex Airborne Surveys Ltd. of Vancouver, B.C. The survey, which was flown in the general Mt. Washington area including the Joe Anne II and 6 claims, recorded the total Field Magnetics and the active (Geonics 33-22) Electromagnetic signature of the area. Results of this survey have been filed with the Ministry (M.E.M.P.R.) under separate cover.

For a summation of the airborne geophysics pertaining to the Joe Anne II and Joe Anne 6 claims, please refer to the Assessment Report "Report of Work, Airborne E.M. and Magnetometer Surveys in the Mount Washington Area, N.T.S., 92F/11,14, Nanaimo Mining Division, Latitude 40°45', Longitude 125°17'", submitted by L. Bradish, Division Geophysicist, Noranda Exploration Company, Limited (no personal liability), November 2, 1987.

## 4.0 CONCLUSIONS AND RECOMMENDATIONS

### Geology

Lower Cretaceous Comox sediments unconformably overlie Upper Triassic Karmutsen Basalt; Tertiary diorites have been intruded along this contact resulting in some hornfelsing of the Comox sediments as well as the development of diatreme breccias.

Geochemistry

Strong and strongly coincident Ag, As and Cu anomalies occur on the north and northwest slopes of Mount Brooks, both in the soil samples and in the rock samples.

Au anomalies are seen within three subparallel zones consistent with Ag, As and Cu anomalies. As well Au soil anomalies define a thin zone to the northeast of Mount Brooks in which Au is the only anomalous element.

The Ag, As and Cu soil anomalies occur both on steep slopes and relatively level areas and although minor downslope element transport is indicated, these anomalies can be considered to be close to source.

The geological mapping and rock sample analyses suggest that the mineralization is related to the emplacement of the Cliff Breccia and Summit Breccia.

Further soil sampling - to the north of the area so far investigated and further up the slopes of Mount Brooks - should be conducted in conjunction with more geological mapping and lithological sampling in order to delineate any other anomalous areas and to better determine the geological origin of the anomalies.

Due to poor outcrop exposure, further investigation of the soil anomalies by trenching or drilling is recommended.

**APPENDIX I**  
**ANALYTICAL METHOD DESCRIPTIONS FOR**  
**GEOCHEMICAL ASSESSMENT REPORTS**

## ANALYTICAL METHOD DESCRIPTIONS FOR GEOCHEMICAL ASSESSMENT REPORTS

The methods listed are presently applied to analyse geological materials by the Noranda Geochemical Laboratory at Vancouver.

### Preparation of Samples:

Sediments and soils are dried at approximately 80°C and sieved with a 80 mesh nylon screen. The -80 mesh (0.18 mm) fraction is used for geochemical analysis.

Rock specimens are pulverized to -120 mesh (0.13 mm). Heavy mineral fractions (panned samples \* from constant volume), are analysed in its entirety, when it is to be determined for gold without further sample preparation.

### Analysis of Samples:

Decomposition of a 0.200 g sample is done with concentrated perchloric and nitric acid (3:1), digested for 5 hours at reflux temperature. Pulps of rock or core are weighed out at 0.4 g and chemical quantities are doubled relative to the above noted method for digestion.

The concentrations of Ag, Cd, Co, Cu, Fe, Mn, Mo, Ni, Pb, V and Zn can be determined directly from the digest (dissolution) with a conventional atomic absorption spectrometric procedure. A Varian-Techtron, Model AA-5 or Model AA-475 is used to measure elemental concentrations.

### Elements Requiring Specific Decomposition Method:

**Antimony - Sb:** 0.2 g sample is attacked with 3.3 ml of 6% tartaric acid, 1.5 ml conc. hydrochloric acid and 0.5 ml of conc. nitric acid, then heated in a water bath for 3 hours at 95°C. Sb is determined directly from the dissolution with an AA-475 equipped with electrodeless discharge lamp (EDL).

**Arsenic - As:** 0.2 - 0.3 g sample is digested with 1.5 ml of perchloric 70% and 0.5 ml of conc. nitric acid. A Varian AA-475 equipped with an As-EDL is used to measure arsenic content in the digest.

**Barium - Ba:** 0.1 g sample digested overnight with conc. perchloric, nitric and hydrofluoric acid; Potassium chloride added to prevent ionization. Atomic absorption using a nitrous oxide-acetylene flame determines Ba from the aqueous solution.

**Bismuth - Bi:** 0.2 - 0.3 g is digested with 2.0 ml of perchloric 70% and 1.0 ml of conc. nitric acid. Bismuth is determined directly from the digest with an AA-475 complete with EDL.

Gold - Au: 10.0 g sample is digested with aqua regia (1 part nitric and 3 parts hydrochloric acid). Gold is extracted with MIBK from the aqueous solution. AA is used to determine Au.

Magnesium - Mg: 0.05 - 0.10 g sample is digested with 4 ml perchloric/nitric acid (3:1). An aliquot is taken to reduce the concentration to within the range of atomic absorption. The AA-475 with the use of a nitrous oxide flame determines Mg from the aqueous solution.

Tungsten - W: 1.0 g sample sintered with a carbonate flux and thereafter leached with water. The leachate is treated with potassium thiocyanate. The yellow tungsten thiocyanate is extracted into tri-n-butyl phosphate. This permits colourimetric comparison with standards to measure tungsten concentration.

Uranium - U: An aliquot from a perchloric-nitric decomposition, usually from the multi-element digestion, is buffered. The aqueous solution is exposed to laser light, and the luminescence of the uranyl ion is quantitatively measured on the UA-3 (Scintrex).

N.B.: If additional elemental determinations are required on panned samples, state this at the time of sample submission. Requests after gold determinations would be futile.

LOWEST VALUES REPORTED IN PPM:

Ag - 0.2	Mn - 20	Zn - 1	Au - 0.01
Cd - 0.2	Mo - 1	Sb - 1	W - 2
Co - 1	Ni - 1	As - 1	U - 0.1
Cu - 1	Pb - 1	Ba - 10	
Fe - 100	V - 10	Bi - 1	

EJvL/ie

APPENDIX II  
ROCK DESCRIPTIONS AND RESULTS

NORANDA EXPLORATION COMPANY, LIMITED.

N.T.S. 92 F/11

PROJECT FORBIDDEN PLATEAU - JOE ANNE II AND 5 CLAIMS

DATE \_\_\_\_\_

PROJECT 167

LAB REPORT \_\_\_\_\_

SAMPLED BY \_\_\_\_\_

SAMPLE REPORT

SAMPLE NO.	LOCATION & DESCRIPTION	% sul.	SMPL TYPE	WIDTH	ASSAYS				SAMPLED BY
					Au	Ag	As	Cu	
R17276	Mount Brooks; Altered Ankeritic Siliceous Body	nil	Grab	3m.	5.0	1.8	262	770	C.D. Frew
R17277	Mount Brooks; Altered Siliceous Intrusive Material	10%	Grab	vari.	5.0	0.8	30.0	268	C.D. Frew
R17376	West Slope, Mount Brooks; Hornfels Talus	<5%	Talus		5.0	0.2	32.0	104	D.R. Bull
R17377	West Slope, Mount Brooks; Siliceous Hornfels	<5%	Talus		5.0	0.2	30.0	320	D.R. Bull
R17378	West Slope, Mount Brooks; Siliceous Breccia	<5%	Talus		5.0	1.6	30.0	404	D.R. Bull
R17379	West Slope, Mount Brooks; Siliceous Breccia	<5%	Talus		1660	2.0	>10000	434	D.R. Bull
R17380	West Slope, Mount Brooks; Siliceous Breccia	<5%	Talus		50.0	0.4	2660	70.0	D.R. Bull
R17381	West Slope, Mount Brooks; Hornfelsed Sandstone	<5%	Talus		30.0	7.2	62.0	2960	D.R. Bull
R17382	West Slope, Mount Brooks; Siliceous Breccia	<5%	Talus		5.0	0.2	34.0	28.0	D.R. Bull
R17383	West Slope, Mount Brooks; Siltstone	10%	Grab		40.0	0.4	16.0	1240	D.R. Bull
R17384	West Slope, Mount Brooks; Siliceous Breccia	10%	Grab		40.0	0.2	24.0	960	D.R. Bull
R17385	West Slope, Mount Brooks; Siliceous Breccia	10%	Grab		30.0	1.0	32.0	1680	D.R. Bull



NORANDA EXPLORATION COMPANY, LIMITED.

N.T.S. 92 F/1

PROJECT FORBIDDEN PLATEAU - JOE ANNE II AND 5 CLAIMS

DATE \_\_\_\_\_

PROJECT 167

LAB REPORT \_\_\_\_\_

SAMPLED BY \_\_\_\_\_

SAMPLE REPORT

SAMPLE NO.	LOCATION & DESCRIPTION	% sul.	SMPL. TYPE	WIDTH	ASSAYS				SAMPLED BY
					Au	Ag	As	Cu	
R17386	North Slope, Mount Brooks; Hornfelsed Sandstone	<5%	Grab		30.0	1.8	4.0	920	D.R. Bull
R17387	North Slope, Mount Brooks; Hornfelsed Sandstone	<5%	Grab		5.0	0.2	24.0	36.0	D.R. Bull
R17388	North Slope, Mount Brooks; Siliceous Breccia	<5%	Grab		10.0	3.0	22.0	920	D.R. Bull
R17389	North Slope, Mount Brooks; Hornfelsed Sediments	<5%	Grab		5.0	0.4	10.0	260	D.R. Bull
R17390	North Slope, Mount Brooks; Breccia	nil	Grab		5.0	0.2	8.0	18.0	D.R. Bull
R17391	North Slope, Mount Brooks; Siliceous Breccia	nil	Grab		5.0	1.2	14.0	258	D.R. Bull
R17395	North Slope, Mount Brooks; Fine-Grained Quartzite	<5%	Grab		5.0	0.2	10.0	64.0	D.R. Bull
R17396	North Slope, Mount Brooks; Quartz Vein	nil	Grab		5.0	0.2	12.0	40.0	D.R. Bull
R17397	North Slope, Mount Brooks; Siliceous Breccia	nil	Grab		5.0	0.4	14.0	112	D.R. Bull
R17398	West Hill; Very Magnetic Hornfelsed Siltstone	<5%	Grab		5.0	0.2	2.0	100	D.R. Bull
R17399	West Hill; Balck Shale	<5%	Grab		5.0	0.2	24.0	70.0	D.R. Bull
R17400	Discovery Lake Shoreline; Silicified Basalt	<5%	Grab		5.0	0.2	12.0	10.0	D.R. Bull

NORANDA EXPLORATION COMPANY, LIMITED.

N.T.S. 92 F/11

PROJECT FORBIDDEN PLATEAU - JOE ANNE II AND 5 CLAIMS

DATE \_\_\_\_\_

PROJECT 167

LAB REPORT \_\_\_\_\_

SAMPLED BY \_\_\_\_\_

SAMPLE REPORT

SAMPLE NO.	LOCATION & DESCRIPTION	% sul.	SMPL. TYPE	WIDTH	ASSAYS				SAMPLED BY
					Au	Ag	As	Cu	
R17401	Discovery Lake Shoreline; Altered Matic Volcanic	<5%	Float		5.0	0.2	12.0	154	D.R. Bull
R17402	West Slope of Mount Brooks; Breccia	nil	Grab		30.0	4.2	30.0	1220	D.R. Bull
R17403	West Slope, Mount Brooks; Siliceous Breccia	<5%	Grab		5.0	0.2	2.0	10.0	D.R. Bull
R17404	West Slope, Mount Brooks; Brecciated Hornfels	nil	Grab		5.0	0.2	2.0	34.0	D.R. Bull
R17405	West Slope, Mount Brooks; Hornfels Sandstone	nil	Grab		5.0	0.2	2.0	8.0	D.R. Bull
R17406	North Slope, Mount Brooks; Feldspathic Sandstone	nil	Grab		5.0	0.2	2.0	26.0	D.R. Bull
R17407	North Slope, Mount Brooks; Hornfelsed Sandstone	5%	Grab		5.0	0.2	2.0	70.0	D.R. Bull
R17408	North Slope, Mount Brooks; Hornfelsed Sandstone	3%	Grab		5.0	0.4	11.0	74.0	D.R. Bull
R17409	North Slope, Mount Brooks; Breccia	<5%	Grab		5.0	2.2	14.0	1180	D.R. Bull
R17410	Summit, Mount Brooks; Breccia with Hornfels	trace	Grab		5.0	0.4	20.0	96.0	D.R. Bull
R17411	North Slope, Mount Brooks; Hornfelsed Sandstone	trace	Grab		5.0	0.2	2.0	128	D.R. Bull
R17412	North Slope, Mount Brooks; Carbonate/Sulphide in Hornfels	20%	Grab		5.0	0.2	2.0	540	D.R. Bull



APPENDIX III  
STATEMENT OF COSTS

NORANDA EXPLORATION COMPANY, LIMITED

STATEMENT OF COSTS

PROJECT: FORBIDDEN PLATEAU, JOE ANNE II & 6 CLAIMS

DATE: February, 1988

TYPE OF REPORT: GEOLOGY, GEOCHEMISTRY

a) Wages:

No. of Days 133 mandays  
Rate per Day \$ 150.00  
Dates From: July 6, 1987 to October 15, 1987  
Total Wages 133 x \$ 150.00 \$19,950.00

b) Food & Accomodations:

No. of Days 133 mandays  
Rate per Day \$ 18.80  
Dates From: July 6, 1987 to October 15, 1987  
Total Costs 133 x \$18.80 \$ 2,500.40

c) Transportation: (Vehicles rental, gasoline, repairs)

No. of Days 133  
Rate per Day \$ 10.30  
Dates From: July 6, 1987 to October 15, 1987  
Total Costs 133 x \$ 10.30 \$ 1,370.49  
Helicopter \$ 1,964.38

d) Instrument Rental:

Type of Instrument  
No. of Days  
Rate per Day \$  
Dates From:  
Total Costs x \$

Type of Instrument

No. of Days  
Rate per Day \$  
Dates From:  
Total Costs x \$

e) Analysis: \$ 7,664.30  
(See attached schedule)

f) Cost of preparation of Report

Author:	\$ 200.00
Drafting:	\$ 200.00
Typing:	\$ 100.00
	-----
	\$ 500.00
	=====

g) Other:

h) Unit costs for: Geochemistry

No. of days:	47	
No. of samples:	834	
Cost per sample:	\$9.19	
Total Cost:	834 x \$9.19	\$ 7,664.30

Unit costs for: Geology

No. of days:	24	
Cost per day:	\$150.00	
Total Cost :	24 x \$150	\$ 3,600.00

Unit costs for: Geophysics (airborne)

Line kilometre:	54.26	
Cost per line/km:	\$85.06	
Total Cost :	54.26 x \$85.06	\$ 4,615.38

Unit costs for: Linecutting

No. of days:	62	
Cost per day:	\$150.00	
Total Cost :	62 x \$150.00	\$ 9,300.00

TOTAL COST: \$38,564.95

NORANDA EXPLORATION COMPANY, LIMITED  
(WESTERN DIVISION)

DETAILS OF ANALYSES COSTS

PROJECT: FORBIDDEN PLATEAU JOE ANNE II & 6 CLAIMS

<u>ELEMENT</u>	<u>NO. OF DETERMINATIONS</u>	<u>COST PER DETERMINATION</u>	<u>TOTAL COSTS</u>
Cu	834	1.60	\$1,334.40
Ag	834	0.60	\$ 500.40
Au	834	4.00	\$3,336.00
As	834	1.50	\$1,251.00
Plotting	834	0.25	\$ 208.50
Data Entry	834	1.00	\$ 834.00
Basic Charge of \$50.00 per map x 4 maps			\$ 200.00
			<hr/>
TOTAL COST:			<u><u>\$7,664.30</u></u>

APPENDIX IV  
STATEMENT OF QUALIFICATIONS



AUTHORS QUALIFICATIONS

\*\*\*\*\*

I Robert G. Wilson of the City of Vancouver, Province of British Columbia, do hereby certify that:

- I am a geologist residing at 3328 West 15th. Avenue, Vancouver, B.C.
- I graduated from the University of British Columbia in 1976 with a BSc degree in Geology.
- I have worked in mineral exploration since 1973 and have practised my profession as a geologist since 1976.
- I am presently a Project Geologist with Noranda Exploration Company, Limited.
- I am a member of the Geological Association of Canada (Cordillera Division).
- I supervised this project and have reviewed the findings presented within this report.



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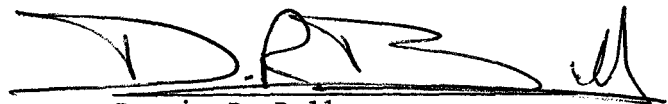
R.G. Wilson  
Project Geologist

AUTHORS QUALIFICATIONS

\*\*\*\*\*

I Dennis R. Bull of the City of Vancouver, Province of British Columbia, do hereby certify that:

- I am a Geologist residing at #206, 941 West 13th. Avenue, Vancouver, B.C.
- I graduated from the University of Alberta in 1986 with a BSc (Honours) degree in Geology.
- I have worked in Mineral Exploration since 1974 and have practiced my profession as a Geologist since May 1987.
- I am presently a Geologist with Noranda Exploration Company Limited.

A handwritten signature in black ink, appearing to read 'D.R. Bull', is written over a horizontal line. The signature is stylized and cursive.

Dennis R. Bull

AUTHOR' S QUALIFICATIONS

\*\*\*\*\*

I, C. Darren Frew, of the City of Vancouver, Province of British Columbia do hereby certify that:

1. I am a geologist residing at Apartment 3, 2820 Heather Street, Vancouver, B.C.
2. I graduated from the University of Calgary in 1982 with a Bachelor of Science degree in Geology.
3. I have worked in either mineral or petroleum exploration since 1980 and have been practising my profession as a geologist since 1982.
4. I am presently a Field Geologist with Noranda Exploration Company, Limited.
5. I am presently registered as a Professional Geologist (P.Geol.) with the Association of Professional Engineers, Geologists and Geophysicists of Alberta (A.P.E.G.G.A.) and have been so registered since 1986.





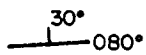

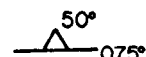
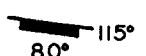
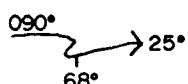
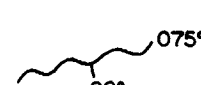
C.Darren Frew, P.Geol.

LEGEND

TERTIARY	
[B]	Breccia
CENOZOIC	[5] Hornfelses Comox Sediments
	[4] Diorite
CRETACEOUS	
	[3] Comox Formation Mudstones
MESOZOIC	[2] Comox Formation Sandstones
TRIASSIC	
	[1] Karmutsen Basalt

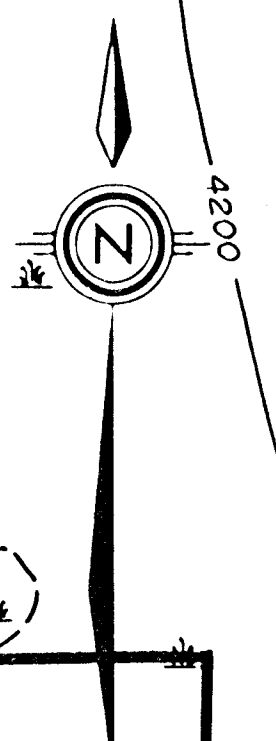
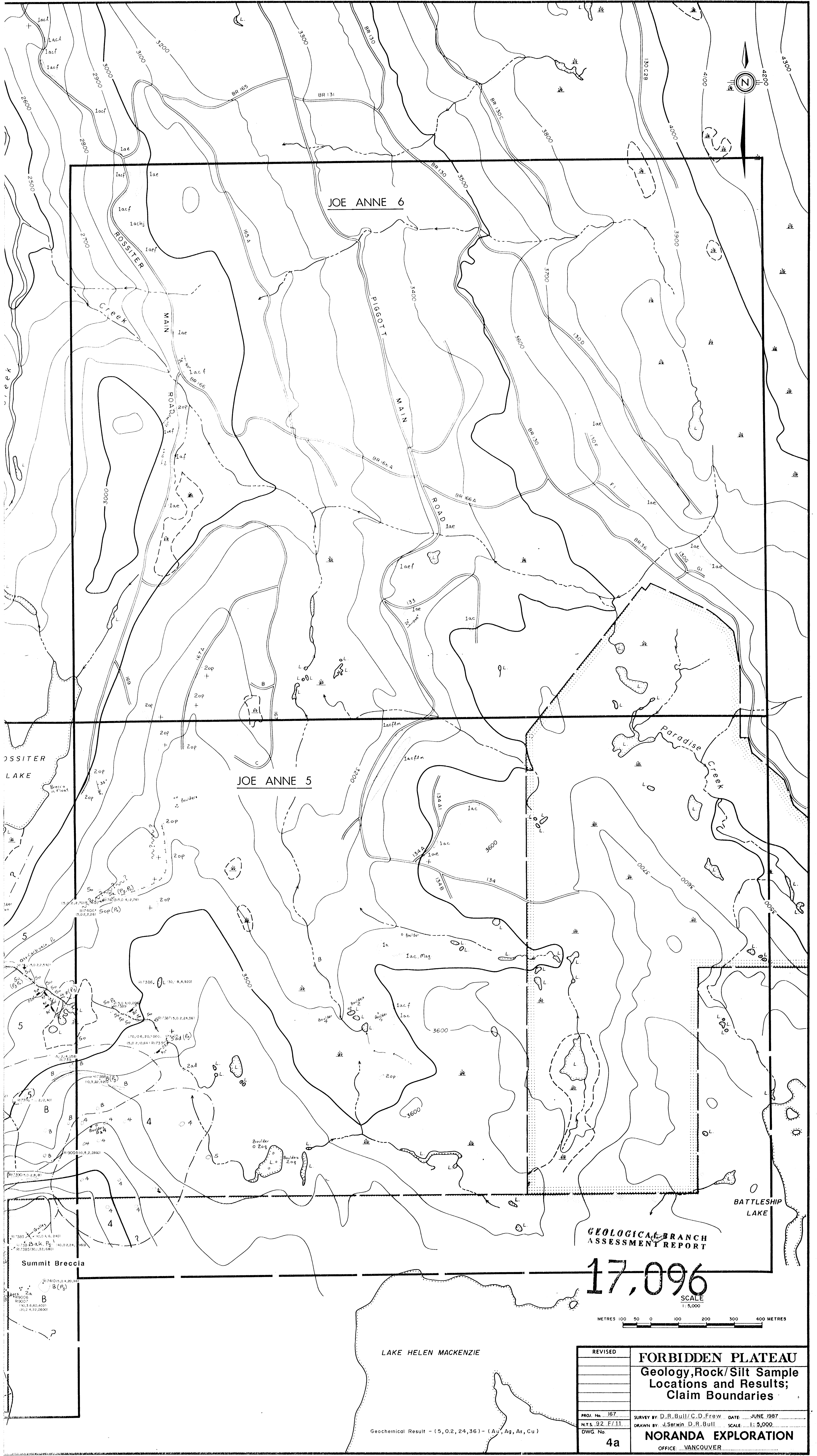
DESCRIPTIVE ELEMENTS

a: Fine grained	n: Clay alteration
b: Porphyritic	o: Medium grained
c: Dark green	p: Feldspathic
d: Dark grey	q: Pebbles
e: Dark greenish grey	r: Cobbles
f: Amygdaloidal	s: Clays
g: Pillow Structures	t: Silica cement
h: Brecciated	u: Calcareous cement
i: Leached	v: Shale
j: Calcareous	w: Black Shale
k: Silicified, Quartz, Chalcedony	x: Concretious
l: Chlorite	y: Volcanic Rubble
m: Epidote	z: Coarse grained

	Geological contact, known	Py: Pyrite
	Geological contact, assumed	Po: Pyrrhotite
		Cpy: Chalcopyrite
	Bedding; strike and dip	Bn: Bornite
		Mlt: Malachite
	Vein; strike and dip	Azt: Azurite
		Hem: Hematite
	Alteration zone; strike and dip	Mag: Magnetite
	Joints; strike and dip	( ): Indicates <1% Mineralization
	Fault face with slickensides; strike, dip, rake	
	Shear zone; strike, dip	

Geology by D.R. Bull, 1987  
Legend after D.R. Bull, 1987

Figure 4b: Legend for Property Geology



JOE ANNE 6

JOE ANNE 5

GEOLOGICAL BRANCH  
ASSESSMENT REPORT

17,096

SCALE  
1:5,000



LAKE HELEN MACKENZIE

Geochemical Result - (5, 0.2, 24, 36) - (Au, Ag, As, Cu)

REVISED	<b>FORBIDDEN PLATEAU</b>	
	<b>Geology, Rock/Silt Sample</b>	
	<b>Locations and Results;</b>	
	<b>Claim Boundaries</b>	
PROJ. No. 167	SURVEY BY: D.R. Bull / C.D. Frew	DATE: JUNE 1987
N.T.S. 92 F/11	DRAWN BY: J. Serwin, D.R. Bull	SCALE: 1:5,000
DWG. No.	<b>NORANDA EXPLORATION</b>	
4a	OFFICE: VANCOUVER	

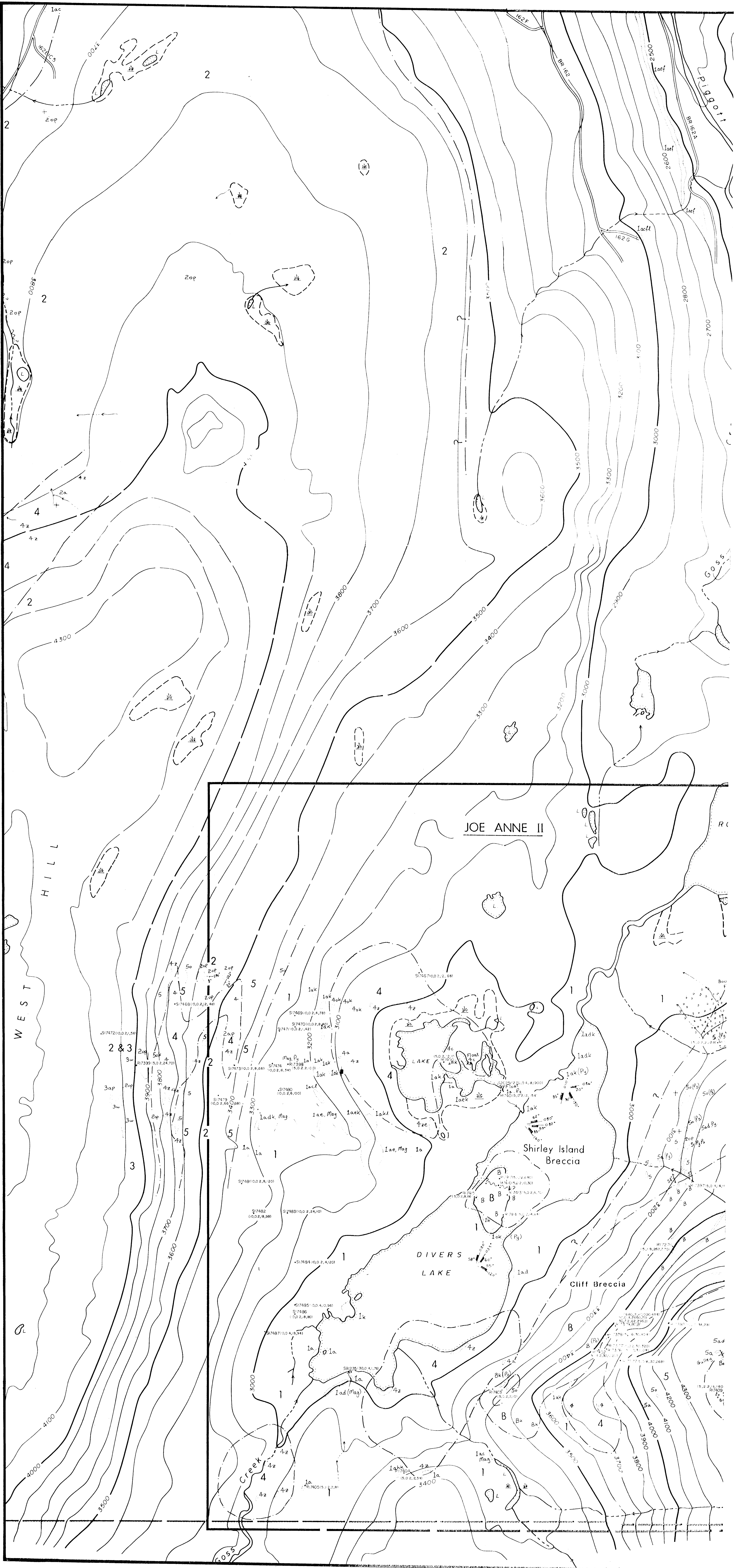
Summit Breccia

BATTLESHIP LAKE

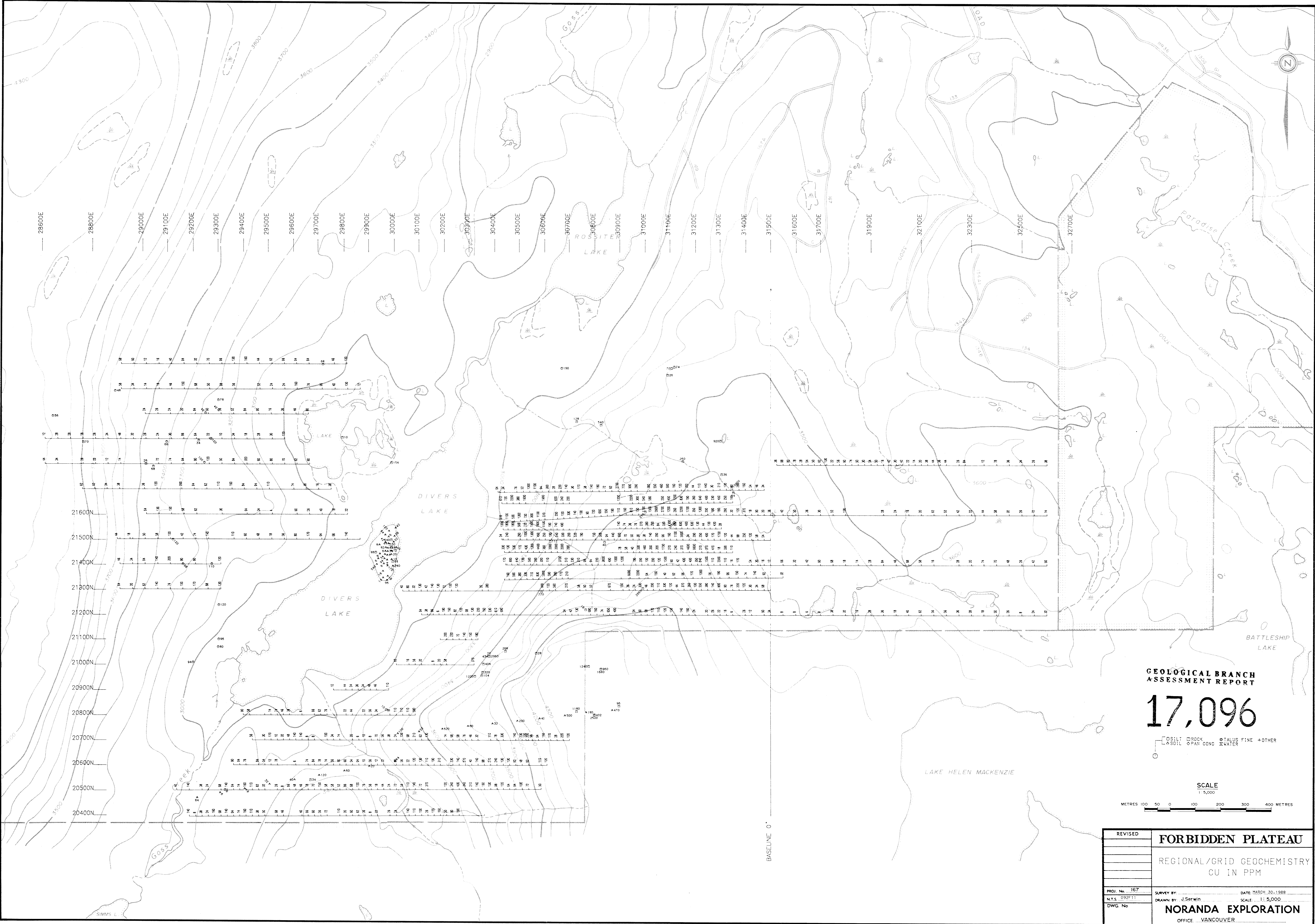
ROSSITER LAKE

B  
171015, 0.4, 20, 30  
B(P<sub>2</sub>)  
171015, 0.4, 20, 30  
171015, 0.4, 20, 30  
171015, 0.4, 20, 30









**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

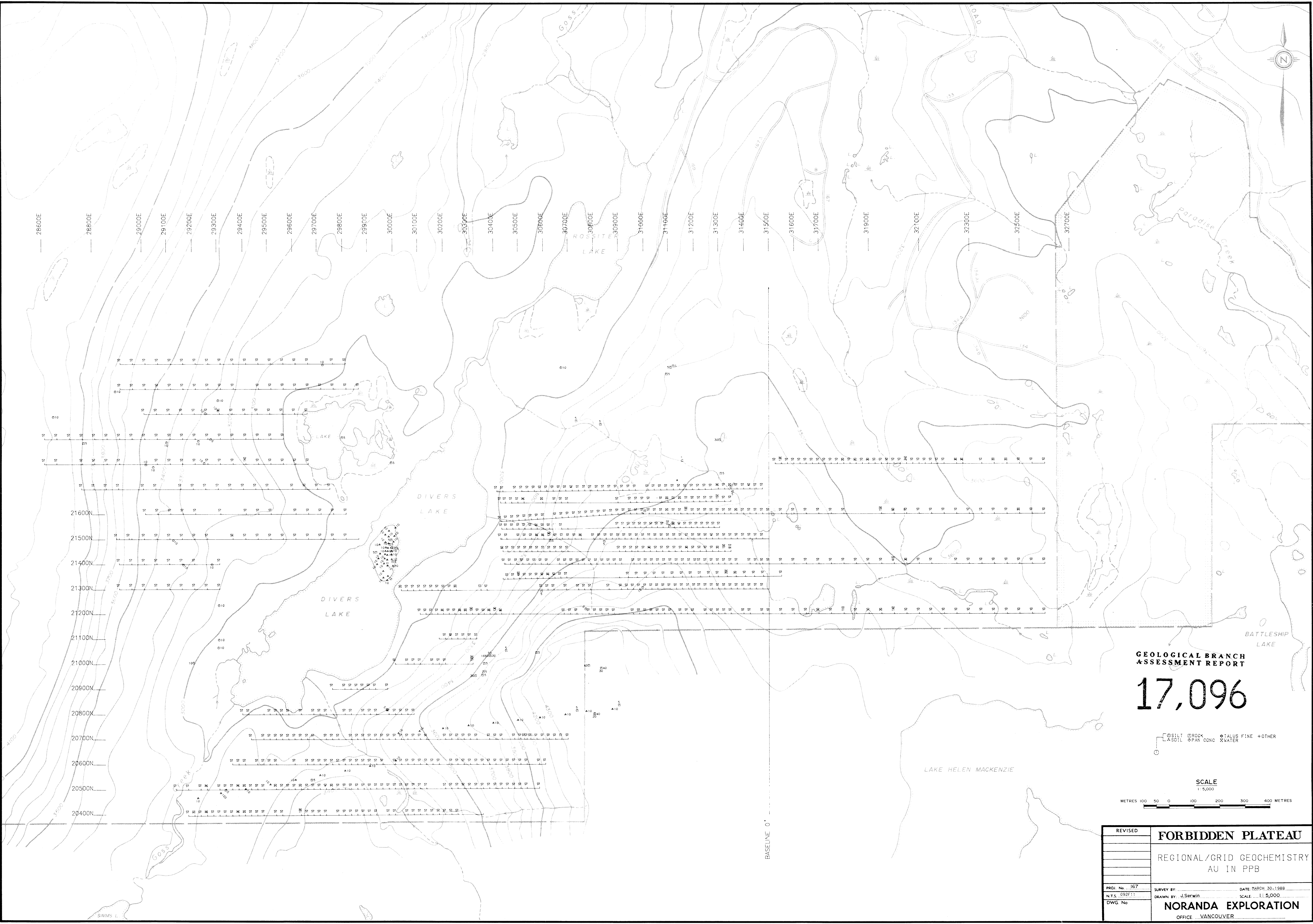
**17,096**

SILT     ROCK     TALUS FINE + OTHER  
 SOIL     PAN CONC     WATER

**SCALE**  
 1:5,000  
 METRES 100 50 0 100 200 300 400 METRES

REVISED	<b>FORBIDDEN PLATEAU</b>	
	REGIONAL/GRID GEOCHEMISTRY CU IN PPM	
PROJ. No. 167	SURVEY BY: J. Serwin	DATE: MARCH 30, 1988
N.T.S. 09211	DRAWN BY: J. Serwin	SCALE: 1:5,000
DWG. No.	<b>NORANDA EXPLORATION</b>	
	OFFICE: VANCOUVER	

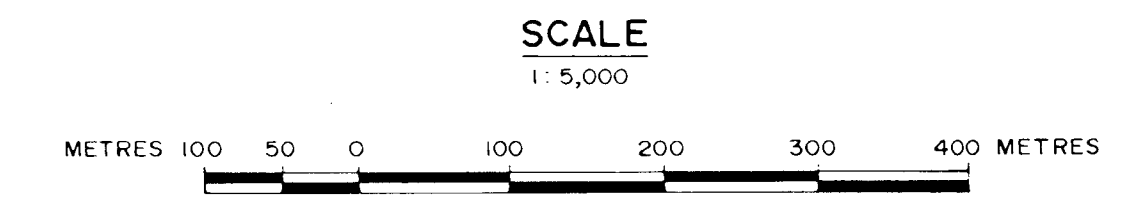




**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

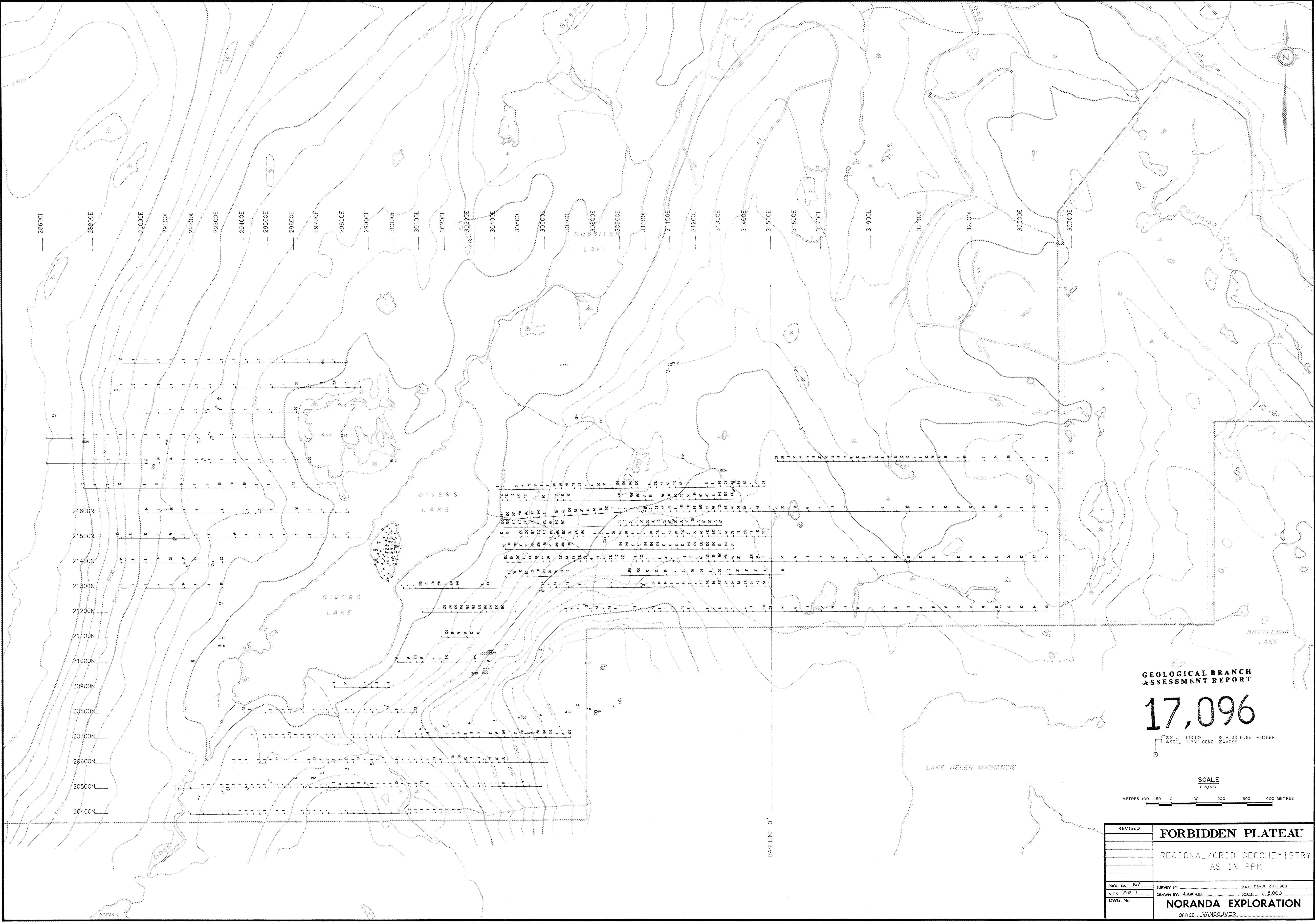
**17,096**

○ SILT    ⊗ ROCK    ○ TALUS FINE + OTHER  
 △ SOIL    ⊕ PAN CONC    ⊗ WATER



REVISED	<b>FORBIDDEN PLATEAU</b>	
	REGIONAL/GRID GEOCHEMISTRY AU IN PPB	
PROJ. No. 167	SURVEY BY: J. Serwin	DATE: MARCH 30, 1988
N.T.S. 592711	DRAWN BY: J. Serwin	SCALE: 1:5,000
DWG. No.	<b>NORANDA EXPLORATION</b>	
	OFFICE: VANCOUVER	

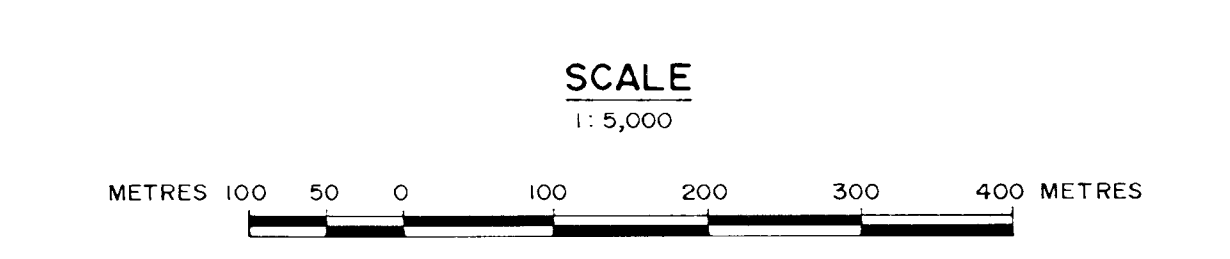




**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

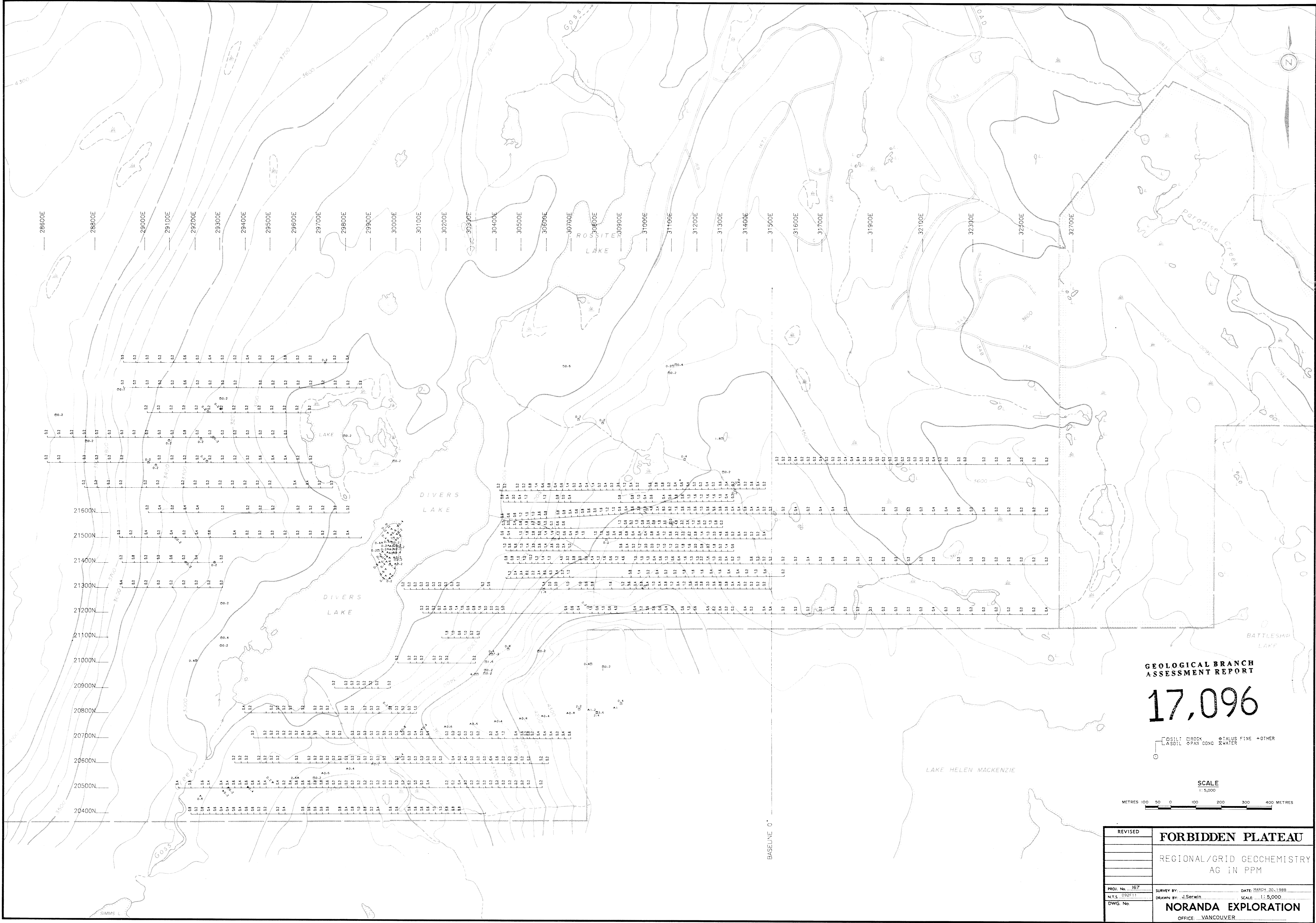
**17,096**

□ SOIL BROCK    ⊙ TALUS FINE + OTHER  
 □ SOIL COPPER CONC    ⊙ SLATER



REVISED	<b>FORBIDDEN PLATEAU</b>	
	REGIONAL/GRID GEOCHEMISTRY AS IN PPM	
PROJ. No. 167	SURVEY BY: J. SREWIN	DATE: MARCH 30, 1988
N.T.S. 092F11	DRAWN BY: J. SREWIN	SCALE: 1:5,000
DWG No.	<b>NORANDA EXPLORATION</b>	
	OFFICE: VANCOUVER	

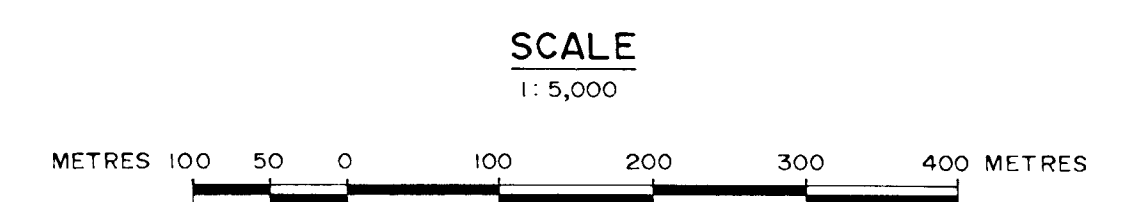




**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

**17,096**

SILT    ROCK    TALUS FINE    OTHER  
 SOIL    PAN CONC    WATER



REVISED	<b>FORBIDDEN PLATEAU</b>	
	REGIONAL/GRID GECHEMISTRY AG IN PPM	
PROJ. No. 167	SURVEY BY: J. Serwin	DATE: MARCH 30, 1988
N.T.S. 092F11	DRAWN BY: J. Serwin	SCALE: 1:5,000
DWG. No.	<b>NORANDA EXPLORATION</b>	
	OFFICE: VANCOUVER	