

85-446-13751

Geological, Geochemical, and Drilling Report

on the

HAWKINS LAKE - ALCLARE RESOURCES OPTION

Located at Coordinates: 51 deg.53'N, 120 deg.56'W

In the Clinton Mining Division of British Columbia

by

Robert J. Baerg

Noranda Exploration Company, Limited
(No Personal Liability)

May, 1985

**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

N.T.S. 92 P/15W

13,751 part 1
of 2

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SUMMARY:

The Hawkins Lake Property is located in south central British Columbia, within the Quesnel Trough greenstone belt. The belt is interpreted as an island arc setting, deposited during Triassic time.

Interest in the property stems from copper-gold mineralization within the volcanics. This mineralization is associated with propylitic alteration proximal to a small monzonite to diorite stock. To date, copper-gold values ranging from .56 to 2.2% copper, and .01 to .16 oz/ton gold, have been recorded within a zone of brecciated volcanics measuring 25 X 50 meters.

The property was discovered in 1978, by prospectors Alfred and Clay Robinson. Following trenching and prospecting by the original owners, Alclare Resources Inc. was formed to manage and explore the area. In 1982, following rock geochem and limited EM and magnetometer surveys, Alclare completed 11 diamond drill holes totalling 424 meters.

In 1984, the property was optioned to Noranda Exploration Co. Ltd. During 1984-85, Noranda completed soil sampling, detailed geological mapping, trenching, magnetometer and induced polarization surveys and 4 diamond drill holes totalling 397.15 m. These surveys defined several Cu and/or Au soil anomalies and 2 IP anomalies, one of which extends 500 meters south from the main showings and has a coincident gold in soils anomaly. The trenching tested the main copper in soil anomalies however, the subsequent results were largely inconclusive due to the depth of the overburden and the apparent transported nature of the geochem response. The drilling program tested the 2 IP anomalies, with only limited results. The IP anomaly extending south of the main showing is attributed to a pyritic Hornblende Diorite-Monzonite dyke encountered in holes NH-85-1 and NH-85-3. The source of the second, more westerly IP anomaly is unclear at present. Only hole NH-85-3 encountered mineralization, a 19.66 section of strongly epidote altered Hornblende-Augite Basalt and breccia, which return values of 0.12% Cu, 0.06 oz/ton Ag, and 0.007 oz/ton Au. Within this section is 4.5 m of 0.27% Cu, 0.13 oz/ton Ag and 0.013 oz/ton Au.

INTRODUCTION:

The Hawkins Lake property was discovered by prospectors Alfred and Clay Robinson in 1978. Subsequently, a junior mining company named Alclare Resources was formed to explore and manage the property.

In June 1984, Noranda Exploration Company, Limited, optioned the Hawkins Lake Property from Alclare Resources. Noranda initiated exploration programs consisting of geological mapping, soil geochemistry, trenching, magnetometer and induced polarization surveys followed by diamond drilling. This report describes the results of the 1985 program of trenching, mapping and diamond drilling.

LOCATION AND ACCESS:

The property is located approximately 40 km northeast of 100 Mile House, in south central British Columbia. The property is also 5 km at 290 degrees (true) from the village of Eagle Creek, located just north of Canim Lake.

Access to the property from 100 Mile House is via the all-weather mine haulage road from Noranda's Boss Mountain Mine. At Eagle Creek, a good gravel road leads to the north shore of Hawkins Lake. From Hawkins Lake, a rough 4 X 4 truck road leads onto the property, a distance of 4 km.

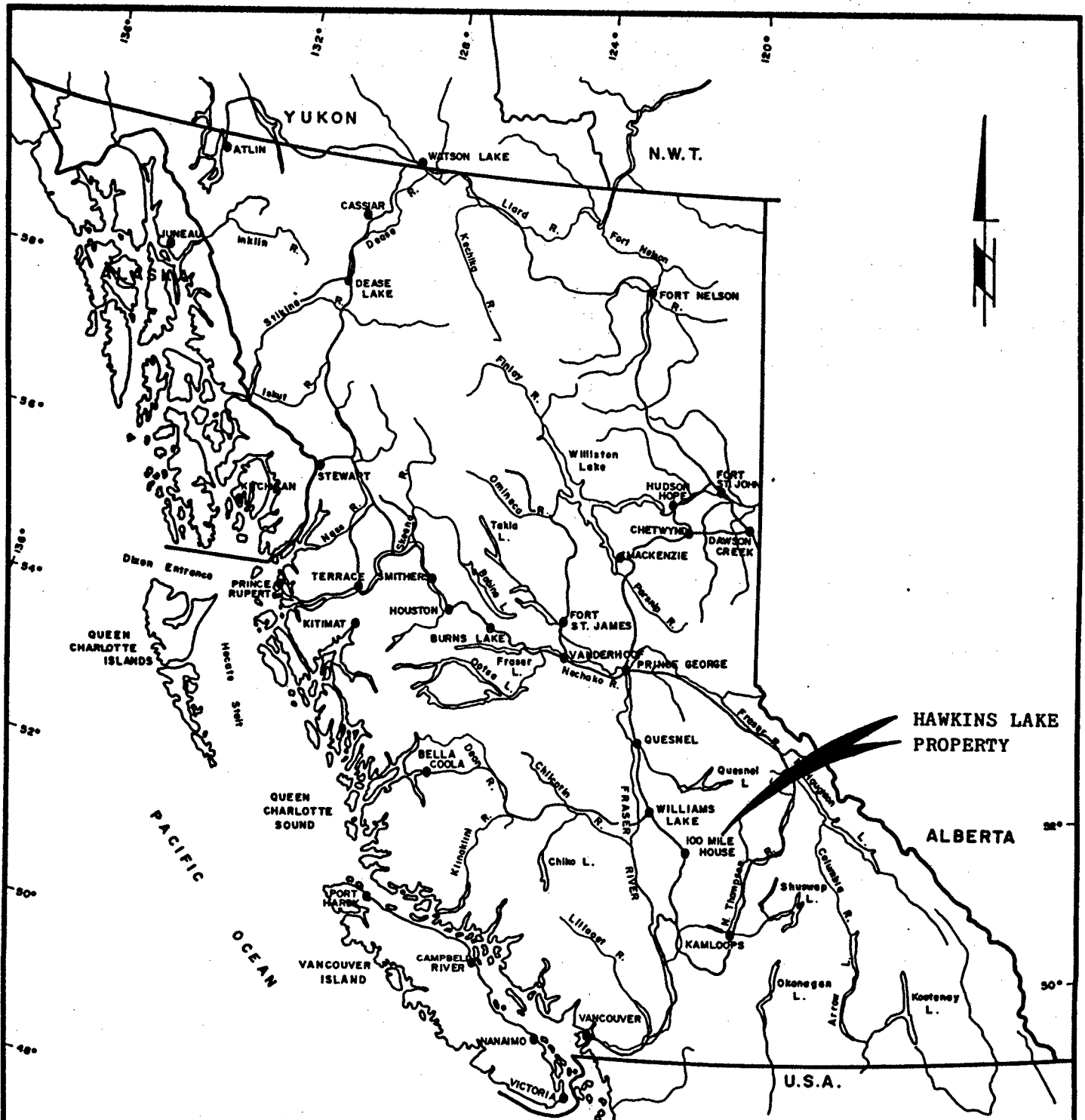
CLAIM STATISTICS:

The Hawkins Lake Property contains the following mineral claims, located in the Clinton Mining District (Figure 3).

<u>Claim Name</u>	<u># Units</u>	<u>Record #</u>	<u>Record Date</u>	<u>Type of Claim</u>
North	12	000286	Feb. 23, 1987	MGS
Cab 1	6	1815	Aug. 21, 1988	MGS
Cab 2	14	1816	Aug. 21, 1988	MGS
Ski 1	16	1817	Aug. 21, 1988	MGS
After	10	001115	Sept. 29, 1987	MGS
Clay 1-8 incl.	8	208-215	May 31, 1988	two-post
Hunter 1-8 incl.	8	927,958-964	Feb. 3, 1987	two-post
Trapper 1-8 incl.	8	853-860	Aug. 18, 1987	two-post

TOTAL 82

The claims are owned by Alclare Resources, but are presently under option to Noranda Exploration Company, Limited.



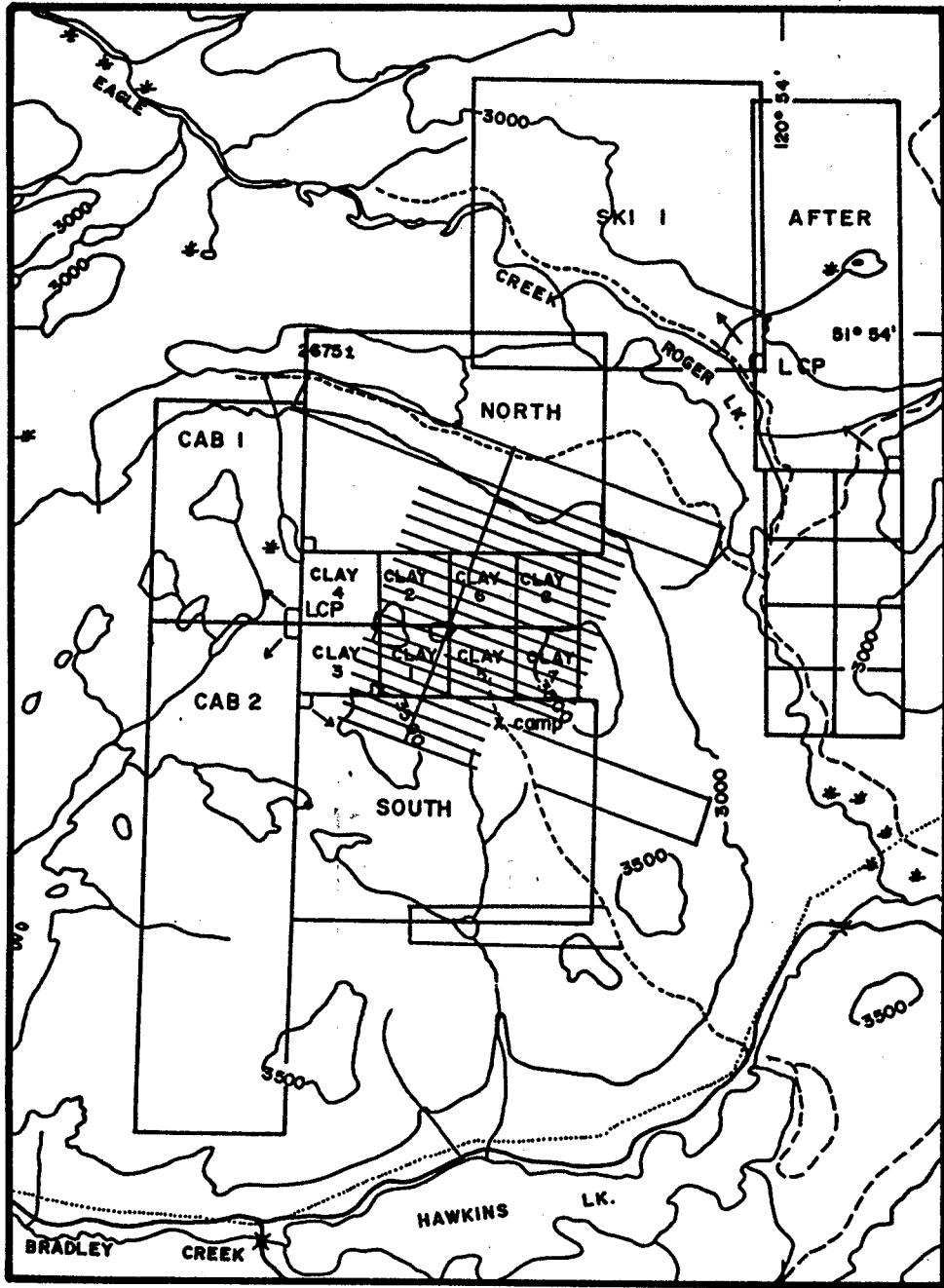
0 100 200 KILOMETRES
SCALE 1:8,000,000

REVISED	HAWKINS LAKE - ALCLARE RES. OPT.	
	<u>LOCATION MAP</u>	
PROJ. No. 261	SURVEY BY: _____	DATE: <u>May, 1985</u>
N.T.S. 92P/15	DRAWN BY: <u>S.K.B.</u>	SCALE: <u>1:8,000,000</u>
DWG. No. 1	NORANDA EXPLORATION	
	OFFICE: <u>PRINCE GEORGE, B.C.</u>	

VANCAL 11827

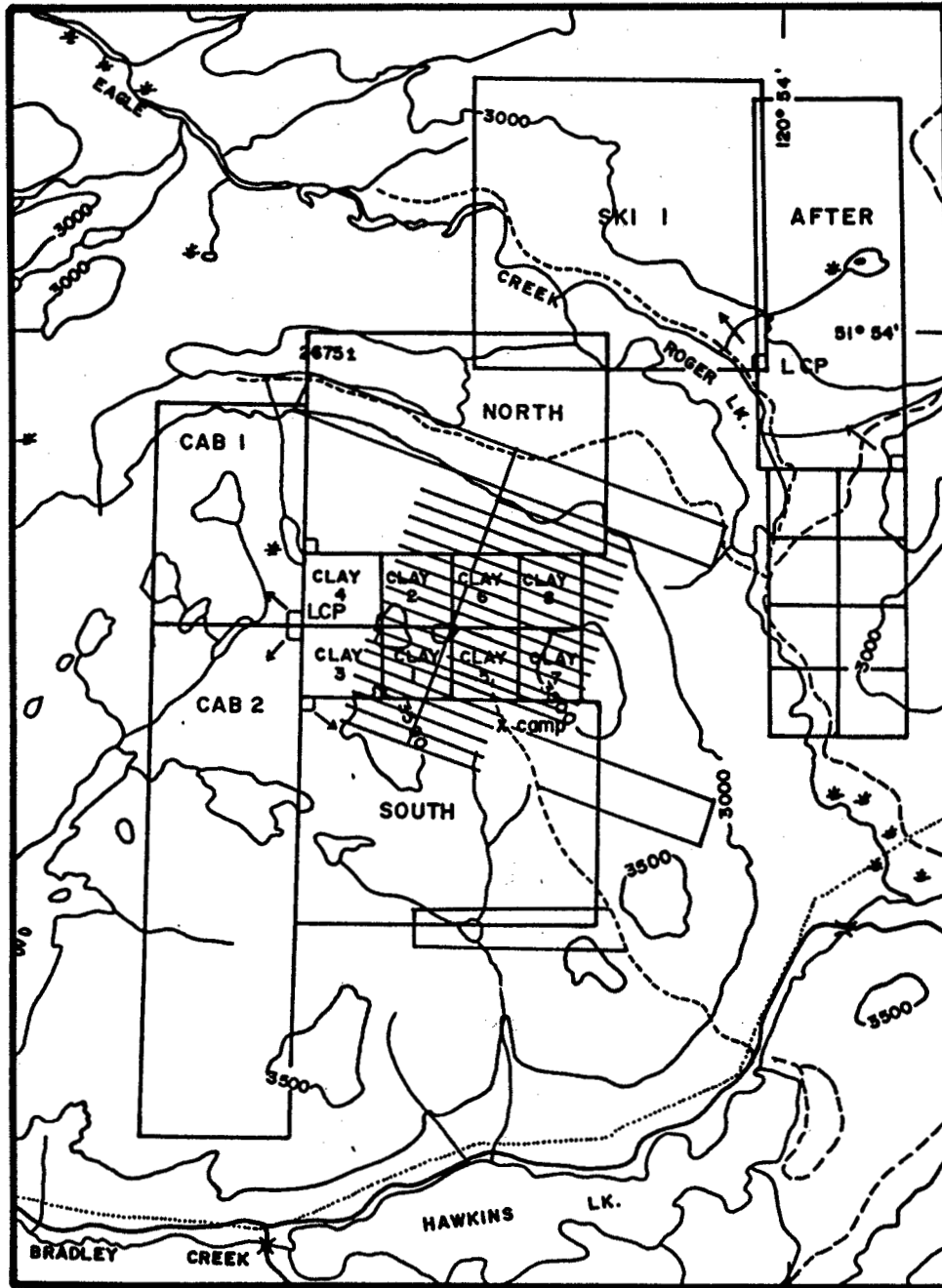
2526

5.55 → 14.0



0 1 2 3 4 Kilometres
 SCALE 1:50,000

REVISED	HAWKINS LK. - ALCLARE RES. OPT.	
	<u>Plan Location Map</u>	
PROJ. No. 261	SURVEY BY: R.B.	DATE: May 1985
N.T.S. 92P/15	DRAWN BY: S.K.B.	SCALE: 1:50,000
DWG. No. 2	NORANDA EXPLORATION	
	OFFICE: Prince George, B.C.	



0 1 2 3 4 Kilometres
 SCALE 1:50,000

REVISED	HAWKINS LK. - ALCLARE RES. OPT.	
	Claim Map	
PROJ. No. 261	SURVEY BY: R.B.	DATE: May 1985
N.T.S. 92P/15	DRAWN BY: S.K.B.	SCALE: 1:50,000
DWG. No. 3	NORANDA EXPLORATION OFFICE: Prince George, B.C.	

PREVIOUS WORK:

The Hawkins Lake property was discovered by Alfred and Clay Robinson in 1978. The prospectors trenched and explored the vicinity of the main showing.

In 1981, a grid was established for the purposes of geological mapping, rock-chip geochemistry, magnetometer and VLF-EM surveys (Werner, 1981). Rock geochem identified anomalous populations in copper, silver and gold over the original discovery. Gold values indicated the zone to extend northerly and easterly. However, no additional mineralization was discovered.

The results of the magnetometer and VLF-EM surveys failed to identify a signature over the known mineralization.

In 1982, Alclare Resources Inc. initiated a program of diamond drilling over the original discovery zone. A total of 1391 feet (424 meters) of BQ drilling was completed in 11 holes. The drilling failed to intersect economic mineralization, and the property lay dormant until being optioned to Noranda in 1984.

During 1984 Noranda conducted geological, geochemical and geophysical surveys and trenching on the property. These programs defined several non-coincidental geochemical and geophysical anomalies.

REGIONAL GEOLOGY:

Geological mapping by Campbell and Tipper (Memoir 363, 1971) of the Geological Survey of Canada, is the most recent mapping in the area. They conclude the region is underlain by Nicola volcanic and sedimentary rocks of Triassic-Jurassic age.

These rocks consist mainly of greenstones, and greenstone tuffs and breccias. In the Hawkins Lake area, interbedded grey limestone is common.

Intruding the volcanic sequence, is the Takomkane batholith of Cretaceous age. It consists mainly of hornblende-biotite granodiorite.

PROPERTY GEOLOGY:

The Hawkins Lake property is underlain by greenstones, tuffs, breccias, and limestones of the Nicola Group. These rocks generally trend northerly with near vertical dip attitudes. Geological mapping by the author on 1:5000 and 1:2500 scales, has determined the following lithologies: unit 1 - dark green, chloritic schistose hornblende-augite basalt; unit 2 - massive locally pillowed, hornblende-augite basalt; unit 3 - monolithic, hornblende-augite basalt breccia and tuff; unit 4 - buff

rhyolite; unit 5 - grey skarnified limestone; and unit 6 - quartz-feldspar chlorite schist. It is postulated that these rocks were deposited in a submarine island arc setting during Triassic time.

During Triassic to Cretaceous time the volcanic pile was intruded by dykes and stocks of varying composition from granodiorite (unit 7) to diorite (unit 7a), monzonite (unit 8), syenite (unit 9), hornblendite (unit 10), and hornblende porphyry (unit 11). Some of the dykes appear to be comagmatic with the volcanics, the remainder are probably part of or related to the Cretaceous age Takomkane Batholith.

MINERALIZATION:

Of economic interest on the property is the presence of copper and gold mineralization. This mineralization occurs as blebs and fracture coatings commonly associated with pink calcite veining hosted predominantly in the hornblende-augite basalt breccia (unit 3). This unit is proximal to the monzonite stock and in contact with the skarnified limestone (unit 4) and the quartz-feldspar chlorite schist (unit 6). The zone of mineralization is approximately 25 meters in width, and subcrops for 50 meters along strike. Mineralization was also locally observed in unit 1, again with significant pink calcite veining.

Thin and polished section studies by D.J.T. Carson (1984) identified the following copper-bearing minerals: bornite (Cu_5FeS_4), chalcocite-digenite (Cu_2S), covellite replacing bornite and chalcocite-digenite, minor chalcopyrite (CuFeS_2), and malachite.

In addition, gold mineralization was observed. According to Carson, 76.6% of the observed gold occurs on grain boundaries between (silicate-carbonate) gangue minerals, and 21.2% of the gold is locked within silicate or carbonate grains. Only 2.2% of the gold is in contact with a copper mineral (digenite).

Furthermore, trace amounts of the silver and mercury tellurides hessite and coloradoite are locally associated with bornite.

ALTERATION:

Intimately associated with the sulphide mineralization, is a zone of prophyllitic alteration related to the monzonite stock. Gangue minerals identified in the banded dark to light green rocks are abundant pyroxene, epidote, and amphibole, with moderate to minor quartz, calcite, K-feldspar, and plagioclase, and 0.5 to 3% magnetite, hematite and rutile (Carson, 1984).

1985 EXPLORATION PROGRAM:

Physical Work

In preparation for the drilling and trenching programs, approximately 1.5 km of new cat road was built and 0.5 km of road was repaired and/or upgraded. The roads, which are approximately ten feet wide, were built with a 1961 HD-5 cat hired from Judson Sawmills.

GRID

Noranda crews initially cut a 1.2 km baseline at an azimuth of 020 degrees (true). A total of 13.0 km of flagged crosslines were established at 100 meter spacings perpendicular to the baseline. Stations were marked at 25 meter intervals using white teflon cards marked with indelible ink. Subsequently, the baseline was extended 500 meters further northward and the crosslines 4600N to 5900N were extended to 6000E for mapping purposes.

Rock Geochemistry

Rock samples collected during the 1984-85 program were analysed for Cu, Ag, Au +/- As. As well, all the available assays and rock geochem from all previous work was compiled in order to determine the relationship between the copper and gold values. This compilation revealed the following information:

Total # of samples = 72

Average Cu value for all samples = 22,876 ppm
approx. 2.29%

Average Au value for all samples = 4.49 ppm
approx. 0.144 oz/ton

Cu/Au = 5092

Rock samples collected during the 1985 mapping program had copper values ranging from 6 to 1100 ppm and gold values from 10 to 130 ppb.

TRENCHING

During May 1985, a trenching program was undertaken on the Hawkins Property to test several copper soil anomalies. A 1973 JCB-5C excavator was hired from Judson Sawmills for the work.

A total of three (3) trenches each approx. 20 m long X 1.5 m wide by 3.5 m deep were completed. Soil profile samples were

taken within the trenches and any bedrock or mineralized float in the trenches was sampled. The results from trenches 6-8 are described below:

TRENCH 6 - (Line 5400N, 5300E): Minor gold (40 ppb) and copper (800 ppm) were detected in a malachite stained basalt boulder. The soil profiles returned anomalous copper values to 660 ppm and gold values to 50 ppb.

TRENCH 7 - (Line 5600N, 5100E): Bedrock consisting of hornblende-augite basalt was exposed. Bedrock samples had copper, gold values ranging from 46 to 820 ppm and 10 to 70 ppb. Soil profile samples returned moderately anomalous copper values ranging from 90 to 430 ppm. No gold in soil values were reported.

TRENCH 8 - (Line 5200N, 5300E): Soil profiles returned moderately anomalous copper values from 76 to 270 ppm, and copper values increased with depth. As well, numerous pieces of pink calcite vein material to 30 cm X 20 cm X 20 cm were uncovered, however, samples of this material did not return any significant values in Cu, Ag, Au.

Drilling

During April, 1985 a drill program was initiated on the Hawkins Property to test the IP anomalies. Initially five (5) drill holes were spotted but the plans had to be revised based on the results of the first two (2) drill holes NH-85-1 and NH-85-2. All the core, with the exception of the intrusive in NH-85-1, was split and sampled for Au, Ag and for Cu where copper mineralization was observed. Also the core was tested for its magnetic susceptibility in conjunction with logging, using a Geoinstruments Susceptibility Meter JH-8.

DDH	Coordinates		Angle	Bearing	Depth (m)
	Northing	Easting			
NH-85-1	4801N	5100E	-50 deg.	290 deg.	77.11 m
NH-85-2	4593N	4842E	-50 deg.	290 deg.	96.32 m
NH-85-3	4800N	5050E	-45 deg.	290 deg.	132.28 m
NH-85-4	4600N	5125E	-45 deg.	290 deg.	91.44 m

NH-85-1: This hole cut a narrow section of pyritic greenstone hornfels at the top and then entered into a pyritic hornblende-diorite-monzonite intrusive. The IP response is attributed to the pyrite. No copper mineralization or gold values were encountered.

NH-85-2: This hole cut a thick section of basic volcanic flows which have been intruded by numerous, variably pyritic, hornblende diorite dykes. No copper mineralization or gold values were encountered. It is postulated that the source of the IP response is magnetite +/- pyrite within the volcanics.

NH-85-3: This hole cut through the western edge of the same intrusive encountered in NH-85-1 and then entered a section of basic volcanics. A strongly epidote altered zone of hornblende-augite basalt breccia was encountered from 42.19 m to 61.85 m. This zone contained minor amounts of bornite and pink calcite veining. The entire zone, 19.66 m, returned an average of 1190 ppm Cu, 1.92 ppm Ag and 233 ppb Au. Within the overall zone was a 4.5 m section from 56.48 - 60.98 m which returned an average of 2700 ppm Cu, 4.2 ppm Ag and 420 ppb Au. The Cu/Au ratios varied from 5107 over the 19.66 m section to 6678 over the 4.5 m section. This correlates with the high Cu/Au ratio obtained from the rock geochem data. The remainder of the hole was in basic volcanics with only local trace mineralization.

NH-85-4: This hole also cut the western edge of the intrusive encountered in NH-85-1 and then entered a thick section of basic, variably hornfelsed, volcanics. Mineralization consisted of minor pyrite at the top of the hole and minor hematite at the bottom. No gold values were encountered.

CONCLUSIONS:

The Hawkins Property exhibits several similarities with Dome's QR deposit. Some of these similarities are listed below:

- (i) Both deposits are hosted within Triassic volcanics of the Quesnel Trough.
- (ii) The gold-sulphide mineralizing event is associated with a comagmatic monzonite (?) stock.
- (iii) Gold-sulphide mineralization is within a zone of propylitic alteration.
- (iv) Gold-sulphide mineralization was deposited in a calcareous environment - calcareous tuff (QR); limestone-volcanic contact (Hawkins).

Mapping indicates that the gold-copper mineralization is mainly located proximal to the main diorite-monzonite stock and the limestone lenses and that the mineralization appears to die out in the eastern portion of the property. Rock geochem from local mineralization in the eastern portion of the grid area returned only trace gold values. As evidenced in the previous soil geochem program and subsequent trenching, the soil geochem has not been an effective tool in locating bedrock mineralization.

The IP anomalies are concluded to be due to a pyritic intrusive and magnetite-rich, locally pyritic basic volcanics. The known mineralization, both that on surface and in drill hole, does not appear to have a distinct geophysical signature.

Compilation of all previous rock sampling indicates a high Cu:Au ratio which means there must be significant copper mineralization present before economic gold values are realized. Drilling and rock sampling to date have not identified such a zone.

RECOMMENDATIONS:

Further work consisting of reconnaissance and/or grid mapping, soil and rock geochem should be extended east on to the Cab 1 and 2 claims to evaluate the area along the main Takomkane intrusive - Nicola volcanic contact.

REFERENCES

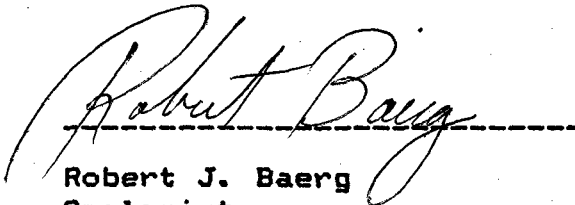
- Burton, Alex, P. Eng. Report for Alclare Resources Ltd., on the North and Clay Mineral Claims, 1980.
- Carson, D.J.T. Mineralogy and Occurrence of Gold in the Hawkins Cu-Au Samples, 1984 (unpublished Noranda Report).
- Lewis, T.D., + Bradish, L. Geological, Geochemical and Geophysical Report on the Hawkins Lake - Alclare Resources Option, 1985.
- Tipper, H.W., & Campbell, R.B. Geology of the Bonaparte Map-Area, British Columbia; Memoir 363, 1971.
- Werner, L.J. Diamond Drill Report, 1982.
- Werner, L.J. Geological, Geochemical, and Geophysical Report, 1981.

APPENDIX I

STATEMENT OF QUALIFICATIONS

I, Robert J. Baerg of the City of Prince George, Province of British Columbia, do certify that:

1. I have been employed as a geologist by Noranda Exploration Company, Limited since May, 1984.
2. I am a graduate of the University of British Columbia with a Bachelor of Science (Honors) in Geology (1984).
3. I supervised and assisted with the work described in this report.

A handwritten signature in cursive script, reading "Robert Baerg", is written over a horizontal dashed line.

Robert J. Baerg
Geologist
Noranda Exploration Company, Limited
(No Personal Liability)

APPENDIX II

NORANDA EXPLORATION COMPANY, LIMITED

STATEMENT OF COST

DATE May 31, 1985

PROJECT - HAWKINS LAKE

TYPE OF REPORT - Geology, Geochem & Drilling

a) Wages:

No. of Days - 56	
Rate per Day - \$141.03	
Dates From - March 1985-May 1985	
Total Wages	\$ 7,897.68

b) Food and Accommodation:

No. of Days - 56	
Rate per Day - \$25.00	
Dates From - March 1985-May 1985	
Total Cost	\$ 2,520.00

c) Transportation:

No. of Days - 56	
Rate per Day - \$25.00	
Dates From - March 1985-May 1985	
Total cost	\$ 1,400.00

d) Analysis:

27 soil samples	Cu/Ag/Au	\$ 5.70/sample	
25 rock samples	Cu/Ag/Au	\$ 7.70/sample	
123 core samples	Cu/Ag/Au	\$12.85/sample	
23 core samples	Cu/Ag/Au	\$12.25/sample	\$ 2,208.70

e) Cost of Preparation of Report:

Author	\$ 300.00
Drafting	300.00
Typing	300.00

f) Other:

Contractor	
Drilling	\$ 22,665.00
Trenching	1,242.50
Road Building	1,660.00

TOTAL COST \$ 40,493.88

UNIT COSTS

Unit Costs for Geology

No. of Days - 56

No. of Units -

Unit costs - \$205.48/day

Total cost - 56 X \$205.48

\$ 11,506.87

Unit Costs for Geochem

No. of Days -

No. of Units - 198

Unit costs - \$12.07/sample

Total cost - 198 X \$12.07

\$ 2,390.31

Unit Costs for Drilling

No. of Days -

No. of Units - 397.15 m

Unit costs - \$59.66/m

Total cost - 397.15 X \$59.66

\$ 23,694.20

Physical work

\$ 2,902.50

TOTAL

\$ 40,493.88

APPENDIX III

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 g - 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.

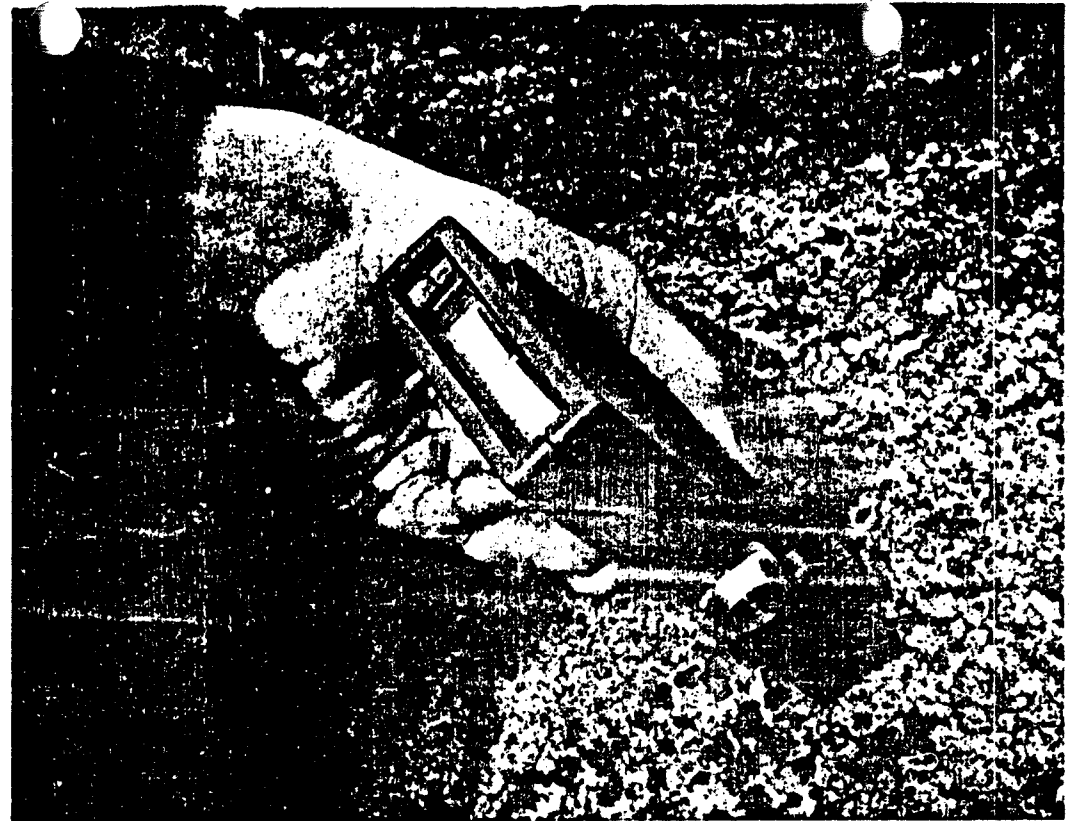
LOWEST VALUES REPORTED IN PPM

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
March 14, 1984

APPENDIX IV

SUSCEPTIBILITY METER



SUSCEPTIBILITY METER JH-8

Operation Manual

Geoinstruments ky

Punapääntie 8
SF 00930 Helsinki 93
Finland



Lahtinen —
Kirjapaino

FOR FURTHER INFORMATION CONTACT

ec

INSTRUMENTS SALES LIMITED

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SUSCEPTIBILITY

Magnetic susceptibility describes the magnetic ability of a substance. It can be defined by the vector equation:

$$\vec{B} = \vec{H} \mu_0 (1 + \kappa)$$

where \vec{B} stands for the magnetic flux density within the substance,

\vec{H} is the external magnetic field due to magnetization,

μ_0 = permeability in vacuum, and

κ = susceptibility

For an isotropic substance, susceptibility is a quantity that depends on the substance itself and on the magnetizing field. The susceptibility of an anisotropic substance is a symmetric tensor.

The JH-8 is designed to measure the magnetic susceptibility of rock samples. Rocks are mixtures of different minerals, and hence, their magnetic properties depend on those of the component minerals.

The mineral that largely governs the magnetic behaviour of a rock, and which accounts for most of the susceptibility observed, is magnetite. The susceptibility of magnetite depends on several factors, such as the intensity of the magnetizing field, the chemical composition of the magnetite and its grain size. Susceptibility can, however, be applied to determine the magnetic abundance, provided that local dependence between susceptibility and magnetic abundance is known.

CONTENTS

Susceptibility

Principle of operation

Operation instructions

Technical specification

In the JH-8 the sample to be measured is placed in a weak source field that does not saturate the sample. The so-called initial susceptibility obtained is independent on the magnetizing field.

As indicated by the above formula, susceptibility is a dimensionless quantity. The different systems of units are related to each other as follows:

$$\kappa[\text{SI}] = 4\pi\kappa[\text{c.g.s.}]$$

PRINCIPLE OF OPERATION

The function of JH-8 is based on electromagnetic induction. There are two coils placed orthogonally to each other in the detector head, which is mounted in the bottom of the instrument case. In non-magnetic environment the voltage induced from transmitter coil to receiver coil is zero. When a sample is brought near the coils, a voltage which is proportional to magnetic susceptibility of the sample is induced to the receiver coil. This signal is detected by a phase-locked amplifier and after rectification it is used to drive an analog panel meter, which is thermally compensated and directly calibrated for susceptibility.

OPERATION INSTRUCTIONS

To make a susceptibility measurement by JH-8 proceed as follows:

1. Switch the instrument on by turning the rotary switch on the right hand side clockwise. Battery voltage can be checked in "B" position where the needle of the panel meter should rise above the red mark on the scale. Choose the most suitable of the four measuring ranges.

2. Check zero setting while the instrument is kept away from metal objects. Sufficient distance is 30-50 cm. Adjust the panel meter to zero by turning the potentiometer on the left hand side. Zero adjustment is usually needed only when range 1 or 2 has been selected.

Note: Care should be taken to avoid errors caused by metal objects in the user's clothes e.g. buttons, belt etc., especially when range 1 is used.

2. Press the bottom of JH-8 against the material to be measured and the susceptibility value can be read from the scale of the panel meter. The location of the most sensitive point of the detector head is marked by a red dot. Calibration is done for a half-space, which is convenient when measurements are done on outcrops. When other samples are measured, readings should be multiplied by the following approximate correction factors:

sample	multiplier
Ø 42 mm drill core	2.0
Ø 37 mm drill core	2.1
Ø 32 mm drill core	2.3
Ø 22 mm drill core	3.0
rock sample, fist sized	2

The length of drill cores should be 10 cm or more.

Note: The low signal frequency (1000 Hz) and phase sensitive receiver circuit usually eliminates the influence of electric conductivity in the sample. However, very good conductors can give erroneous values (negative readings).

TECHNICAL SPECIFICATION

- Control knobs**
1. 10-turns, long life potentiometer for zero adjustment on the left side of the instrument case.
 2. 6-position range switch

Position

- 0 off
- B battery test
- 1 measuring range 0-100 $\times 10^{-5}$ SI
 - 2 measuring range 0-1000 $\times 10^{-5}$ SI
 - 3 measuring range 0-10000 $\times 10^{-5}$ SI
 - 4 measuring range 0-100000 $\times 10^{-5}$ SI

The scale of the panel meter is divided in 20 parts, which gives 5×10^{-5} SI resolution on the most sensitive measuring range.

Current consumption 8mA

Battery One disposable 9V calculator battery which is located behind plastic cover containing range information. To replace the battery the cover has to be removed.

Dimensions 190 x 80 x 30 mm

Weight 0,5 kg

100k

APPENDIX V

DRILL LOGS

NORANDA EXPLORATION COMPANY LTD.

Date Collected March 31/85		Date Completed		Core Size		DIP TESTS				PROPERTY HAWKINS LAKE		PROJECT No. 261		N.T.S. No. 92 P/15	
FIELD CO-ORDINATES				DEPTH		BEARING		ANGLE		SURVEYED CO-ORDINATES					
Lat. 5100 E		Elev.		Dip -50°		RECORDED	CORRECTED	RECORDED	CORRECTED	Lat.		Elev.		Dip	
Dep. 4801 N		Length 77.11 m		Bearing 290°						Dep.		Length		Bearing	
From (m)	To (m)	Recovery %	Description			Structure Angle to Core Axis		% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS			
												Au (ppb)	Ag (ppm)	MAG Suscept.	
						(C.A.)								(X 10 ⁻²)	SI
0.00	4.57	0													
4.57	13.55	94	Basalt Breccia Hornfels	dk gr, v.f.g.; predom. dk gr chl matrix with 5-10% f.g.; ep, chl altered; hbl grains are locally distinct; breccia frags to 10 cm, local chl-ep banding, bands 1-3 mm wide; local Qtz(?) filled amygdules; calc, Qtz. and chl locally form sm. veins and irreg. patches, the calc is wh. to pale pink; py occurs as v.f. dissem grains in the matrix; the unit is weakly to strongly magnetic; contact with the diorite is interfingered and sharp.	banding 50° at 5.82 m					16001	4.57 - 7.57 (3.0 m)	15	.2	1050 - 4200	13,000 Avg.
					banding 20° at 10.19 m		2-3			16002	7.57 - 10.19 m	10	.2		
					banding 50° at 12.05 m					16003	10.57 (3 m) - 13.55 (2.98 m)	10	.2		
					contact 75° to C.A.										
13.55	77.11	98	Hornblende Diorite	lt. to med. gr; f. to med. g.; hbl pheno's to 1X5 mm are chl altered; matrix is f.g.; fs variably altered to ep and/or ser, ep also occurs as f. grains in the matrix from tr. to locally 10%; there are numerous f.g. ang. to subround dk gr chl wallrock frags to 47 cm; tr to 5% py occurs as dissem. grains; bright gr ep and/or dk gr chl occurs on fractures; there are also local zones of increased ser alteration; the unit is weakly to mod magnetic. 17.67 - 18.25 - is an amphibolite dike with chl hbl pheno's to 3 X 10 mm; matrix is mainly chl & ep with minor irreg. patches of wh to pink calc; the dike has a weak chl-ep haloe and is very strongly magnetic.						16004	13.55 - 16.55 (3.0 m)	10	.2	420 - 6300	3200 Avg.
							3-5			16005	16.55 - 19.55 (3.0m)	10	.2		
										16006	19.55 - 22.55 (3.0m)	20	.2		
										16007	22.55 - 25.55 (3.0 m)	>5	.2		
										16008	25.55 - 28.55 (3.0 m)	>5	.2		
						contact 60° to C.A.				16009	28.55 - 31.55 (3.0m)	5	.2	21,000 - 38,000	42,000 Avg.
						contact 45° to C.A.				16010	31.55 - 34.55 (3.0m)	5	.2		
										16011	34.55 - 37.55 (3.0m)	5	.2		

DRILL LOG - 81

Date Mar. 31/85 37.55 (3.0m)
 Logged By R. Baerg

NORANDA EXPLORATION COMPANY LTD.

Date Collared Mar. 31/85		Date Completed April 2/85		Core Size BQ		DIP TESTS				PROPERTY HAWKINS LAKE		PROJECT No. 261		N.T.S. No. 92P	
FIELD CO-ORDINATES				DEPTH	BEARING		ANGLE		SURVEYED CO-ORDINATES				Sheet 2 of 2		
RECORDED		CORRECTED			RECORDED		CORRECTED		Lat.		Elev.		Dip		
Lat. 5100 E		Elev.		Dip -50°						Lat.		Elev.		Dip	
Dep. 4801 N		Length 77.11 m		Bearing 290°						Dep.		Length		Bearing	
From	To	Recovery	Description	Structure	% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS						
									Au(ppb)	Ag(ppm)					
							16012	37.55 - 40.55 (3.0 m)	5	.2					
							16013	40.55 - 43.55 (3.0 m)	<5	.2					
							16014	43.55 - 46.55 (3.0 m)	<5	.2					
							16015	46.55 - 49.55 (3.0 m)	<5	.2					
							16016	49.55 - 52.55 (3.0 m)	5	.2					
							16017	52.55 - 55.55 (3.0 m)	5	.2					
							16018	55.55 - 60.05 (4.5 m)	5	.2					
							16019	60.05 - 64.55 (4.5 m)	5	.2					
							16020	64.55 - 67.55 (3.0 m)	5	.2					
							16021	67.55 - 70.55 (3.0 m)	10	.2					
							16022	70.55 - 73.55 (3.0 m)	10	.2					
							16023	73.55 - 77.11	10	.2					

DRILL LOG - 81

Date Apr. 1/85 Logged By R. Baerg

NORANDA EXPLORATION COMPANY LTD.

Date Collared Apr. 4/85		Date Completed Apr. 10/85		Core Size BQ		DIP TESTS				PROPERTY HAWKINS		PROJECT No. 261		N.T.S. No. 92 P/15	
FIELD CO-ORDINATES						DEPTH		BEARING		ANGLE		SURVEYED CO-ORDINATES			
Lat. 4842 E		Elev.		Dip -50°		RECORDED		CORRECTED		RECORDED		CORRECTED		Sheet 1 of 6	
Dep. 4593 N		Length 96.32 m		Bearing 290°										HOLE No. NH-85-2	
From (m)	To (m)	Recovery %	Description			Structure	% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS				
											Au(ppb)	Ag(ppm)	Mag Suscept.		
0.00	4.90		Overburden											X 10 ⁻⁵	SI
4.90	6.51	98%	Hornblende Diorite gry-gr, med grained hbl pheno's to 1X4 mm, fs grains to 1X1 mm; hbl grains are chloritized and the fs grains commonly are ep ± ser altered; the f.g. groundmass is composed of equal amounts of fs, chl and ep with trace dissem.py and is slightly calcareous; the unit is mod. to strongly magnetic and is mod. hard.			contact 25° to C.A.	.5-1.0		16024	4.90 - 6.51 (1.61 m)	<5	0.2 (Cu-8ppm)	1700 - 3200	4200	Avg.
6.51	11.96	95%	Hornblende Basalt dk gry-gr, hbl pheno's to 2X4 mm are chloritized; the matrix is mainly pale to bright gr ep and minor dk gr chl and is weakly calcareous, the unit is locally fractured with white calcite filling the fractures, there are also local pink calcite veins which are overprinted by the ep alteration and predate the white calcite; py occurs as local coarse patches and f. dissem grains; fractures are commonly limonitic or have dk gr chl ± ep.; unit is strongly magnetic.				Tr.		16025	6.51 - 9.51 (3.0 m)	5	0.4 (Cu-120ppm)	3200 - 4200	10,500	Avg.
									16026	9.51 - 11.96 (3.0 m)	<5	0.2 (Cu-50ppm)			
11.96	21.96	98%	Andesite med gr-gry, v.f. to f.g., relic chl hbl pheno's to 1 mm; matrix is predominantly dk gr chl with local zones of increased ep to 5%, matrix is weakly calcareous and is locally fractured with vuggy wh. calcite ± qtz ± py ± hem filling the fractures; there are also several ep altered hbl porphyry fragments to 10 cm; local sections with strong ep and/or calcite have abund. rec				.5		16027	11.96 - 14.96 (3.0 m)	<5	0.2 (Cu-84ppm)	1100 - 3200	12,600	Avg.
									16028	14.96 - 17.96 (3.0 m)	10	0.2 (Cu-140ppm)			

DRILL LOG - 81

/orange hem grains after magnetite.

Date Apr. 11/85 Logged By R. Baerg

NORANDA EXPLORATION COMPANY LTD.

Date Collared Apr. 4/85		Date Completed Apr. 10/85		Core Size BQ		DIP TESTS				PROPERTY HAWKINS LAKE		PROJECT No. 261		N.T.S. No. 92P/15	
FIELD CO-ORDINATES				DEPTH		BEARING		ANGLE		SURVEYED CO-ORDINATES				Sheet 2 of 6	
Lat.		Elev.		Dip -50°		RECORDED		CORRECTED		RECORDED		CORRECTED		HOLE No.	
Dep.		Length		Bearing 290°						Dep.		Length		Bearing	
From (m)	To (m)	Recovery %	Description			Structure	% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS				
											Au (ppb)	Ag (ppm)	MAG	Suscept.	
									16029	17.96 -	10				
									16030	20.96 (3.0 m)	<5	0.4 (Cu-80ppm)			
										20.96 -	<5	0.2 (Cu-54ppm)			
										21.96 (1.0 m)	<5	0.4	400 -	12,600	
21.96	34.53	95	Hornblende Andesite v.f. to med. g., med. gr -						16031	21.96 -	<5	0.4	2100	Avg.	
			gry to dk gr; predominantly chl altered with local							24.96 (3.0 m)	<5	0.2 (Cu-66ppm)			
			zones of intense ep, to 15%, overall ep content is							24.96 -	<5	0.2			
			approx. 2%, ep occurs in the matrix and as irreg.							27.96 (3.0 m)	<5	0.2 (Cu-68ppm)			
			veins and patches; hbl pheno's to 2 mm are locally					Tr.	16033	27.96 -	<5	0.2			
			distinct within the ep ground mass; the unit is locally							30.96 (3.0 m)	<5	0.2 (Cu-82ppm)			
			strongly fractured with vuggy qtz-cal veins filling							16034	30.96 -	<5	0.2		
			the fractures; the unit is locally magnetic; hem as							33.96 (3.0 m)	<5	0.2 (Cu-64ppm)			
			dk red grains locally occurs with the ep and locally							16035	33.96 -	<5	0.2		
			with calcite; only trace grains of py were observed;							34.53 (1.57 m)	<5	0.2 (Cu-26ppm)			
			dk gr chl and/or ep and/or cal and/or a powdery wh.												
			mineral coat the fractured surfaces.												
34.53	36.50	98	Hornblende Porphyry Dike med gry-br, v.f.g. matrix				Tr.1		16036	34.53 -	<5	0.2	100 -	800	
			with 2-3 mm hbl pheno's; hbl grains are chloritized;							36.50 (1.97m)	<5	0.2 (Cu-34ppm)	400	Avg.	
			dk gr chl on fracture surfaces, local 1-3 mm wide			contact 30° to									
			qtz-cal veins; trace py; non-magnetic			C.A.									
36.50	39.27	95	Andesite med gry-gr; v.f. to med.						16037	36.50 -	10	0.2	2100 -	6300	
			g., predominantly chl altered with increasing ep							39.27 (2.77m)	<5	0.2 (Cu-110ppm)	3200	Avg.	
			toward the bottom, approx. 20-30% ep in the lower 50												
			cm; upper contact is marked by a siliceous fragmental												
			zone with hem-ser alteration; locally there are f.g.												
			dk gr chl frags to 4 cm; hem increases toward the					.5-1							
			lower contact, trace to 1% py along the upper contact												
			local .5 to 3 mm wide cal-qtz veins, some with gry												
			bleached rims rich in hem; dk gr chl and locally												
			hem occur on fractas; weakly magnetic.												

DRILL LOG - 81

Date April 12/85 Logged By R. Baerg

NORANDA EXPLORATION COMPANY LTD.

Date Collared Apr. 4/85		Date Completed Apr. 10/85		Core Size BQ		DIP TESTS				PROPERTY HAWKINS LAKE		PROJECT No. 261		N.T.S. No. 92 P/15	
FIELD CO-ORDINATES				DEPTH		BEARING		ANGLE		SURVEYED CO-ORDINATES					
Lat.		Elev.		Dip		RECORDED	CORRECTED	RECORDED	CORRECTED	Lat.		Elev.		Dip	
Dep.		Length		Bearing						Dep.		Length		Bearing	
From (m)	To (m)	Recovery %	Description			Structure		% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS			
												Au(ppb)	Ag(ppm)	Cu(ppm)	MAG
39.27	42.75	85	Hornblende Porphyry Dike As for 34.53-36.50; with increased qtz-cal veining, veins to 1.5 cm wide at 50° to C.A.; rims of veins are locally bleached; f.g. dissem. py occurs throughout.			contact 40° to C.A.		1-2		16038	39.27 - 42.27 (3.0m)	15	0.2	180	50-200
			16039	42.27 - 42.75 (.48m)	10					0.2	190	100 Avg.			
42.75	44.96	90	Andesite med-dk gr., v.f. to f.g.; chl altered with approx. 10% ep in the matrix and as irreg. veins and patches; hbl and fs grains to 1 mm are locally distinct; local qtz-cal veins to 3 mm wide; py occurs as dissem grains in the matrix and as coarse aggregates in several of the veins; py and dk gr chl occur on fract's, unit is locally strongly fractured; mod. magnetic.			flow contact 55° to C.A.				16040	42.75 - 44.96 (2.21 m)	<5	0.2	130	2100 - 8400 3200 Avg.
44.96	47.15	75	Andesite med gry-gr, f.-med g., extensive chl + ser alteration; abund qtz-cal veins to 4 mm wide, py occurs as f. dissem. grains and hairline veinlets; dk gr chl ± py occurs on fract's; ser occurs as pale br rims on fs grains; trace hem., non-magnetic.					.5-1		16041	44.96 - 47.15 (2.4 m)	10	0.2	140	100 - 1300 800 Avg.
47.15	49.31	85	Hornblende Porphyry Dike as for 34.53-36.50 m.					1-2		16042	47.15 - 49.31 (2.16 m)	20	0.2	210	200 - 600 300 Avg.
49.31	52.50	85	Basalt med dk gr, v.f.-f.g.; locally weakly banded; local fragments of f.g. chl and strongly ep altered hbl porphyry; matrix is extensively chl-ep altered, ep to 15%; local qtz-cal veins to 4 mm wide, some with coarse x-line py and tr hem., py and hem. locally occur as dissem. grains in the matrix; dk gr chl ± hem occurs on the fractures; strongly magnetic.												
						banding at 49.93 m. 50° to C.A. contact 30° to C.A.		1-2		16043	49.31 - 52.50 (3.19 m)	5	0.2	140	2100 - 5300 3200 Avg.

DRILL LOG - 81

Date Apr. 12/85 Logged By R. Baerg

NORANDA EXPLORATION COMPANY LTD.

Date Collared Apr. 4/85		Date Completed Apr. 10/85		Core Size BQ		DIP TESTS				PROPERTY HAWKINS		PROJECT No. 261		N.T.S. No. 92P/15	
FIELD CO-ORDINATES				DEPTH		BEARING		ANGLE		SURVEYED CO-ORDINATES				Sheet 4 of 6	
Lat.		Elev.		Dip		RECORDED		CORRECTED		Lat.		Elev.		Dip	
				-50°											
Dep.		Length		Bearing		RECORDED		CORRECTED		Dep.		Length		Bearing	
				290°										NH-85-2	
From (m)	To (m)	Recovery %	Description	Structure	% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS						
									Au(ppb)	Ag(ppm)	Cu (ppm)	MAG			
52.50	56.08	70	Hornblende Diorite med gry; f.-med. g., hbl pheno's to 2 X 5 mm, fs pheno's to 1 mm, local sm. chl frags to 2 mm; weak overall chl-ser alteration; py occurs as dissem grains and sm irreg. patches; dk gr chl + calc occurs on fract's; non-magnetic. :from 55.29 to 55.51 is a sm section of chl andesite with weak ep and tr py.		1		16044	52.50 -	5	0.2	100	100 -			
								55.50 (3.0 m)					400		
							16045	55.50 -			74	200 Avg.			
								56.08 (.58 m)	<5						
56.08	59.43	70	Andesite Breccia med - dk gr; v.f.-f.g.; hbl and fs. pheno's to 1 mm; top of unit is marked by a 30 cm wide fault - breccia zone. This zone contains numerous ang. chl, qtz and calc frags in a gry-gr matrix; the unit is strongly chl ± ep altered and is very fractured; frags consist of ang ep, chl and hbl diorite frags; dk gr chl ± hem occurs on fract's, unit is strongly magnetic; approx. 10% ep.	fault zone at 56.90 45° to C.A.			16046	56.08 -	10	0.2	90	400 -			
								59.08 (3.0 m)					3200		
							16047	59.08 -	5	0.2	120	2100 Avg.			
								59.43 (.35 m)							
59.43	61.06	70	Hornblende Diorite as for 52.50 - 56.08 m		1		16048	59.43 -	10	0.2	140	200 -			
								61.06 (1.63 m)				800			
												600 Avg.			
61.06	62.17	70	Hornblende Basalt dk gr; v.f. - f.g., local hbl pheno's to 1 X 2 mm distinct; alteration is mainly chl with minor ep (approx. 5% ep); local frags of hbl diorite to 3 cm, some are strongly ep altered; unit is strongly fractured with dk gr chl on fract's; unit is mod. magnetic.		Tr		16049	61.06 -	<5	0.2	84	1200 -			
								62.17 (1.11 m)					4600		
												3200 Avg.			
62.17	65.23	85	Hornblende Diorite as for 52.50 - 56.08 m	contact 50° to C.A. (top)	Tr		16050	62.17 -	<5	0.2	22	4200 -			
								65.23 (3.06 m)					6300		
												5200 Avg.			

DRILL LOG - 81

Date April 1985 Logged By R. Baerg

NORANDA EXPLORATION COMPANY LTD.

Date Collared Apr. 4		Date Completed Apr. 10		Core Size BQ		DIP TESTS				PROPERTY HAWKINS		PROJECT No. 261		N.T.S. No. 92P/15	
FIELD CO-ORDINATES				DEPTH		BEARING		ANGLE		SURVEYED CO-ORDINATES					
Lot.		Elev.		Dip		RECORDED	CORRECTED	RECORDED	CORRECTED	Lat.		Elev.		Dip	
				-50°										NH-85-2	
Dep.		Length		Bearing						Dep.		Length		Bearing	
				290°											
From (m)	To (m)	Recovery %	Description	Structure	% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS						
									Au(ppb)	Ag(ppm)	Cu(ppm)	MAG			
65.23	70.06	80	Basalt dk gr-gry, v.f.-f.g. with local porphyritic zones; intense chl-ep alteration, approx. 20% ep overall with several zones of massive ep to 10 cm wide; local qtz-calc veins to 3 mm; py occurs as dissem grains and sm irreg. patches to 2 mm, py content increases toward the bottom; dk gr chl occurs on fractures; unti is mod. magnetic.		1		16051	65.23 - 68.23 (3.0 m)	20	0.2	210	2100 - 6300			
			:sm. section of ep altered hbl diorite at 67.55 m				16052	68.23 - 70.06 (1.83 m)		0.2	150	3200 Avg			
70.06	74.98	80	Hornblende Diorite as for 52.50 - 56.08 m though hbl and fs grains are slightly coarser and more distinct; upper contact with the basalt is gradational; unit also contains local subang chl frags to 2 cm.		Tr		16053	70.06 - 73.06 (3.0 m)	15	0.2	68	2100 - 6300			
							16054	73.06 - 74.98 (1.92 m)		0.2	70	4200 Avg			
74.98	78.15	70	Andesite dk gry-gr, v.f.-f.g. f. hbl grains local distinct; matrix is strongly chl-ep altered, ep to 15%, ep increases toward bottom; calc occurs as local veins and as fract coatings with dk gr chl; a 3 cm wide hornblende diorite dike occurs at 77.10 m ; py occurs as dissem grains and on fract's; minor hem associated with ep zones; unit is mod. magnetic.		Tr-1		16055	74.98 - 78.15 (3.17 m)	10	0.4	320	400 - 4200			
78.15	80.00	100	Hornblende Diorite as for 70.06 to 74.98 m, with local zones of mod. ep alteration along some fract's; weakly magnetic.		Tr-1		16056	78.15 - 80.00 (1.85 m)	<5	0.2	50	1100 - 4200			
80.00	85.30		Andesite dk gr, v.f. - f.g., hbl and fs pheno's to 1 mm are locally distinct, matrix is strongly chl-ep altered with local zones to 10 cm wide of massive pale vel-gr ep, ep also occurs as f.		Tr-1		16057	80.00 - 83.00 (3.0 m)	5	0.2	200	1100 - 10,500			
												5300 Avg			

NORANDA EXPLORATION COMPANY LTD.

Date Collared Apr. 4/85		Date Completed Apr. 10		Core Size BQ		DIP TESTS				PROPERTY HAWKINS		PROJECT No. 261		N.T.S. No. 92P/15	
FIELD CO-ORDINATES				DEPTH		BEARING		ANGLE		SURVEYED CO-ORDINATES				Sheet 6 of 6	
Lot.		Elev.		Dip -50°		RECORDED	CORRECTED	RECORDED	CORRECTED	Lot.		Elev.		Dip	
Dep.		Length 96.32 m		Bearing 290°						Dep.		Length		Bearing	
From	To	Recovery	Description			Structure		% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS			
												Au(ppb)	Ag(ppm)	Cu (ppm)	MAG
			veinlets; there are also local pale br irreg. bleached and silic. patches; the unit is mod. magnetic and quite hard; ep to 15%; sm hbl diorite 81.28-81.48.			contact 50° to C.A. contact 45° to C.A.		dike		16058	83.00 - 85.30 (2.3 m)	<5	0.2	82	
85.30	87.94		Hornblende Diorite : as for 78.15 - 80.00 m			contact 65° to C.A. contact 45° to C.A.				16059	85.30 - 87.94 (2.64 m)	<5	0.2	32	4200 - 9500 6300 Avg.
87.94	96.32		Basalt pale-dk gr, v.f.g., intensely chl-ep altered, ep to 40-50%; unit is well-banded with alternating ep and chl bands, ep also occurs as irreg patches to 2 cm and as f. veinlets,			banding 45° to C.A.		Tr		16060	87.94 - 90.94 (3.0 m)	5	0.4	180	700 - 6300 2100 Avg.
			ep content appears to increase toward the bottom; the unit is very hard, possibly hornfelsed; mod. magnetic, py occurs as f. dissem grains; local zones contains numerous wh. silic grains to 2 mm, relic amygdules?							16061	90.94 -		0.2	220	
			:sm. ep altered hbl diorite			contacts 30° to C.A.				16062	93.94 - 96.32 (2.38 m)	5 10	0.2	160	

DRILL LOG - 81

Date April 1985 Logged By R. Baerg

NORANDA EXPLORATION COMPANY LTD.

Date Collared Apr. 12/85		Date Completed Apr. 20/85		Core Size BQ		DIP TESTS				PROPERTY HAWKINS		PROJECT No. 261		N.T.S. No. 92 P/15													
FIELD CO-ORDINATES				DEPTH		BEARING		ANGLE		SURVEYED CO-ORDINATES				Sheet 1 of 5													
Lat. 5050 E		Elev.		Dip -45°		132.28 m		RECORDED	CORRECTED	RECORDED	CORRECTED	Lat.		Elev.													
Dep. 4800 N		Length 132.28 m		Bearing 290°								Dep.		Length													
Dep.		Length		Bearing								Dep.		Length													
From (m)		To (m)		Recovery (%)		Description				Structure		% Sulph.		Est. Grade		SAMPLE No.		Width		ASSAYS							
																				Au(ppb)		Ag(ppm)		Cu(ppm)		MAG	
0.00		4.57		0		Overburden																				(X10 ⁻⁵ SI)	
4.57		13.71		95		Hornblende Diorite gry-gr, med g. hbl pheno's to 2 mm X 5 mm with interstitial anhed. fs grains, fs grains are weakly ser altered; and the hbl grains are locally chloritized; ep content ranges from 1-5% and increases toward the bottom; there are numerous sub-round to subang. f.g. dk gr chl frags to 2 cm; the unit is weakly calcareous and magnetic; py occurs as dissem. grains and sm irreg patches to 2 mm; lim. + ep occur on fractures.				2-3				16063		4.57 -		<5		0.2		90		900 -		2100	
														16064		7.57 (3.0m)		<5		0.2		52		2000 Avg.			
														16065		7.57 -		<5		0.2		82					
																10.57 (3.0m)		<5		0.2		82					
																13.71 (3.14m)		<5		0.2		82					
13.71		21.03		98		Amphibolite dk gry-blk; med-crse g.; hbl phenos to 3 X 10 mm in a variably calcareous chloritic ep-rich matrix; hbl pheno's coarsen toward the bottom and are weakly to mod chl altered; py occurs as dissem. grains throughout; unit is very magnetic; sm pale gry dike at 20.43 - 20.60 with approx. 5% py; lower contact is marked by a narrow silic zone with approx. 5% py.				3-5				16066		13.71 -		<5		0.4		220		2100 -		46,200	
														16067		16.71 (3.0m)		<5		0.4		140		12,600 Avg.			
														16068		16.71 -		<5		0.2		130					
														16069		19.71 (3.0 m)		<5		0.2		66					
																21.03 (1.32m)		<5		0.2		66					
																24.03		<5		0.2		66					
21.03		42.19		90		Hornblende Basalt mottled gr-gry, v.f.-f.g., local hbl pheno's to .5 X 2 mm, matrix is f.g. dk. gr chl with tr to 20% pale gr ep, ep also occurs as pale streaky bands, irreg patches and massive veins to 3 cm wide, the unit is distinctly banded with hbl phenos oriented parallel to the banding, the unit is weakly calcareous and is locally cut by 1-3 mm qtz-calc. veins, fract's commonly have dk gr chl ± ep, unit is locally non-magnetic to strongly magnetic; py occurs as v.f. dissem. grains and micro veinlets parallel to banding.				dike contacts at 40° to C.A. contact ? 35° to C.A.		banding 45° to C.A.		16070		24.03 -		70		0.8		420		800 -		12,600	
														16071		27.03		15		0.2		32		4200 Avg.			
														16072		27.03 -		<5		0.2		24					
														16073		30.03		<5		0.2		26					
																33.03		5		0.2		26					
																36.03		<5		0.2		40					
																36.03-39.03		5		0.2		40					

DRILL LOG - 81

Date Apr. 14/85 16074 36.03-39.03 5
 Logged By R. Baerg 16075 39.03-42.19 5
 0.2 40
 0.2 42

NORANDA EXPLORATION COMPANY LTD.

Date Collared Apr. 12/85		Date Completed		Core Size BQ		DIP TESTS				PROPERTY HAWKINS		PROJECT No. 261		N.T.S. No. 92 P/15	
FIELD CO-ORDINATES				DEPTH		BEARING		ANGLE		SURVEYED CO-ORDINATES					
Lat.		Elev.		Dip		RECORDED		CORRECTED		RECORDED		CORRECTED		Sheet 2 of 5	
Dep.		Length		Bearing						Dep.		Length		HOLE No. NH-85-3	
From (m)	To (m)	Recovery (%)	Description			Structure		% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS			
												Au(ppb)	Ag(ppm)	Cu(PPM)	MAG
42.19	44.26	100	Hornblende-Augite Basalt Breccia: med-crse g., med. gr. chl altered hbl phenos to 2X5 mm in a matrix of ep, chl and calc, approx. 60% ep, numerous subang dk-pale gr chl frags to 3 cm; calc occurs as irreg patches and veins with qtz ± py, the veins commonly are pink colored; banding is locally marked by parallel frags and/or hbl pheno's, py occurs as v.f. dissem. grains in the matrix and locally as coarse aggregates in vuggy qtz-calc veins; the strongly ep altered zones are non-magnetic but the weakly altered zones are strongly magnetic.			banding 40° to C.A.				16076	42.19 - 44.26 (2.07 m)	70	0.2	52	200 - 12,600 5000 Avg.
									Tr-5						
						contact 40° to C.A.									
44.26	47.48	95	Hornblende-Augite Basalt med. gry-gr, f.-med g.; hbl pheno's to 2X4 mm occur in an ep-chl matrix, ep approx. 20%; the unit is well banded with alternating chl, ep-rich zones; local vuggy calc-qtz veins to 3 mm, also local irreg patches of wh-pink qtz-calc with tr brn and cp; at 44.86 m; matrix chl varies from dk gr to pale gr, py occurs as dissem grains, hairline veinlets and local irreg patches, mod-str. magnetic.			banding 45° to C.A.				16077	44.26 - 47.26 (3.0 m)	850	0.6	400	2100 - 12,600 8400 Avg.
										16078	47.26 - 47.48 (.22 m)		0.2	62	
												10			
47.48	61.85	100	Hornblende-Augite Basalt Breccia: med-dk gr. v.f.-crse grained, hbl pheno's to 2X5 mm; unit is intensely ep ± chl altered, ep to 80%; with local zones of lesser alteration scattered throughout; breccia frags consist of crse hbl basalt and f.g. dk chl and are round to subang., unit is locally banded; copper-bronze colored mineral (digenite) ± cp ± bn occurs as scattered grains and irreg patches to 5X5 m associated with patches of wh-pink qtz-calc and/or vuggy calc veins; azurite locally occurs on fract's,			banding 40° to C.A.				16079	47.48 - 48.98	170	1.8	1100	200 - 12,600 4200 Avg.
										16080	48.98 - 50.48		2.8	1600	
								.5-1	.1% Cu	16081	50.48 - 51.98	110	0.6	260	
										16082	51.98 - 53.48	25	1.6	1000	
										16083	53.48 - 54.98	170	2.0	1100	
										16084	54.98 - 56.48	160	2.2	1600	

DRILL LOG - 81

there is also a pale blue soft mineral locally in the matrix;

Date April 12/85 Logged By R. Baerg

NORANDA EXPLORATION COMPANY LTD.

Date Collared Apr. 12/85		Date Completed		Core Size BQ		DIP TESTS				PROPERTY HAWKINS		PROJECT No. 261		N.T.S. No. 92P/15	
FIELD CO-ORDINATES				DEPTH		BEARING		ANGLE		SURVEYED CO-ORDINATES					
Lat.		Elev.		Dip		RECORDED	CORRECTED	RECORDED	CORRECTED	Lat.		Elev.		Dip	
Dep.		Length		Bearing						Dep.		Length		Bearing	
From (m)	To (m)	Recovery (%)	Description			Structure		% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS			
												Au(ppb)	Ag(ppm)	Cu(ppm)	MAG
			the strong ep zones are ngn to weakly magnetic whereas the weak ep zones are mod-strongly magnetic; fract's have pale gr ep and/or pale-dk gr chl; py locally occurs as dissem grains. dissem dig, cp, bn and py were observed in the matrix of the unit upon splitting, also locally abund. py on fract's.							16085	56.48 -	420	4.6	2800	
										16086	57.98 -	420	3.6	2500	
										16087	59.48 -	420	4.4	2800	
										16088	60.98 -	20	0.2	160	
										16089	61.85 -	15	0.2	54	2100 -
61.85	65.58	90	Andesite dk gry-gr; v.f.-med. g., local hbl pheno's to 1 mm; matrix is dk gr chl with 1-2% ep; local frags to 2 cm (same rock type), unit is locally fract with Qtz-calc filling the fract's; tr-1% py as f.-med. dissem grains, unit is locally fol; local Qtz calc veins contain approx 5% py with v.f.g. dk gr. chl; dk gr chl on fract's.			fol. 25° to C.A.		Tr1%		16090	64.85 -	15	0.2	50	14,700 -
											65.58				7300 Avg
65.58	75.91	98	Hbl-Aug. Basalt Bx med-dk gr, f.-med. g. hbl + Aug. pheno's to 3 mm common, matrix is approx. 60% dk gr chl 40% pale-bright gr ep.; chl-ep frags to 5 cm, subround to subang.; upper 50 cm is a			contact 30° to C.A.		Tr.5		16091	65.58 -	20	0.2	100	2100 -
										16092	68.58 -	100	0.6	480	20,000 -
											71.58				8400 Avg
			bleached gry with several py-rich vuggy Qtz-calc veins; wh. pink calc veins occur locally with minor brn and cpy; locally fol with frags oriented parallel to fol. ep decr. --> bottom.			fol. 35° to C.A.				16093	71.58 -	<5	0.2	120	
										16094	74.58 -	35	0.2	230	
											75.91				
75.91	81.40	100	Hbl-Felds. Porphyry Flow: gr-bl-gry, med-crse g hbl pheno's to 3 mm, fs altered to pale gr chl, dk gr chl occurs interstitial to the grains outlining the grain					Tr		16095	75.91 -	<5	0.2	16	600 -
			rims and as irreg patches; local zones with 5-10% f.g. ep are bleached to a pale gr; tr dissem py; dk gr chl ± py ± ser on fract's, rock is mod soft.							16096	78.91 -	<5	0.2	6	12,600 -
											81.40				8400 Avg

NORANDA EXPLORATION COMPANY LTD.

Date Collared Apr. 12/85		Date Completed		Core Size BQ		DIP TESTS				PROPERTY HAWKINS		PROJECT No. 261		N.T.S. No. 92P/15	
FIELD CO-ORDINATES				DEPTH		BEARING		ANGLE		SURVEYED CO-ORDINATES				Sheet 4 of 5	
Lat.		Elev.		Dip		RECORDED		CORRECTED		RECORDED		CORRECTED		HOLE No.	
Dep.		Length		Bearing						Dep.		Length		NH-85-3	
From (m)	To (m)	Recovery (%)	Description	Structure	% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS						
									Au (ppb)	Ag (ppm)	Cu (ppm)	MAG			
81.40	85.65	95	Hbl-Fs Andesite gry, v.f.-f. g., locally fragmental; hbl pheno's to 3 mm are altered to dk gr chl ± ep; matrix if v.f.g. gry with local mottled gr ep approx. 10% ep; bleached silic-py zone at 83.44-84.12 m, approx. 5% py; local 1-2 mm Qtz-calc veins ± tr py; tr dissem py; dk. gr. chl ± py ± calc on fract's; rock is mod hard.				16097	81.40 -	20	0.2	16	1900 -			
								84.40			4200				
							16098	84.40 -	<5	0.2	2	1000 Avg.			
							16099	85.65 -	60	0.2	110				
								88.65							
85.65	95.96	95	Hbl-Basalt dk gr-gry, f.-crse g. locally porphyritic, extensive ep alteration of fs grains and chl alteration of hbl grains, ep approx. 20%, matrix is predom. dk gr chl; ep locally forms massive zones to 10 cm wide; py occurs as tr dissem grains and as fract coatings with dk gr chl; unit is strongly magnetic and interm. hardness; tr hem after magn.			Tr.	16100	88.65 -	55	0.2	20	4200 -			
								91.65			42,000				
							16101	91.65 -	<5	0.2	100	15,000			
								94.65				Avg.			
							16102	94.65 -	<5	0.2	2				
								95.96							
							16103	95.96 -	<5	0.2	6				
								98.96							
95.96	100.42	98	Andesite dk gr-gry, v.f.g., uniform f.g. unit with local 2-5 mm ep veins, one 20 cm mottled gr ep zone; dk gr chl ± hem on fract's; tr py as dissem grains.			Tr.	16104	98.96 -	20	0.2	18	400 -			
								100.42			7000				
							16105	100.42 -	30	0.2	84	1200 Avg.			
								103.42							
100.42	115.46	85	Andesite and Breccia gry-dk gr, v.f.g.; local heterolithic bx, frags composed of round to ang. f.g. chloritic and., ep, and chloritic spherulitic volcanics, frags contain 3-5% dissem py, py also locally forms rims around the frags and around the spherulites; py is also common on fract's; local pale gr. bleached zones with approx. 20% ep; minor calc occurs in the bx zones; also local pale gry silic zones with 5-7% v.f. dissem py.			3-5	16106	103.42 -	20	0.2	80	500 -			
								106.42			19000				
							16107	106.42 -	15	0.2	34	2100 Avg.			
								109.42							
							16108	109.42 -	5	0.2	50				
								112.42							
							16109	112.42 -	30	0.4	140				
								115.46							

NORANDA EXPLORATION COMPANY LTD.

Date Collared		Date Completed Apr. 20/85		Core Size		DIP TESTS				PROPERTY HAWKINS		PROJECT No. 261		N.T.S. No. 92P/15	
FIELD CO-ORDINATES				DEPTH		BEARING		ANGLE		SURVEYED CO-ORDINATES					
Lat.		Elev.		Dip		RECORDED	CORRECTED	RECORDED	CORRECTED	Lat.		Elev.		Dip	
Dep.		Length		Bearing						Dep.		Length		Bearing	
From (m)	To (m)	Recovery (%)	Description		Structure	% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS					
										Au (ppb)	Ag (ppm)	Cu (ppm)	MAG		
115.46	121.92	80	Andesite pale gry; v.f.g., locally spherulitic text.; local 1-2 cm zones of ep alteration, one sm zone of hbl porphyry at 116.95 m; unit has approx. 5% v.f.g. dissem py, py also			5		16110	115.46 -	70	0.6	200	100 -		
			16111	118.46 -				40	0.2	60	6300 -				
			locally forms rims around spherulites; dk gr chl and py occur in fract's.												
121.92	132.28	75	Hbl Andesite dk gr-gry, v.f.-med g.; extremely broken unit; locally abund. qtz ± calc veining with dk gr chl and crse subhed py; matrix is dk gr chl ± ep to 5%, local hbl pheno's to 3 mm; local monolithic fragmental zones, one sm zone of pale gry pyritic and. at 127.90; tr dissem. py, py also occurs on fract's with dk gr chl ± calc.			Tr-1		16112	121.92 -	25	0.2	54	2100 -		
			16113	124.92 -				35	0.2	44	6300 -				
								16114	127.92 -	25	0.2	80			
								16115	130.92 -	15	0.2	8			
									132.28						

NORANDA EXPLORATION COMPANY LTD.

Date Collared Apr. 22/85		Date Completed		Core Size BQ		DIP TESTS				PROPERTY HAWKINS		PROJECT No. 261		N.T.S. No. 92P/15		
FIELD CO-ORDINATES				DEPTH		BEARING		ANGLE		SURVEYED CO-ORDINATES						
Lat. 4600N		Elev.		Dip -45°		RECORDED	CORRECTED	RECORDED	CORRECTED	Lat.		Elev.		Dip		
Dep. 5125E		Length 91.44 m		Bearing 290°						Dep.		Length		Bearing		
From (m)	To (m)	Recovery (%)	Description			Structure	% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS					
											Au(ppb)	Ag(ppm)	Cu(ppm)	MAG		
00.00	5.18	0	Overburden													X10 ⁻⁵ SI
5.18	7.28	95	Diorite-Andesite Bx: gry, v.f.-f.g., frags to 3 cm; the frags are pale gr-gry and are v. silic and have inter-frag Qtz-calc and/or diorite with approx. 1-2% py; local 10-20 cm zones of massive diorite with approx. 5% py; the diorite is weakly chl altered, some of the frags are weakly ep-chl altered; chl, ep, lim [±] py occurs on fract's.				3-5	16116	5.18 - 7.28	<5	0.2				4200 - 6300	
7.28	11.96	95	Andesite Bx: dk gr-gry, v.f.g.; and to subang frags to 5 cm; unit is v. hard, possibly hornfelsed, frags are a bleached gry and v. silic; matrix is a f.g. dk gr chl with local chl grains after hbl and minor ep; the chl and ep grains show a preferred orient; py occurs as dissem f. grains and sm irreg patches to 2 mm; minor Qtz-calc veinings; dk gr chl, ep, lim [±] py on fract's.			fol 40° to C.A.	2-3	16117	7.28 - 10.28	<5	<0.2				200 - 3200	
11.96	13.37	100	Diorite gry, med.g., hbl's altered to dk gr chl, grains are anhedral; py occurs as dissem. grains; dk gr chl + lim on fract's.				3-5	16118	10.28 - 11.96	10	<0.2				1300 Avg	
13.37	24.25	85	Hbl-Aug. Basalt Hornfels dk gr, v.f. - med g.; from 13.37-14.37 is a bx as for 7.28-11.96 m; f.g. hbl locally has a preferred orientation, pale gr ep occurs in irreg. mottled zones with dk gr chl, ep also forms local hairline to 2 cm veins; the fract's have abund py with dk gr chl [±] calc, the unit is locally strongly fract; local pink Qtz-calc veins [±] ep; the unit appears to have been hornfelsed, it is very hard;			contact 55° to C.A.		16119	11.96 - 13.37	640	<0.2				400 - 3200	
								16120	13.37 - 16.37	35	<0.2				1700 Avg	
								16121	16.37 - 19.37	20	<0.2				200 - 17000	
						fol 45° to C.A.	1-2	16122	19.37 - 22.37	20	<0.2				6300 Avg	
								16123	22.37 - 24.25	20	<0.2					

DRILL LOG - 81

10-15% ep.

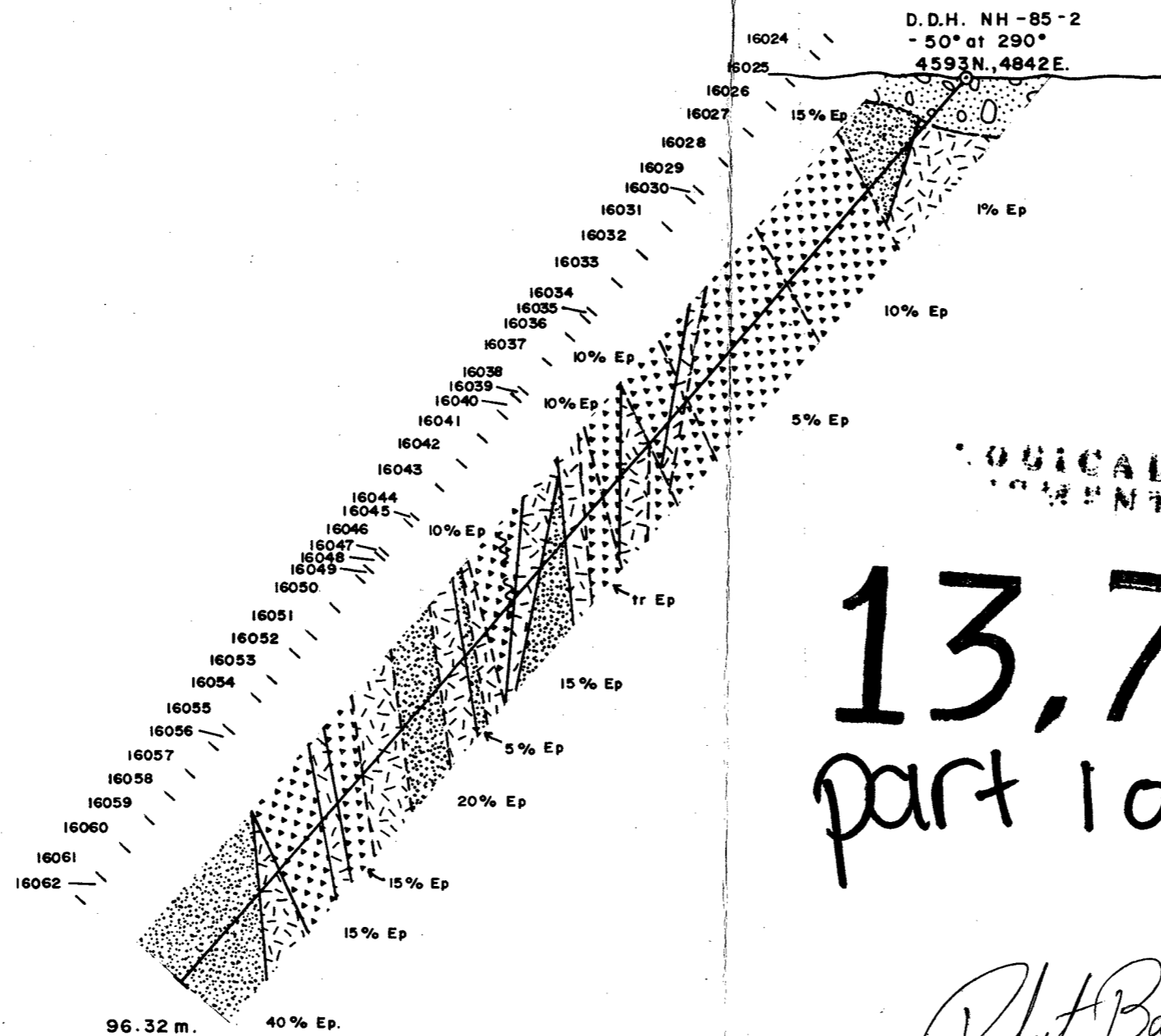
Date Apr. 23-25 Logged By R. Baerg

NORANDA EXPLORATION COMPANY LTD.

Date Collared Apr. 22/85		Date Completed		Core Size BQ		DIP TESTS				PROPERTY HAWKINS		PROJECT No. 261		N.T.S. No. 92P/15	
FIELD CO-ORDINATES				DEPTH		BEARING		ANGLE		SURVEYED CO-ORDINATES				Sheet 2 of 3	
Lat. 4600N		Elev.		Dip -45°		RECORDED	CORRECTED	RECORDED	CORRECTED	Lat.		Elev.		Dip	
Dep. 5125E		Length 91.44		Bearing 290°						Dep.		Length		Bearing	
From (m)	To (m)	Recovery (%)	Description	Structure	% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS						
									Au (ppb)	Ag (ppm)	Cu (ppm)	MAG			
24.25	46.33	95	Spotted Hbl-Aug Basalt Hornfels: dk gr-gry; v.f.-med. g.; chloritic hbl-aug pheno's to 3 mm are common and show a preferred orient (flow banding?); the matrix is v.f.g. dk gr chl with 10 to locally 40% ep. local fract. zones have increased ep and are bleached; ep zones locally have pink qtz-calc veins to 2 mm; the spots are irreg patches of wh. qtz ± calc (amygd?), the patches commonly have f. ep rims, locally the patches as well as hbl-aug grains are replaced by ep and/or bleached to a v. pale gry; the spotting is scattered throughout with local intense zones i.e. 31.00-34.43m, 36.58-37.34 m, 43.06-44.20.	banding 40° to C.A.	Tr.5		16124	24.25 -	<5	<0.2		2100 -			
								27.25			6300				
							16125	27.25 -	<5	<0.2		4400 Avg			
								30.25							
							16126	30.25 -	55	<0.2					
								33.25							
							16127	33.25 -	50	<0.2					
								36.25							
							16128	36.25 -	5	<0.2					
								39.25							
							16129	39.25 -	<5	<0.2					
								42.25							
46.33	91.44	90	Hbl-Aug Basalt dk gr-gry, v.f.-med. g. hbl-aug. pheno's to 3 mm locally; matrix is predom. f.g. dk gr chl in the upper part with a general incr. in ep toward the bot., the most intense ep is often assoc. with the coarser grained zones, ep also occurs as 1-10 mm wide veins and irreg. patches; local vuggy qtz-calc veins; the unit is locally strongly fract. and is locally banded with mafic grains and local sm ang dk gr chl frags showing a preferred orient.; py occurs as f. dissem. grains and locally on fract's with dk gr chl ± ep, approx 20% ep overall. : from 83.52-83.70 is a chloritic hbl fs porphyry flow similar to NH-85-3. :from 79.86 to 91.44 m there is an incr. in hem on fract's and in local qtz-calc veins and an incr. in py on fract's.	banding 40-45° to C.A.	Tr		16130	42.25 -	10	<0.2					
								45.25							
							16131	45.25 -	<5	<0.2					
								46.33							
							16132	46.33 -	10	<0.2					
								49.33							
							16133	49.33 -	20	<0.2					
								52.33							
							16134	52.33 -	10	<0.2		300 -			
								55.33				21,000			
							16135	55.33 -	10	<0.2		12,600			
								58.33				Avg.			
							16136	58.33 -	5	<0.2					
								61.33							
							16137	61.33 -	35	<0.2					
								64.33							
							16138	64.33 -	<5	<0.2					
								67.33							
							16139	67.33 -	5	<0.2					
								70.33							

NORANDA EXPLORATION COMPANY LTD.

Date Collared		Date Completed		Core Size		DIP TESTS				PROPERTY		PROJECT No.		N.T.S. No.	
FIELD CO-ORDINATES				DEPTH	BEARING		ANGLE		SURVEYED CO-ORDINATES				Sheet 3 of 3		
Lat.		Elev.			Dip		RECORDED	CORRECTED	RECORDED	CORRECTED	Lat.		Elev.		Dip
Dep.		Length		Bearing						Dep.		Length		Bearing	
From	To	Recovery	Description	Structure	% Sulph.	Est. Grade	SAMPLE No.	Width	ASSAYS						
									Au(ppb)	Ag(ppm)	Cu(ppm)	MAG			
							16140	70.33 -	<5	<0.2					
							16141	73.33 -	10	<0.2					
							16142	76.33 -	10	<0.2					
							16143	79.33 -	<5	<0.2					
							16144	82.33 -	<5	<0.2					
							16145	85.33 -	<5	<0.2					
							16146	88.33 -	10	<0.2					
								91.44							



13,751
part 1 of 2

*Robert Baerg
June 17/85*

LEGEND

ROCK TYPES

- Overburden
- Basalt, local hornblende porphyry
- Hornblende-Augite Basalt
- Hornblende-Augite Basalt Breccia
- Andesite
- Hornblende-Feldspar Andesite
- Hornblende Diorite
- Amphibolite

- brn bornite Ep epidote
- Cpy chalcopyrite py pyrite
- dg digenite tr trace

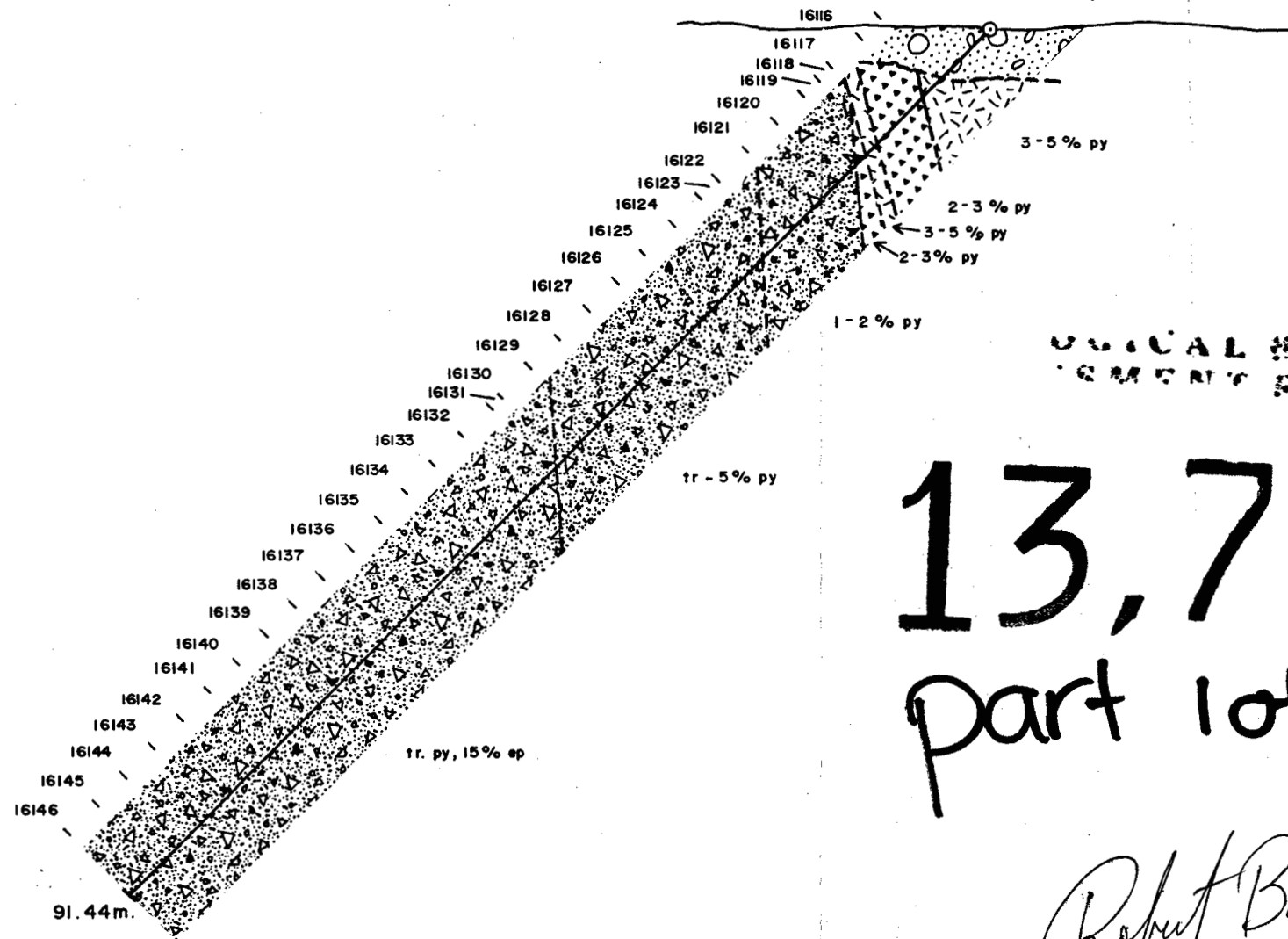
SYMBOLS

- Geologic contact defined / inferred
- D.D.H. location
- Fault



REVISED	HAWKINS - ALCLARE OPT.
	D.D.H. NH 85 - 2
	Cross Section
	Looking Az. 020°
PROJ. No. 261	SURVEY BY: R. BAERG DATE: APRIL, 1985
N.T.S. 92P/15	DRAWN BY: S. K. B. SCALE: 1:500
DWG. No.	NORANDA EXPLORATION
Fig. 10	OFFICE: PRINCE GEORGE, B.C.

D.D.H. NH-85-4
 - 45 at 290°
 4600N., 5125 E.



LOCAL BRANCH
 GEM REPORT

13,751
 part 1 of 2

*Robert Baerg
 June 17/85*

LEGEND

ROCK TYPES

- Overburden
- Basalt, local hornblende porphyry
- Hornblende-Augite Basalt
- Hornblende-Augite Basalt Breccia
- Andesite
- Hornblende-Felspar Andesite
- Hornblende Diorite
- Amphibolite

- brn bornite Ep epidote
- Cpy chalcopyrite py pyrite
- dg digenite tr trace

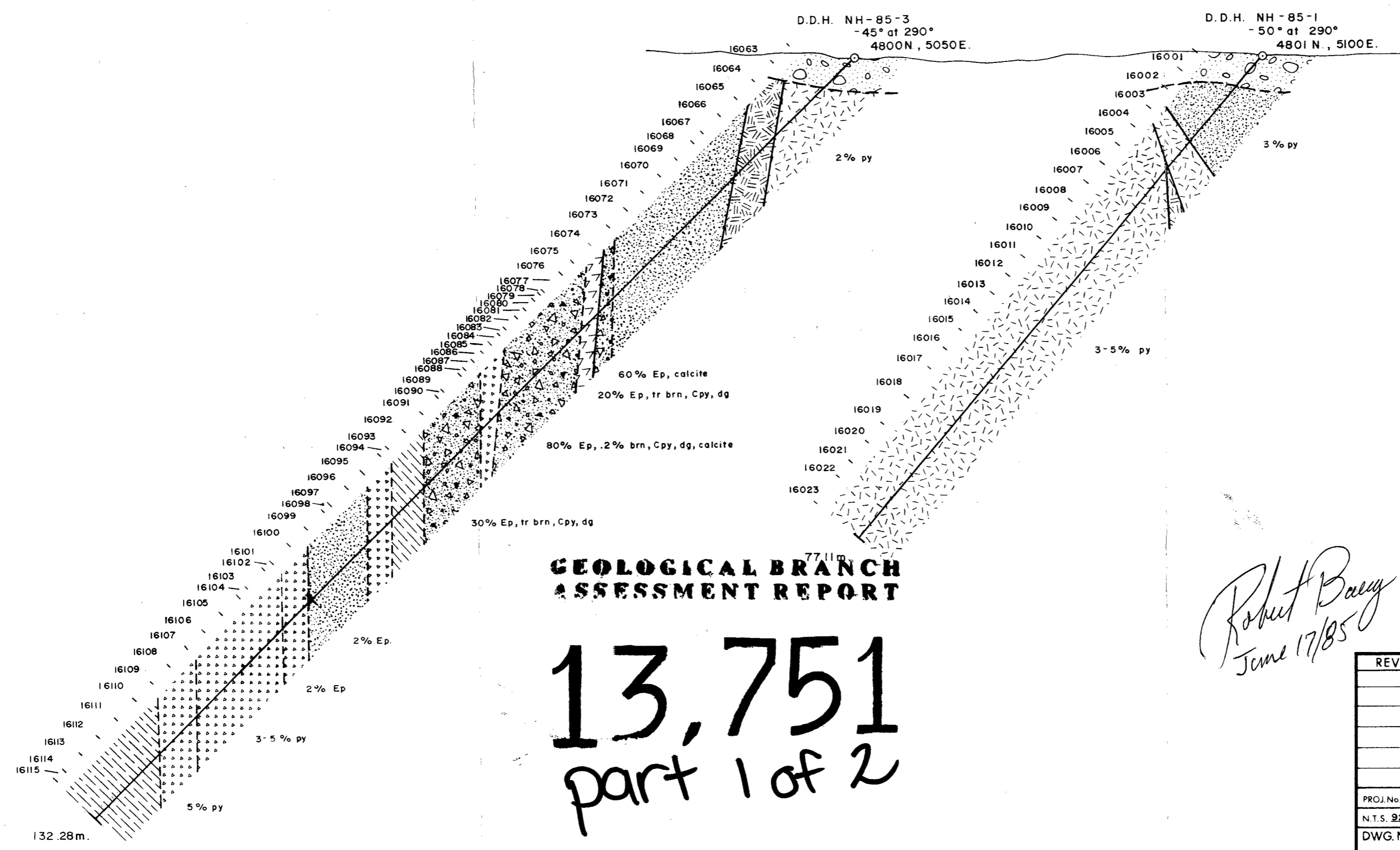
SYMBOLS

- Geologic contact defined / inferred
- D.D.H. location
- Fault



REVISED	HAWKINS - ALCLARE OPT.	
	D.D.H. NH 85 - 4	
	Cross Section	
	Looking Az. 020°	
PROJ.No. 261	SURVEY BY: R. BAERG	DATE: APRIL 1985
N.T.S. 92P/15	DRAWN BY: S.K.B.	SCALE: 1:500
DWG.No.	NORANDA EXPLORATION	
Fig. 11	OFFICE: PRINCE GEORGE, B.C.	

VANICAL 11925



**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

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part 1 of 2

Robert Baerg
June 17/85

LEGEND

ROCK TYPES

- Overburden
 - Basalt, local hornblende porphyry
 - Hornblende-Augite Basalt
 - Hornblende-Augite Basalt Breccia
 - Andesite
 - Hornblende-Feldspar Andesite
 - Hornblende Diorite
 - Amphibolite
- brn bornite Ep epidote
Cpy chalcopyrite py pyrite
dg digenite tr trace

SYMBOLS

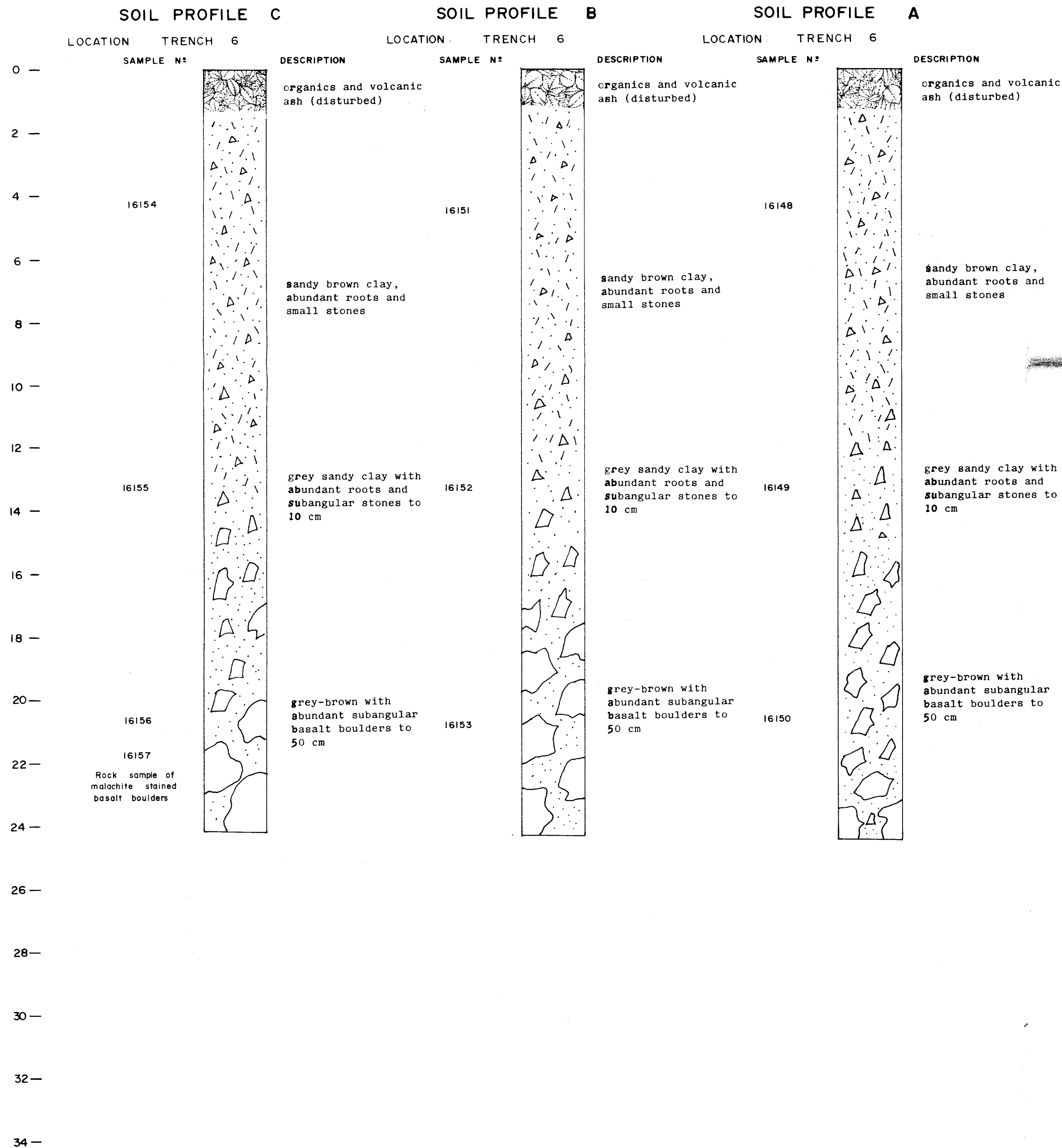
- Geologic contact defined / inferred
- D.D.H. location
- Fault



REVISED	HAWKINS - ALCLARE OPT.	
	D.D.H.'s NH 85-1 and 3 Cross Section Looking Az. 020°	
PROJ. No. 261	SURVEY BY: R. BAERG	DATE: APRIL, 1985
N.T.S. 92P/15	DRAWN BY: S.K.B.	SCALE: 1:500
DWG. No.	NORANDA EXPLORATION	
Fig. 9	OFFICE: PRINCE GEORGE, B.C.	

P.J.A.

13,751
part 1 of 2



LEGEND

- Leaves, twigs, organic material
- Angular rock fragments
- Roots
- Clay
- Buff volcanic ash
- Bedrock - volcanics

TABLE OF GEOCHEM ASSAYS

SAMPLE N°	Cu(ppm)	Au(ppb)	Ag(ppm)	As(ppm)
16148	120	10	0.8	
16149	660	50	0.8	
16150	420	10	0.8	
16151	220	10	1.0	
16152	530	20	0.6	
16153	240	10	0.6	
16154	100	10	0.8	
16155	630	10	0.8	
16156	450	10	1.0	
16157	800	40	0.6	

*Robert Bay
June 17/85*



REVISED	HAWKINS LAKE PROPERTY ALCLARE RES. OPTION	
	TRENCH 6 SOIL PROFILE A,B,C	
PROJ. No. 2-61	SURVEY BY: R. BAERG	DATE: MAY / 1985
N.T.S. 92P/15	DRAWN BY: S. K. B.	SCALE: 1:10
DWG. No.	NORANDA EXPLORATION	
FIG. 6	OFFICE: PRINCE GEORGE, B.C.	

SOIL PROFILE C

SOIL PROFILE B

SOIL PROFILE A

LOCATION TRENCH 7

LOCATION TRENCH 7

LOCATION TRENCH 7

0 —
2 —
4 —
6 —
8 —
10 —
12 —
14 —
16 —
18 —
20 —
22 —
24 —
26 —
28 —
30 —
32 —
34 —

SAMPLE N°

DESCRIPTION

SAMPLE N°

DESCRIPTION

SAMPLE N°

DESCRIPTION

16492

disturbed organics, ash, soil

brown sandy clay, abundant roots, angular to subangular rocks to 50 cm

16175

disturbed organics, ash, soil

brown sandy clay, abundant roots, angular to subangular rocks to 50 cm

16171

disturbed organics, ash, soil

brown sandy clay, abundant roots, angular to subangular rocks to 50 cm

16493

grey-grown, sandy gravel, minor clay, broken basalt bedrock

16490

grey-grown, sandy gravel, minor clay, broken basalt bedrock

16172

grey-grown, sandy gravel, minor clay, broken basalt bedrock

16494

Hornblende-Augite Basalt

16491

Hornblende-Augite Basalt

16173

Hornblende-Augite Basalt

LEGEND


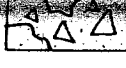
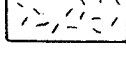
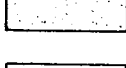
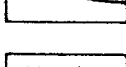
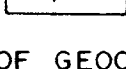
-  Leaves, twigs, organic material
-  Angular rock fragments
-  Roots
-  Clay
-  Buff volcanic ash
-  Bedrock - volcanics

TABLE OF GEOCHEM ASSAYS

SAMPLE N°	Cu(ppm)	Au(ppb)	Ag(ppm)	As(ppm)
16171	160	10	0.4	
16172	430	10	0.4	
16173	640	20	0.4	
16175	150	10	0.4	
16490	240	10	0.4	
16491	46	10	0.2	
16492	90	10	0.4	
16493	120	10	0.2	
16494	62	10	0.4	

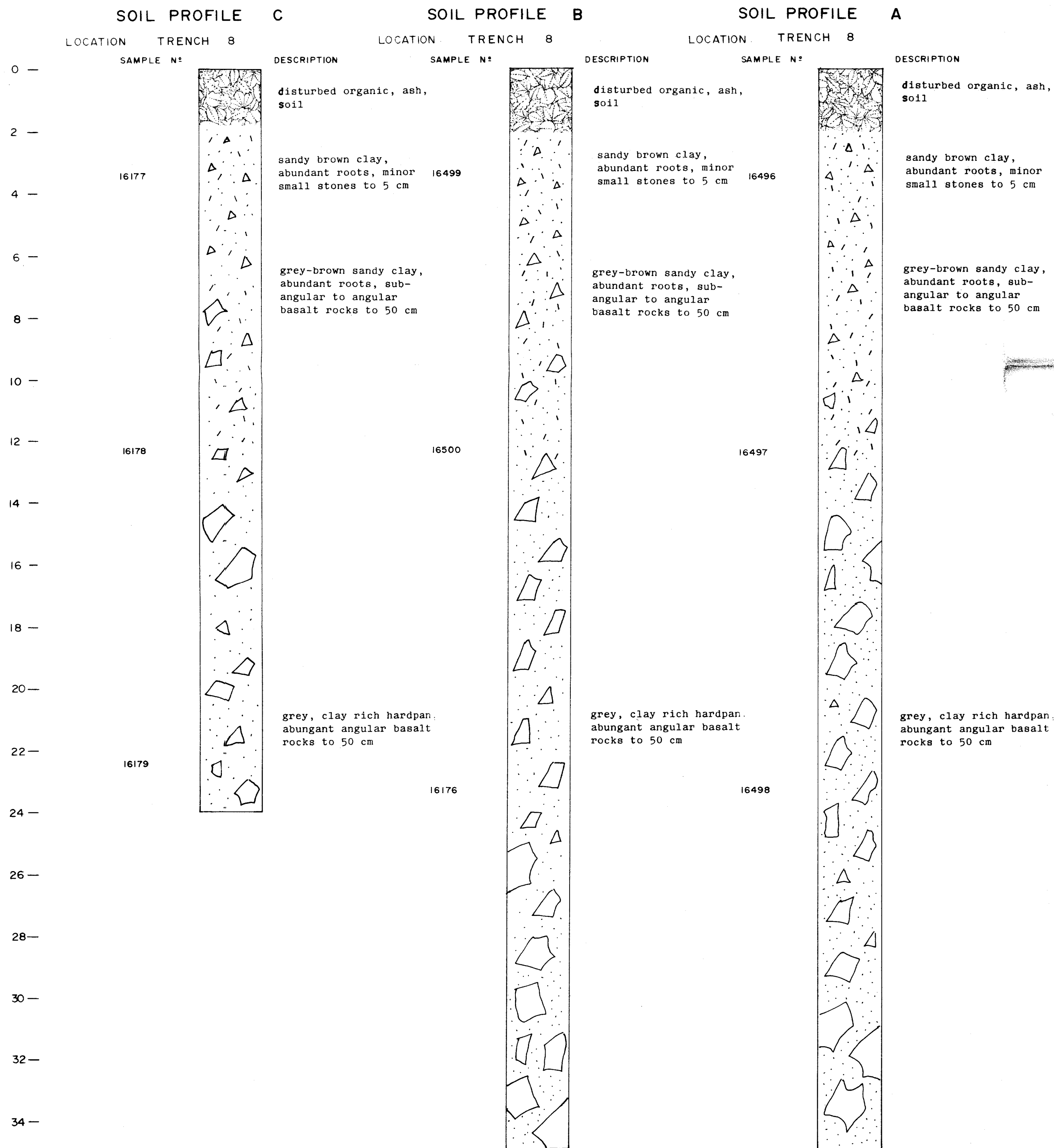
GEOLOGICAL BRANCH ASSESSMENT REPORT

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part 1 of 2

*Robert Baerg
June 17/85*

0 10 20 40 60 80 cm.
SCALE: 1:10

REVISED	HAWKINS LAKE PROPERTY ALCLARE RES. OPTION	
	TRENCH 7 SOIL PROFILE A,B,C	
PROJ. No. 2-61	SURVEY BY: R. BAERG	DATE: MAY / 1985
N.T.S. 92P/15	DRAWN BY: S K B	SCALE: 1:10
DWG. No.	NORANDA EXPLORATION	
FIG. 7	OFFICE: PRINCE GEORGE, B.C.	



LEGEND

- Leaves, twigs, organic material
- Angular rock fragments
- Roots
- Clay
- Buff volcanic ash
- Bedrock - volcanics

TABLE OF GEOCHEM ASSAYS

SAMPLE N°	Cu(ppm)	Au(ppb)	Ag(ppm)	As(ppm)
16176	270	10	0.6	
16177	120	10	0.4	
16178	170	10	0.2	
16179	200	30	0.2	
16496	50	10	0.4	
16497	180	10	0.4	
16498	210	10	0.2	
16499	76	10	0.4	
16500	180	40	0.2	

**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

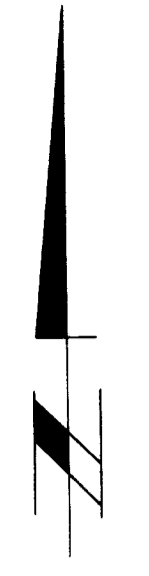
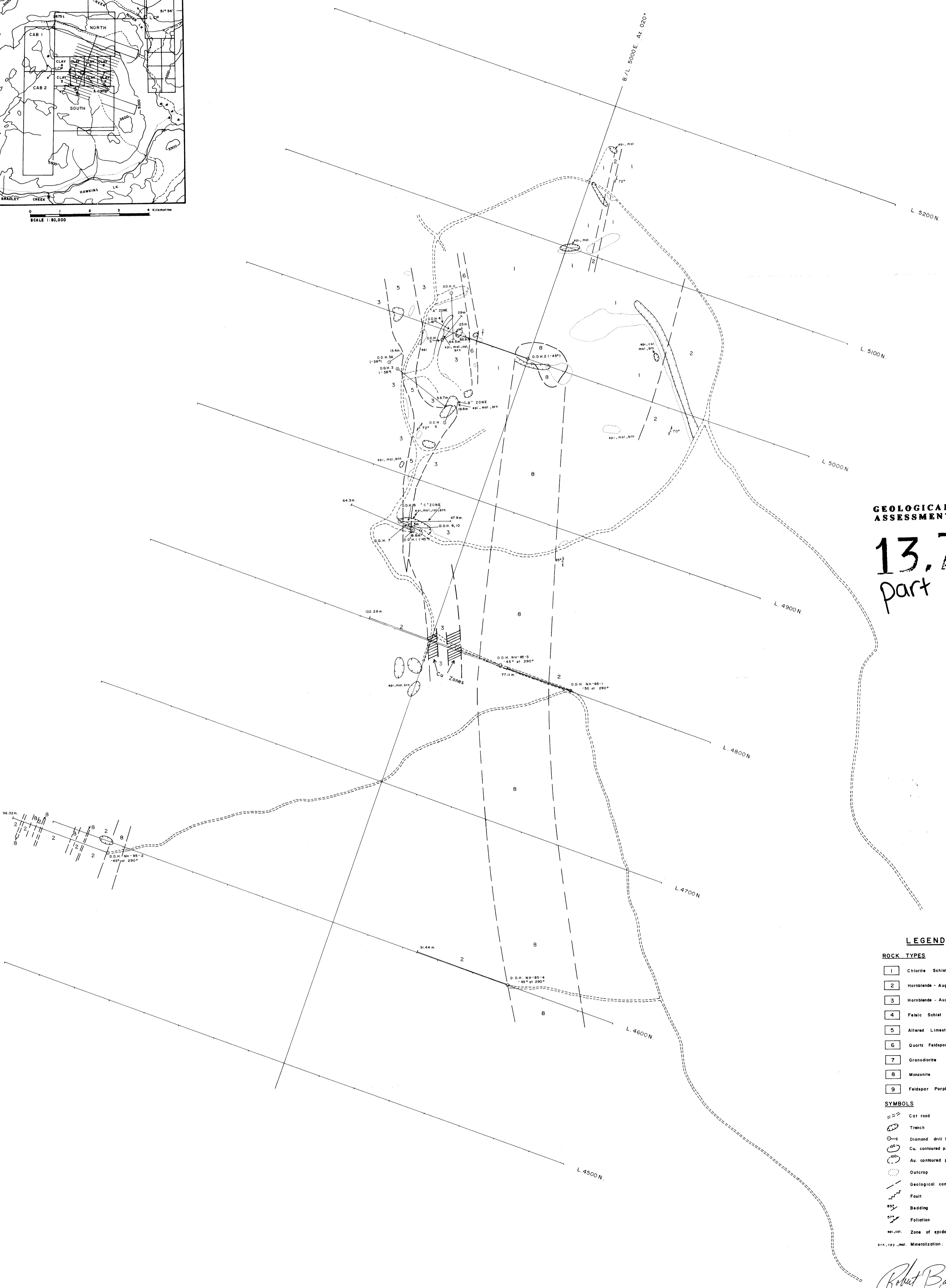
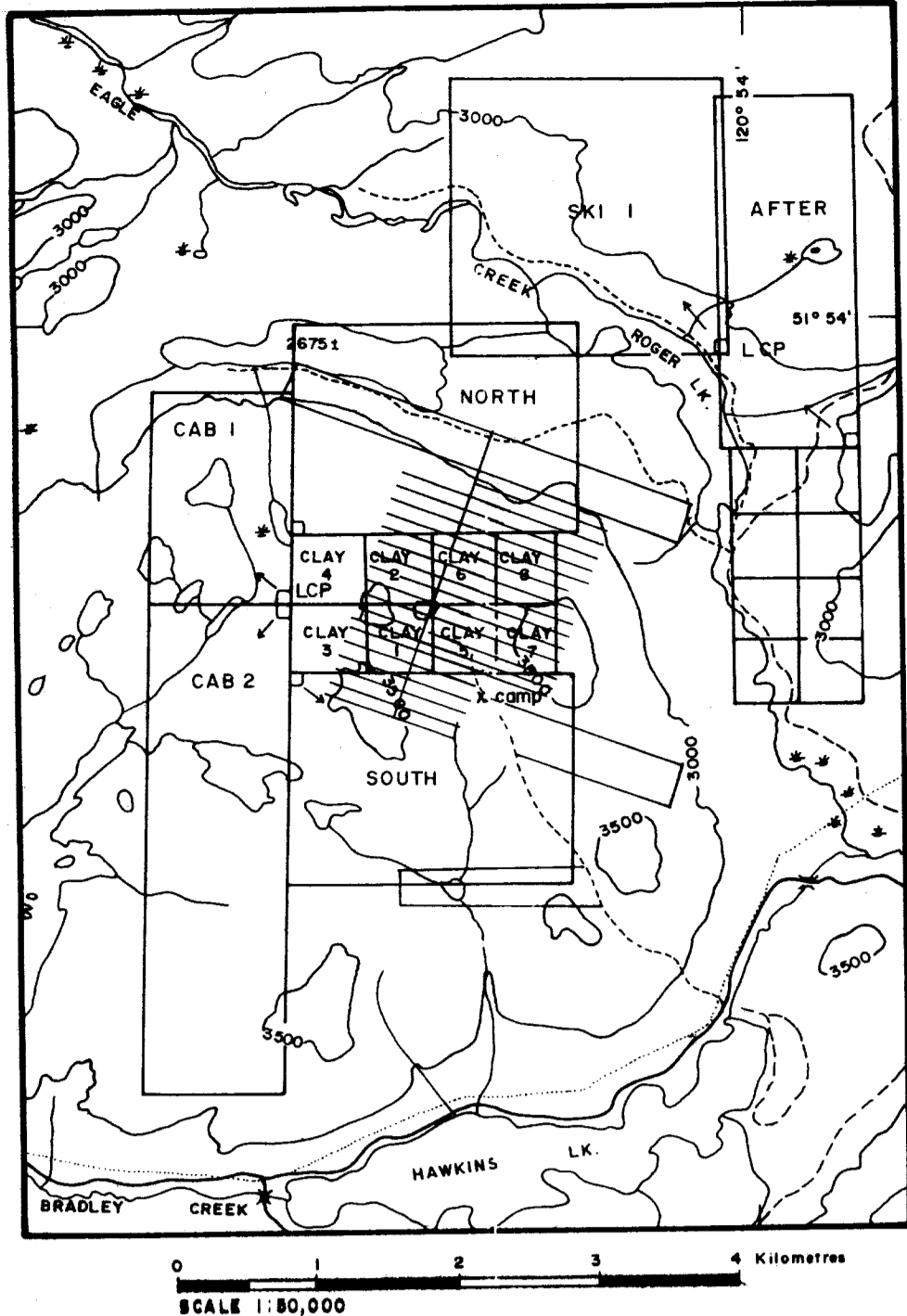
13,751
part 2

*Robert Baerg
June 17/85*



REVISED	HAWKINS LAKE PROPERTY ALCLARE RES. OPTION	
	TRENCH 8 SOIL PROFILE A,B,C	
PROJ. No. 2-61	SURVEY BY: R. BAERG	DATE: MAY / 1985
NTS. 92P/15	DRAWN BY: S. K. B.	SCALE: 1:10
DWG No.	NORANDA EXPLORATION	
FIG. 8	OFFICE: PRINCE GEORGE, B.C.	

LOCATION MAP



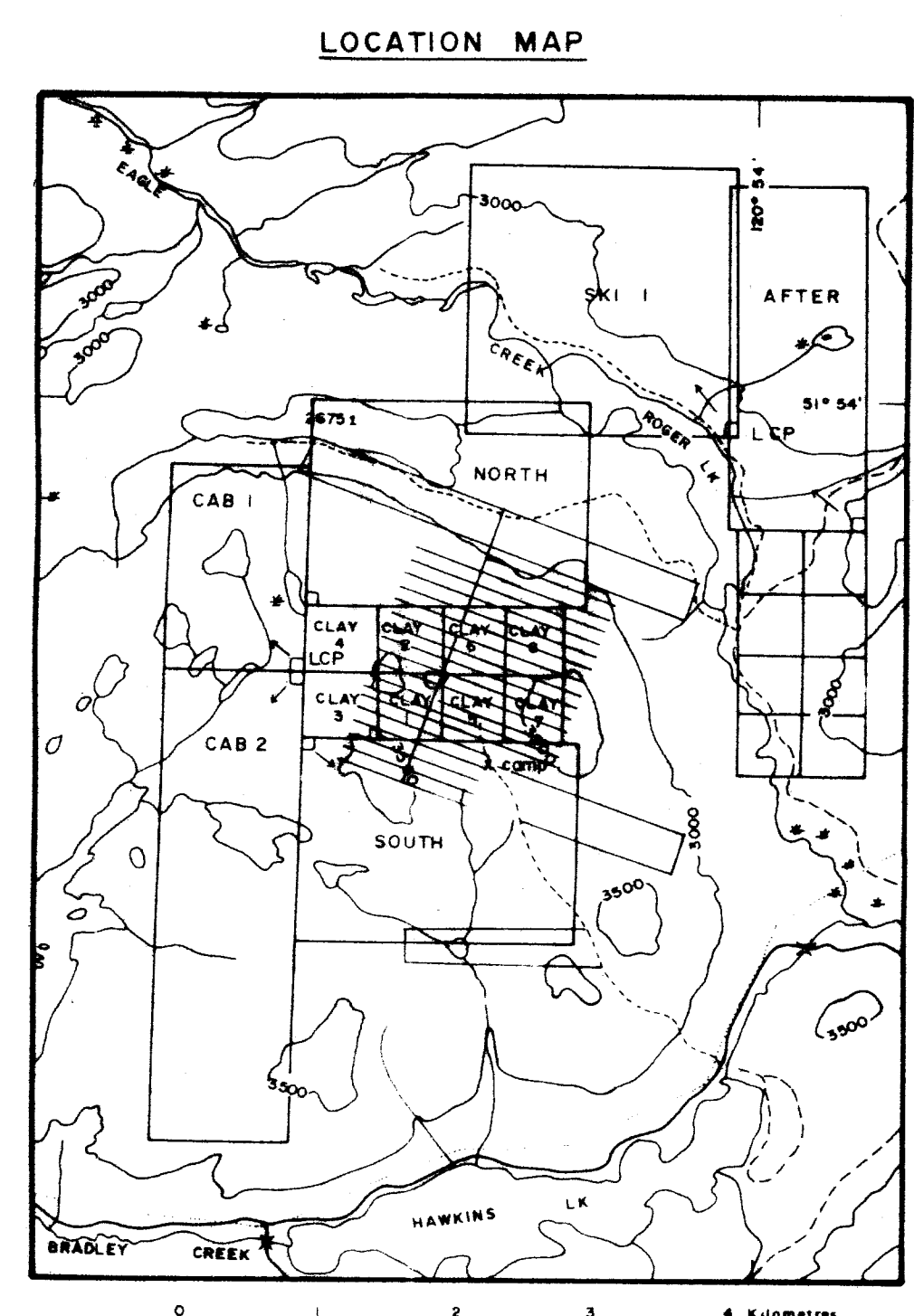
**GEOLOGICAL BRANCH
ASSESSMENT REPORT**
13,751
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LEGEND

- ROCK TYPES**
- 1 Chlorite Schist
 - 2 Hornblende - Augite Basalt and Andesite
 - 3 Hornblende - Augite Basalt Breccia
 - 4 Felsic Schist
 - 5 Altered Limestone
 - 6 Quartz Feldspar Chlorite Schist
 - 7 Granodiorite
 - 8 Monzonite
 - 9 Feldspar Porphyry Dykes
- SYMBOLS**
- Cat road
 - Trench
 - Diamond drill hole
 - Cu. contoured p.p.m.
 - Au. contoured p.p.m.
 - Outcrop
 - Geological contact
 - Fault
 - Bedding
 - Foliation
 - epi. cal. Zone of epidote, calcite, alteration
 - Mineralization: Bornite, Chalcocopyrite, Malachite

Robert Bay
June 17/85

REVISED	HAWKINS LAKE - ALCLARE RES. INC.
	DETAIL GEOLOGY OF THE KNOB SHOWINGS AND 1985 D.D.H. LOCATIONS
PROJ. No. 81	SURVEY BY: R. Bay, T. Lewis DATE: APRIL, 1985
N.T.S. 927/15	DRAWN BY: S.K.B. SCALE: 1:1000
DWG. No.	NORANDA EXPLORATION
FIG. 5	OFFICE: PRINCE GEORGE, B.C.



**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

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LEGEND

- ROCK TYPES -**
- JURASSIC OR OLDER**
- 1 Chlorite Schist, dark green with weakly developed foliation
 - 2 Hornblende Basalt, hornblende phenocrysts in a chlorite and/or epidote matrix
 - 3 Hornblende Basalt Breccia, monolithic subangular hornblende basalt fragments in an epidote and/or chlorite matrix
 - 4 Felsic Schist, buff colored, fine grained rhyolite, with a weakly developed foliation
 - 5 Altered Limestone, foliated, grey limestone, with epidote banding
 - 6 Quartz-feldspar chlorite schist

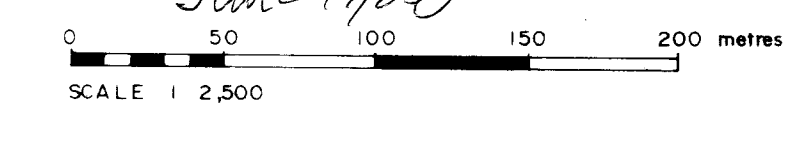
- INTRUSIVES**
- 7 Granodiorite, 7% Clinor
 - 8 Monzonite, and Monzonite dyke
 - 9 Feldspar Porphyry Dyke
 - 10 Hornblende
 - 11 Hornblende Porphyry Dyke
- a Amphibole hb Hornblende
 brn Biotite hm Hematite
 cal Calcite lim Limestone
 chl Chlorite mel Melanite
 cpy Chalcopyrite py Pyrite
 ep Epidote tr Traces

- SYMBOLS**
- Lake
 - Outcrop
 - L.C.P. and claim boundary
 - ▲ Floor
 - Cell road
 - Geological contact
 - Trench
 - Fault
 - Diamond drill hole
 - Bedding
 - ▲ Swamp
 - Foliation

ROCK SAMPLE ASSAYS

SAMPLE #	TRENCH #	Cu (ppm)	Ag (ppm)	Au (ppm)	Au (ppb)
16167	Tr. #1				
39364	Tr. #2	1300	1.4	<2	350
39369	Tr. #3	260	0.8	<2	10
39370	Tr. #3	12000	6.2	<2	1300
39372	Tr. #4	200	0.4	<2	10
39373	Tr. #4	60	0.2	<2	10
39374	Tr. #4	86	0.4	<2	20
39375	Tr. #4	320	0.6	<2	30
39382	Tr. #4	360	0.4	<2	60
39383	Tr. #4	260	0.4	<2	20
39384	Tr. #4	120	0.4	<2	10
39385	Tr. #5	100	0.2	2	10
39389	Tr. #5	58	0.2	2	10
39390	Tr. #6	800	0.6	—	20
16157	Tr. #6	630	0.4	—	10
16173	Tr. #7	820	0.6	—	70
16163	Tr. #7	6	0.2	—	10
16491	Tr. #7	16	0.2	—	10
16494	Tr. #7	62	0.4	—	10
16495	Tr. #7	54	0.4	—	10
16147	Tr. #8	—	1.0	—	10
16158	Tr. #8	800	1.4	—	10
16159	Tr. #8	740	1.2	—	40
16160	Tr. #8	300	0.8	—	10
16161	Tr. #8	120	0.2	—	10
16162	Tr. #8	14	0.4	—	10
16164	Tr. #8	8	0.2	—	10
16165	Tr. #8	180	0.4	—	10
16166	Tr. #8	220	0.2	—	100
16168	Tr. #8	1100	1.6	—	130
16169	Tr. #8	74	0.8	—	10
16170	Tr. #8	34	0.4	—	10
16180	Tr. #8	—	0.2	—	20
16181	Tr. #8	—	0.2	—	30
16182	Tr. #8	—	0.2	—	10
16183	Tr. #8	—	0.2	—	10
16184	Tr. #8	—	0.2	—	10
16185	Tr. #8	—	0.2	—	50
16186	Tr. #8	—	0.2	—	10
55259	Tr. #8	—	1.0	—	10

Robert Bray
June 1985



REVISED	HAWKINS LAKE - ALCARE RES. INC.
	GEOLOGY AND TRENCHING
PROJ. No. Z-61	SURVEY BY: R. BAERG, T. LEWIS. DATE: MAY 1985
PLTS. 92 F/15	DRAWN BY: S.K.B. SCALE: 1:2500
DWG. No.	NORANDA EXPLORATION
FIG 4	OFFICE: PRINCE GEORGE, B.C.

