GEOLOGY, ROCK GEOCHEMISTRY, PETROGRAPHY, AND SOIL PROFILES REPORT

LOUISE LAKE CLAIM

No. 784

Omineca Mining Division, B. C.

N.T.S. 93L/13E

Latitude 54° 51' N
Longitude 127° 41' W

Owner and Operator: Noranda Exploration Company, Limited (No Personal Liability) Vancouver, B. C.

Report by: Delbert E. Myers, Jr.
Noranda Exploration Company, Limited (N.P.L.)
Smithers, B. C.

Submitted: December, 1983

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SUMMARY

Four man days of work was done on the Louise Lake Claim on 30 July, 1983. The purpose of the work was to evaluate the potential of the property for hosting economic porphyry Cu-Mo type mineralization. Geology and rock and soil geochemistry were done. Rock samples were later studied by Dr. J. F. Harris at Vancouver Petrographies.

The main showing area is underlain by quartz + sericite + chlorite ± clay altered dacite-andesite crystal tuffs (or possibly subvolcanic porphyry) which is mineralized with pyrite + tetrahedrite + chalcopyrite + marcasite + molybdenite.

The alteration and mineralization are suggested of the outer phyllic zone in the Lowell-Gilbert porphyry deposit model and may indicate economic mineralization at depth.

Further drilling is recommended when the economics of large tonnage, low grade Cu-Mo deposits again seem favorable.

INTRODUCTION

PURPOSE

The purpose of this work was to determine the potential of the Louise Lake Claim for hosting economic Cu-Mo-Au-Ag porphyry-type mineralization.

LOCATION AND ACCESS

The Louise Lake Claim is situated just west of the west end of Louise Lake. It is 33 km west of the Smithers Airport (Figures 1 and 2). Logging roads approach the property from McDonell Lake and Kitseguecla Lake but stop 5 to 10 km short of the property. Winter roads have been travelled to the property from both lakes but not for ten years or more. We travelled by helicopter to the property.

PHYSIOGRAPHY

The Louise Lake Claim lies on Coal Creek which drains into the Zymoetz or Copper River. The property lies at an elevation of about 975m in a broad but hilly valley within the Hazelton Mountains. The claim is covered by grassy swamps and pine, spruce, and balsam forest on hills.

FIGURE 1. Location of Louise Lake Claim

NTS 93 L / 13E

noranda

NORANDA EXPLORATION COMPANY LTD.
Office: Smithers, B.C.

MAP TITLE	LOCATION MAP
PROJECT TITLE	LOUISE LAKE
PROJECT NO. 1031-2	SCALE 1 : 9,240,000

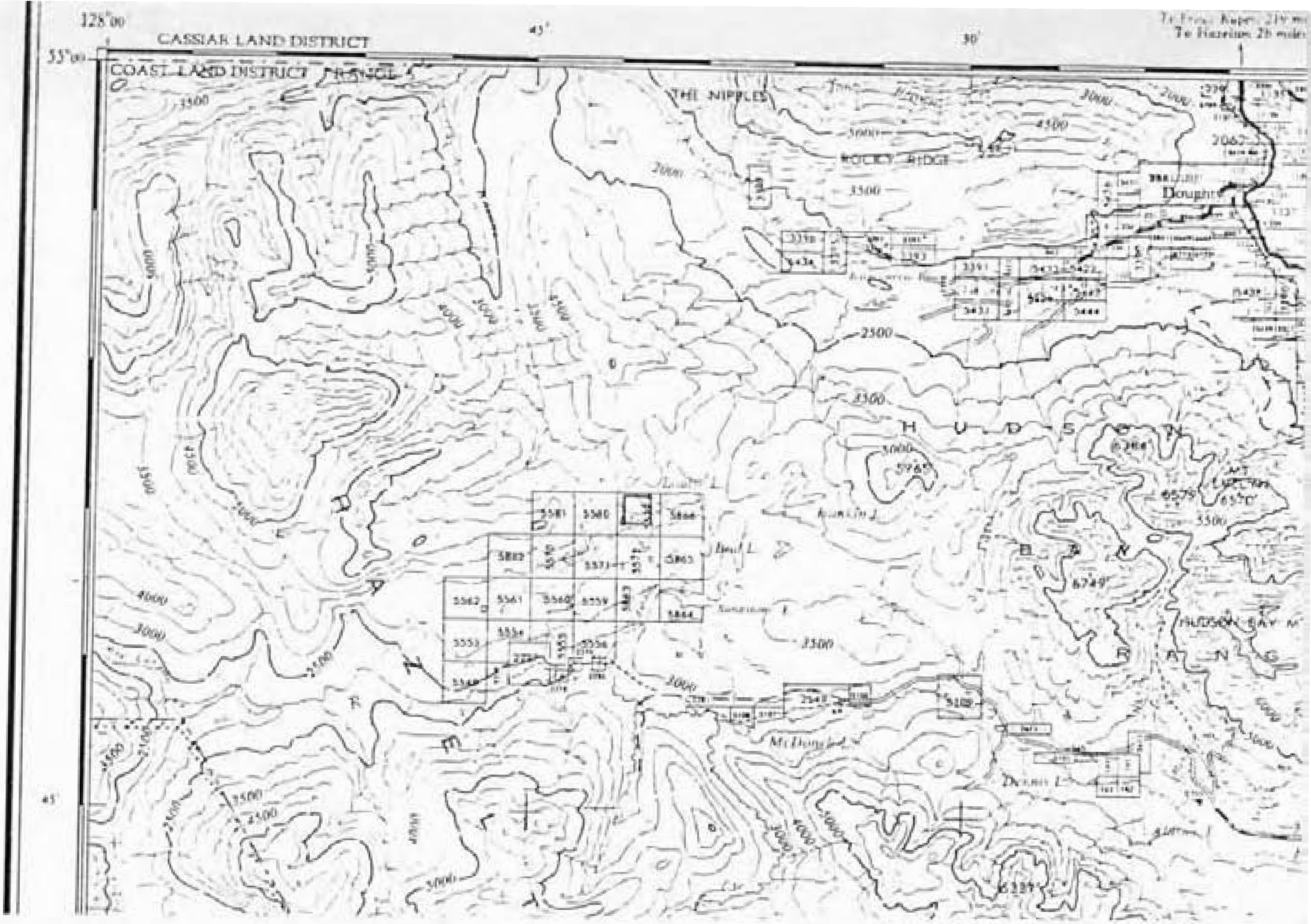

Figure 2. Location map, Louise Lake claim, NTS 93 L / 13E

Noranda Exploration Company, Limited(No Personal Liability)

1:250,000

0 5 10

km

PROPERTY DESCRIPTION

The property consists of one metric grid claim named Louise Lake, record number 784, consisting of 2 units W and 2 units S of the LCP (Figure 3). The claim was located by L. B. Warren on 8 September 1977 for Granby Mining Corporation as a relocation of the abandoned Louise and Louise 2 Claims. The claim was transferred to Noranda on 29 November 1979. Pending acceptance of this report, the Louise Lake claim will be in good standing until 20 September 1986.

PREVIOUS WORK

The Louise Lake showing was staked early in 1969 by Mastodon-Highland Bell Mines Ltd. They did linecutting, IP and magnetometer surveys, a small soil survey, and 720 linear feet of bulldozer trenching in seven trenches.

Late in 1969, the property was optioned by Canadian Superior Exploration Ltd., who did soil geochemical, geological, and IP surveys from 1969 to 1971. Sixteen BQ-size DDH totalling 6632 feet (2021m) were drilling from February to March 1970. The option was dropped and the claims lapsed.

Granby restaked the showing in 1975. In 1976, they did a magnetometer and soil geochemical survey for Cu over the showing area. In 1977, Granby reduced its holdings to 4 units.

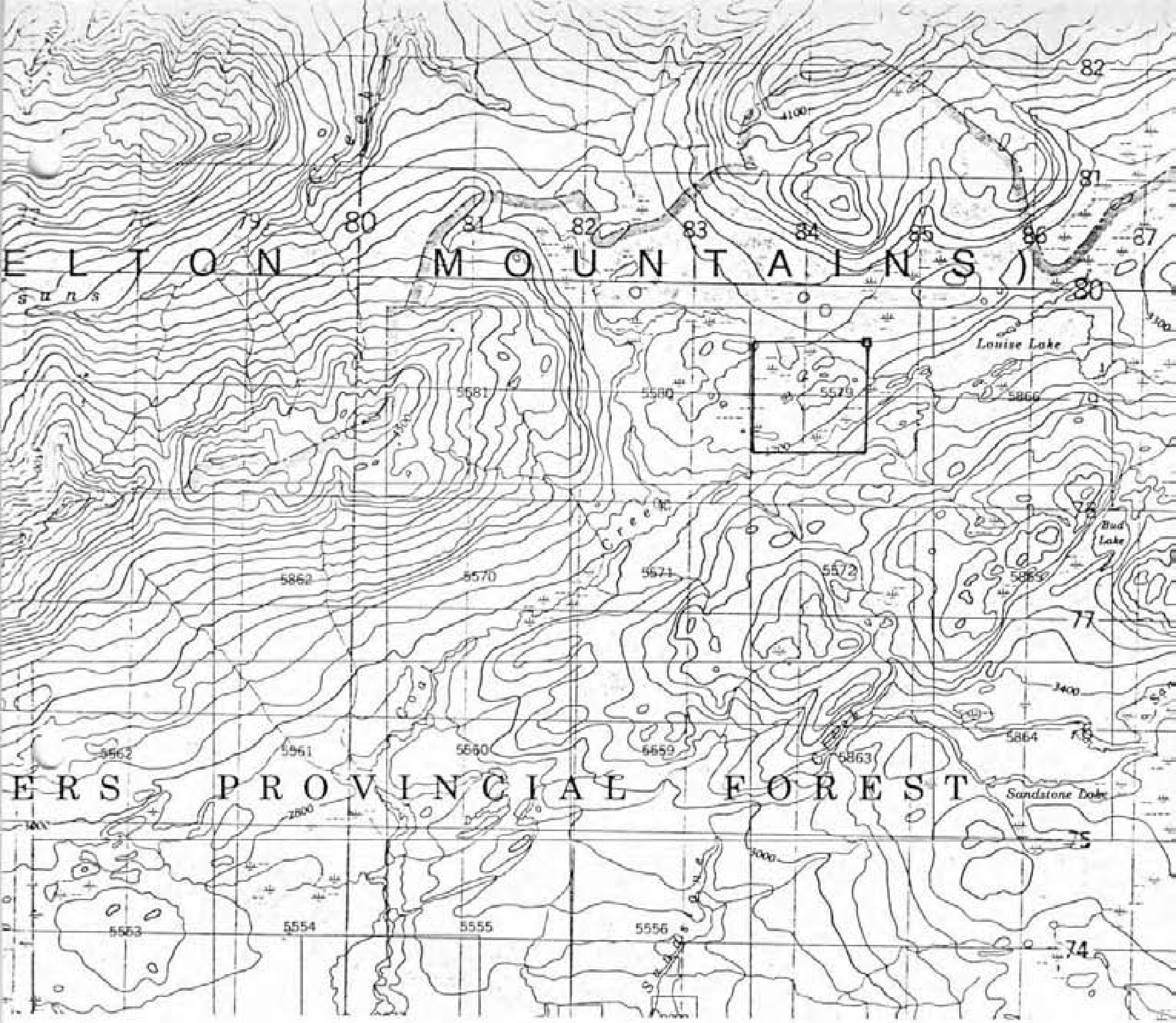

Figure 3. Claim Sketch, Louise Lake Claim NTS 93 L / 13E
Noranda Exploration Company, Limited (No Personal Liability)

1:50,000

0 1 2
km

N

In April 1979, Bethlehem Copper Corporation staked the Rob 1-4 Claims surrounding Granby's Louise Lake Claim. They did soil geochemical surveys for Cu and Mo, resampled the Canadian Superior core, and did some IP surveys beyond the limit of previous surveys. These claims subsequently lapsed.

The Louise Lake Claim was transferred November 1979 from Granby Mining Corporation to Noranda Exploration Co., Ltd.

In October 1980, Noranda did a helicopter-borne magnetic and VLFEM survey totalling 100 line-kilometers in the area of the Louise Lake Claim. Three VLF-EM anomalies were detected. M. Leahey also has done an airphoto of the area.

REGIONAL GEOLOGY

Louise Lake lies within the Intermontane Belt of the Pacific Orogen. It lies within a broad tectonic uplift known as the Skeena Arch (Wheeler and Gabrielse, 1972).

According to GSC Map 1424A (1979), south of Louise Lake bedrock is Middle and Upper Jurassic Smithers and Ashman Formation shales, greywackes, breccias, and conglomerates. North of Louise Lake bedrock is Lower Cretaceous Skeena Group conglomerates, greywackes, shales, coals, and volcanic breccias. The area at Louise Lake and Hankin Lake is intruded by Early Tertiary quartz monzonites, granodiorites, and quartz diorites.

In GSC Open File 351 (1976), Louise and Hankin Lakes are shown to be intruded by Late Cretaceous and Eocene intrusives. To the north lie Lower Cretaceous Kitsun Creek sediments. To the south lie Upper Jurassic Netalzul volcanics (basalts and andesites). A number of normal faults are shown on this map. Predominate strikes at 60^{o} and 335^{o}. An E-W strike thrust fault is shown about 2 km south of Louis Lake.

WORK UNDERTAKEN

Four persons spent one day, 30 July 1983, working on the property.

The old grid location 50+00N, 44+00E was located and renumbered 10,000mN, 10,000mE. The E-W baseline was rechained in meters and geologically mapped for about 1000m. Two sidelines were rechained and geologically mapped. The area near the baseline east of 10,000mE was also mapped. Bedrock and float geochemical samples were taken. Two soil profile pits were dug, described and sampled.

Access to the property was by helicopter from Smithers Airport.

Production was as follows:

geology	2.7+ line-km	
soil samples	7	(8 elements analysed)
rock samples	17	(8 elements analysed)

A suite of 10 rock samples was sent to Vancouver Petrographies for polished thin sectioning and description. The report of Dr. J.F. Harris, dated 7 September 1983, is attached (Appendix 5).

RESULTS AND INTERPRETATION

Property Geology

Outcrop in the showing area is poor. In the area traversed in 1983, only one outcrop was found (line 10,000E). Even the trenches expose only a rubbly, rock rich C horizon at a depth of 3 or 4 meters.

The showing area is considered to be a small (500 x 200m) hill defined by the 3300' contour on Figure 4, just west of the outlet of Louise Lake. The showing consists of pyritic, quartz veined, sericite-clay-rich felsic intrusive or porphyry which is seen in all the trenches. Minor molybdenite was seen at about 10,000N, 10,200E. Diamond drill holes in this hill are reported to contain common quartz-pyrite veinlets which contained minor amounts of chalcopyrite and tetrahedrite.

Dr. J. David Lowell of Arizona, USA, examined the property for Bethlehem Copper in 1979 and stated that "the sulfide habit, silicate alteration and mineral assemblage of all are suggestive of mineralization vertically above or laterally surrounding a body of copper mineralization (Morris, 1980)".

Canadian Superior Exploration drilled 17 DDH totalling 2021m on the property. Mineralization defined by this program is subeconomic. Bethlehem Copper resampled the core in 1979 and analysed it for gold (average grade about 0.004 oz. Au/ton), but not for silver (Morris, 1980). With sufficient silver content and more drilling, this might still be proven to be an economic deposit. Noranda's work in 1983 was primarily a geochemical orientation study.

Because of the mineralization and alteration of the rocks in trenches near 10,000N, 10,000E, it is not certain what the host rock is. It has been described as porphyritic felsic intrusives (Baird, 1969) dacite and dacite porphyry (Wilkinson & James, 1976), or Feldspar porphyry (Morris 1980). Harris (1983) believes the rocks (his slide numbers NN4 to NN10) to be altered, recrystallized dacite-andesite crystal tuffs. The commonest mineral assembledge in these rocks is sericite + quartz + chlorite + plagioclase ± clay + sulfides. This assembledge is characteristic of phyllic to argillic alteration zones. As such economic mineralization might be expected at depth or laterally according to the model of Lowell and Gilbert (1970).

Little is known of the structural geology of the showing area because of poor outcrop. The path of Coal Creek is thought to be fault controlled by a N 60^{o} E striking fault.

Rock Geochemistry

Seventeen rock samples were analysed for eight elements (Au, Ag, Cu, Pb, Zn, Mo, Mn, Fe) by the Noranda laboratory in Vancouver. The results are shown on Figure 4 and in Appendix 4.

Gold values of 6 of the samples were definitely anomalous ($\geq$100 ppb). The highest value was 470 ppb or 0.014 oz. Au/ton.

Only two samples had silver values greater than 1.0 ppm (both were 1.2 ppm).

Copper values ranged up to 3580 ppm (0.358%) and five samples were greater than 1000 ppm (0.1%).

Lead values were all low (less than 28 ppm).

Zinc values were also low with ore sample containing 440 ppm. The rest were all 136 ppm or less.

Molybdenum values ranged from 4 ppm to 1200 ppm (0.12%). All but one value were below 130 ppm.

Manganese and iron values are generally low with only one sample containing more than 1000 ppm Mn and no samples containing more than 3.9% Fe.

The copper contents are surprising high considering that no visible copper minerals were seen. Copper may occur as chalcopyrite blebs within pyrite grains.

Gold values are interesting but it would be important to determine the Au values in less weathered samples.

The samples with significant Au-Ag-Cu-Mo mineralization are all from an area between 9900N to 10,100N and 10,100E to 10,500E. The sampling is, however, somewhat biased with 11 of the 17 samples coming from this area. Additional drilling in and around this area should be done.

Petrography

Polished thin sections were prepared from 10 of the 17 rock samples. These sections were described by Dr. J.F. Harris of Vancouver Petrographies Ltd. (see Appendix 5).

A comparison of the field descriptions and petrographic descriptions is as follows:

Mineralized	Field Number	Field Description	Slide No., Description
---	9460N, 9750E	rusty, felsic, pyritic rock	NN1 sub volcanic dacite-andesite
---	9440N, 10,000E	rusty, quartz porphyry	NN2 carbonitized dacite porphyry
---	Y3167	fine grain, rusty, feldspar quartz rock	NN3 quartzose greywecke
weak	Y3168	pyritic rhyolite/ intrusive	NN4 altered dacite-andesite crystal tuffs
---	10112N, 10,004E	rusty, altered, felsic intrusive	NN5 altered dacite-andesite crystal tuffs
yes	X19962	pyritic, siliceous, volcanic tuff	NN6 altered dacite-andesite crystal tuffs
yes	X19963	pyritic, siliceous, volcanic tuff	NN7 altered dacite-andesite crystal tuffs
weak	X19966	pyritic, siliceous, volcanic tuff	NN8 altered dacite-andesite crystal tuffs
yes	X19969	pyritic, siliceous, volcanic tuff	NN9 altered dacite-andesite crystal tuffs
yes	X19971	pyritic, siliceous, volcanic tuff	NN10 altered dacite-andesite crystal tuffs

Most of the rocks are sericite-quartz rich rocks and hence were called felsites or rhyolites in the field. Dr. Harris believes, from thin section study, that the rocks were dacitic or andesitic volcanics or subvolcanic intrusives which have been silicified, sericitized, and to a lesser extent altered to clay. With the exception of Sample Y3167 (greywacke), all the other rocks are probably closely related volcanics and subvolcanic intrusives.

Major mineral phases ($\geq$10%) identified in these nine igneous rocks were:

plagioclase	4 samples
limonite/clay	1 sample
glass	1 sample
chlorite	7 samples
quartz	8 samples
carbonate	1 sample
sericite	8 samples

Minor mineral phases ($\geq$ 1% to $<$10%) identified (excluding those listed above) were:

rutile-sphene limonite mixture	1 sample
limonite	2 samples
dumortierite-topaz	1 sample
pyrite	5 samples
rutile-sphene	2 samples
clays	2 samples
rutile-sphene-zircon	1 sample

Sulfides consisted of pyrite, chalcopyrite (as tiny blebs within pyrite or tetrahedrite), marcasite (as intergrowths within pyrite or as colloform masses), tetrahedrite (separate and intergrown with pyrite and/or chalcopyrite), and molybdenite. Sulfides are generally randomly disseminated, mainly independent of veinlets or fractures.

Other trace minerals noted included apatite, pyroxene and tourmaline (as small clusters within limonite in 10112N, 10004E).

Alteration consists primarily of quartz + sericite ± kaolinite ± chlorite ± carbonate.

It is quite evident that the volcanics or subvolcanic intrusives of the "showing area" are highly altered pyrite + chalcopyrite + tetrahedrite + molybdenite ± marcasite mineralized rocks commonly associated with porphyry Cu-Mo type deposits.

Soil Profiles

Two shallow (62 and 30 cm deep) soil pits were dug to sample and describe various soil layers. These are located on Figure 4. The results of this work are given in Tables 1 and 2.

Both pits contained low values of precious and base metals except for profile 2 which is anomalous in molybdenum. Here molybdenum increases with depth within the B or C horizons (samples 18255 and 18256, 18 and 38 ppm Mo, respectively).

More soil profiles are needed to design a sophisticated soil sampling program.

The soil profiles are shallow due to lack of time and the shallow nature of soils in the mineralized area. Both pits contained mainly weather rocks at their bottoms which was very difficult to dig with prospectors grub hoes.

TABLE 1

Louise Lake Claim

10025N, 10000E

SOIL PROFILE 1

Sample No.	Thickness	Description	Au	Ag	Cu	Pb	Zn	Mo	Mn	Fe,%
			Concentrations in ppm							
	2 cm	organic material								
15747	10 cm	irregular layer, gray, clayey soil	.010	.2	4	2	14	2	60	0.7
15748	25 cm	reddish brown clay-rich soil	.010	.6	26	4	66	2	220	3.9
15749	20 cm	brownish clay layer w. rounded pebbles and cobbles, orangish pebble layer at base	.010	.2	36	4	86	2	400	4.2
15750	5 cm+	light grayish brown rock and clayey soil layer	.050	.2	20	4	28	6	110	1.9
		bottom of excavation @ 62 cm depth								

Sampled and described by DEMJr., DH

30 July, 1983

TABLE 2

Louise Lake Claim

10000mN, 10300mE

SOIL PROFILE 2

			Concentrations in ppm							
Sample No.	Thickness	Description	Au	Ag	Cu	Pb	Zn	Mo	Mn	Fe,%
18254	5 cm	black organic rich fines and sand	--	1.2	28	4	18	6	110	1.0
18255	5 cm	light brown sands and fines	.010	0.6	10	4	8	18	40	1.0
18256	20 cm	reddish brown sands and fines	.010	0.4	36	4	16	38	50	3.7

bottom of excavation @ 30 cm depth

Sampled and described by MH

30 July, 1983

CONCLUSIONS AND RECOMMENDATIONS

From the rock geochemical work undertaken, rocks in the showing area were found to be anomalous in Au-Ag-Cu-Mo. Both Au and Ag contents appear sub-economic but are poorly known. Work by Bethlehem Copper to determine the gold content of the drill core was not done until the samples had weathered for about 10 years. At some point in time, probably when the economics of low grade, large tonnage copper deposits improve, it will be necessary to test the showing area further by drilling and determine Au and Ag concentrations at that time.

Petrographic descriptions of 10 samples from the property indicate extensive alteration of rocks from the showing area to sericite-quartz rich rocks with chlorite and clay. Some surrounding rocks also are altered to carbonate.

Sulfides present are pyrite + tetrahedrite + chalcopyrite + marcasite + molybdenite in order of abundance.

The alteration and mineralization of the volcanics or subvolcanic intrusives in the showing area are suggestive of phyllic alteration peripheral to or above economic Cu-Mo mineralization in the Lowell and Gilbert model of porphyry deposits.

From drilling done to date, it seems most likely that if economic Cu-Mo porphyry mineralization exists on the property that it lies within the area drilled or below it at depth.

Further drilling to test for economic Cu-Mo-Ag-Au mineralization is recommended when economic conditions are again favorable.

REFERENCES

Baird, Jon. G., 1969

Report on Induced Polarization Survey, Lou Claim Group,
Seigel Associates Ltd., Vancouver, B.C.

Harris, J.F., 1983

Petrographic Report, Vancouver Petrographics Ltd.

Leahey, M. and Walker, Tom, 1981

Geophysical and Airphoto Interpretation Assessment Report No. 8710, BCMEMPR
Noranda Exploration Co. Ltd.

Lowell, J.D. and Gilbert, J.M., 1970

Lateral and Vertical Alteration-Mineralization Zoning in Porphyry
Ore Deposits
Econ. Geol., 65(4), pp. 373-408

Morris, A., 1980

Geochemical and IP Assessment Report No. 7961, BCMEMPR
Bethlehem Copper Corp.

Overstall, R.J. and Murphy, J.D., 1970

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Canadian Superior Exploration Ltd.

Tipper, H.W., 1976

GSC Open File 351
GSC, Ottawa

Tipper, H.W. et al, 1979

Parsnip River, B.C., Sheet 93
GSC Map 1424A, 1:1,000,000 Geological Atlas

Wheeler, J.O. and Gabrielse, H., 1972

The Cordilleran Structural Province
In Variations in Tectonic Styles in Canada, GAC Special Paper No. 11

Wilkinson, W. and James, D.H., 1976

Geochemical Assessment Report No. 6105, BCMEMPR
Granby Mining Corp.

APPENDIX 1

SUMMARY OF PERSONNEL

Name	Position	Dates	Man-Days
Delbert Myers Box 3972 Smithers, B.C.	District Geologist	30 July 1983	1
Daryl Hill c/o Box 2169 Smithers, B.C.	Field Supervisor	30 July 1983	1
Doug Shearer 7624 - 152 A Ave. Edmonton, Alberta	Field Geologist	30 July 1983	1
Martin Halvorson c/o Box 2169 Smithers, B.C.	Field Assistant	30 July 1983	1

APPENDIX 2

STATEMENT OF COST

NORANDA EXPLORATION COMPANY, LIMITED

STATEMENT OF COST

PROJECT - Louise Lake **DATE:** September 26, 1983
TYPE OF REPORT - Geochem & Geology

a) Wages:

No. of Days - 4 mandays
Rate per Day - $95.40
Dates From - July 30, 1983
Total Wages - 4 X $95.40 $ 381.60

b) Food and Accommodation:

No. of Days - 4
Rate per Day - $22.00
Dates From - July 30, 1983
Total Cost - 4 X $22.00 $ 88.00

c) Transportation:

No. of Days - 4
Rate per Day - $102.24
Dates From - July 30, 1983
Total cost 4 X $102.24 $ 408.96

d) Analysis $ 226.00
(See attached schedule)

e) Cost of Preparation of Report:

Author	$ 95.40
Drafting	$ 95.40
Typing	$ 95.40

f) Other:

Vancouver Petrogapnics	$ 736.50
Camp and Field Supplies	$

Total Cost $2,127.26

UNIT COSTS

Unit Costs for - Geochem

No. of Days - 4
No. of Units - 24 Samples
Unit Costs - $35.85/Sample

Total Cost	24	X	$35.85	$ 860.58

Unit Costs for - Geology

No. of Days - 4
No. of Units - 4
Unit costs - $316.67/day

Total Cost	4	X	$316.67	$1,266.68
Total				$2,127.26

NORANDA EXPLORATION COMPANY, LIMITED

DETAILS OF ANALYSES COSTS

Project: Louise Lake

Element	No. of Determinations	Cost per Determination	Total
Cu	7	1.60	38.40
Pb	7	.60	14.40
Zn	7	.60	14.40
Ag	7	.60	14.40
Mo	7	.60	14.40
Au	7	4.00	96.00
Rock Sample Prep	17	2.00	34.00

Total $226.00

Appendix 3

STATEMENT OF QUALIFICATIONS

Relevant Training

B.Sc. (1970) - Pennsylvania State University
Geological Sciences

M.Sc. (1973) - University of Toronto
Geochemistry

Relevant Experience

1973 - 1980 - Exploration and Mine Geologist
Cominco Limited
Vancouver and Yellowknife

1980 - 1982 - Project Geologist
Noranda Exploration Company, Limited
Yellowknife

1982 - present- District Geologist
Noranda Exploration Company, Limited
Smithers

Professional Affiliations

Fellow, Geological Association of Canada

Founding Member, Association of Professional Engineers, Geologists and Geophysicists of the Northwest Territories.

DELBERT E. MYERS, JR.
District Geologist

APPENDIX 4

DESCRIPTION OF SAMPLES AND ANALYTICAL RESULTS

NORANDA GEOCHEM LABORATORY

SEP 13 1983

LOCATION Louise Lake PROJECT 1031-2 COLLECTOR DM DATE RECEIVED Aug / 5 / 83 CODE 8308-045 SHEET 1

MATERIAL Soil DATE ANALYSED Aug / 10 / 83 ANALYST RF

REMARKS Cu, Zn, Pb, Ag, Mo, Mn in ppm; Fe in %; Au in p.p.b.
0.2g/2ml HClO4 · HNO3 → 5ml 10g / Aqua Regia – MIBK/AA

T.T. NO.	SAMPLE NO.		Cu	Zn	Pb	Ag	Mo	Mn	Fe	Au				N.T.S.
119	15747		4	14	2	0.2	<2	60	0.7	10	Soil Profile			93 4/13E
120	48		26	66	4	0.6	<2	220	3.9	10	10025N, 10,000E			↓
1	49		36	86	4	0.2	<2	400	4.2	10				
2	15750		20	28	4	0.2	6	110	1.9	50				
3	18254		28	18	4	1.2	6	110	1.0	I.S.				
4	55		10	8	4	0.6	18	40	1.0	10				
125	18256		36	16	4	0.2	38	50	3.7	10				

10/5/83

NORANDA EXPLORATION COMPANY, LIMITED
Central BC District

N.T.S. 93 L/13E

PROPERTY Louise Lake

DATE 30 July 83

SAMPLE REPORT

SAMPLE NO.	LOCATION & DESCRIPTION	TYPE	WIDTH	Geochemical ~~ASSAYS~~ Analyses							SAMPLED BY
	Soil profile										
15747	"2"	soil									DEMJr, D
8	"3"	"									
9	"4"	"									"
15750	"5"	"									"
	Soil profile @ 10,000mN, 10,300mE										
18254	"A"	soil									DS, MH
5	"B"	"									"
6	"C"	"									"

Rossbacher Laboratory Ltd.

GEOCHEMICAL ANALYSTS & ASSAYERS

CANADA
TELEPHONE: 299-6910

dm

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 83362-1

INVOICE NO.

DATE ANALYSED SEPT 21/83

TO: NORANDA EXPLORATION CO. LTD.
1050 DAVIE STREET
VANCOUVER, B.C.

SEP 13 1983

LOUISE LAKE D.M.

PROJECT 1031-2 #8-36

No.	Sample	pH	Mo	Cu	Mn	% Fe	Ag	Zn	Pb	PPB Au		Rock Type		No.
01	Y 3167		5	194	110	3.2	0.2	20	10	30		porphyry		01
02	Y 3168		10	450	40	3.8	0.2	6	2	20		felsic		02
03	X 19962		106	760	40	1.0	0.4	50	12	110		felsic		03
04	963		48	2260	50	1.2	1.2	106	28	270		felsic		04
05	964		70	1300	40	1.9	0.6	36	10	80		felsic		05
06	965		62	900	40	1.4	0.8	48	10	40		felsic		06
07	966		18	860	30	1.6	0.6	102	8	70		felsic		07
08	967		86	850	40	2.6	0.4	82	4	30		felsic		08
09	968		72	1600	30	2.0	0.4	40	2	140		felsic		09
10	X 19969		100	900	30	1.8	0.4	72	4	240		felsic		10
11	970		130	980	30	1.1	0.4	50	22	30		felsic		11
12	X 19971		1200	3580	50	1.4	1.2	58	12	470		felsic		12
13	9440N-10000E		8	140	850	2.3	0.2	440	14	10		porphyry		13
14	9460N-9750E		4	8	1320	7.9	0.2	136	4	10		felsic		14
15	9950N 9990E		14	10	40	2.2	0.2	4	2	10		felsic		15
16	10100N-10190E		164	1100	40	1.2	0.6	68	20	170		felsic		16
17	10112N-10004E		18	200	30	1.1	0.4	8	6	10		felsic		17
18														18
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40														40

VALUES IN PPM, UNLESS NOTED OTHERWISE.

Certified by T. Rossbacher

NORANDA EXPLORATION COMPANY, LIMITED

N.T.S. 93 L /13E

PROPERTY Louise Lake

DATE 30 July 1983

Central B.C. District

SAMPLE REPORT

SAMPLE NO.	LOCATION & DESCRIPTION	TYPE	WIDTH	Geochemical ~~ASSAYS~~ Analysis Au	Ag	Cu	Pb	Zn	Mo	Mn Fe	SAMPLED BY
9460 N 9750 E	Float, "rusty, felsic, pyritic rock" from steep hill side	rock	grab								DEM Jr.
9440 N 10000 E	Float, just down hill from some outcrop(?) of similar rock, "quartz porphyry, rusty specks" quartz-white feldspar ~~ph~~ porphyry, qtz. phenocrysts to 5mm, wht. Fldsp. phenocrysts to 3mm? (not preserved well), abundant rusty specks to 1-2mm	rock	grab								"
Y3167	Float from same location as 9440N, 10000E - not as common. Fine grain version of above, grains to 2mm maximum 1mm common, fsp-qtz-rusty specks	rock	grab								"
9950 N ~~10000~~ 9990 E	From trench, rusty, siliceous or felsic pyritic rock, about 3% pyrite in v. fn. gn. ~~aphanitic~~ gray/tan rhyolite rock ~~to~~ to fn./md. gn. pyritic (3%) felsic intrusive w. no mafic minerals	rock	grab								DH

NORANDA EXPLORATION COMPANY, LIMITED

N.T.S. 93 L/13E

PROPERTY Louise Lake

DATE 30 July 1983

Central B.C. District

SAMPLE REPORT

SAMPLE NO.	LOCATION & DESCRIPTION	TYPE	WIDTH	Geochemical ~~ASSAYS~~ Analysis Au	Ag	Cu	Pb	Zn	Mo	Mn Fe	SAMPLED BY
Y3168	From trench @ 9950N, 9990E, v.fn.gn., pyritic rhyolitic rock to fn.gn. qtz-fsp intrusive, both with about 3% dissem and fracture pyrite to 1mm, common quartz-pyrite veinlets in several directions, ~~also~~ fairly fresh	rock	grab								DEM Jr
10,112 N 10,004 E	Float, "rusty altered, felsic intrusive with negligible pyrite, lt. gray/tan, no mafic minerals	rock	grab								"
10,000N 10190E	From trench, float, pyritic intrusive with trace molybdenite along fracture, 2-3% dissem and fracture pyrite in fn.gn. felsic intrusive w. no mafic minerals	"	"								"
								DEMJr	31 July 83		

NORANDA EXPLORATION COMPANY, LIMITED

N.T.S. 93L/13E

PROPERTY Louise Lake - 10312

DATE 30/07/83

Central B.C. District

SAMPLE REPORT

SAMPLE NO.	LOCATION & DESCRIPTION	TYPE	WIDTH	ASSAYS Au	Ag	Cu	Pb	Zn	Mo		SAMPLED BY
X19962	trench: L 104+75E Δ 100+00N; rusty and grey siliceous volcanic tuff with disseminated pyrite	rock	grab								DS
X19963	trench: L 103+55E Δ 99+70N to Δ 100+00N; same as above; also some fracture controlled pyrite	rock	grab								DS
X19964	trench; L 103+55E Δ 100+50N to Δ 100+85N; same as above; fracture controlled pyrite more prominent and pyrite also associated with quartz veins	rock	grab								DS
X19965	trench; L 103+55E Δ 100+85N; same as above	rock	grab								DS
X19966	trench; L 102+50E Δ 98+40N to Δ 98+90N; same as above; prominent fracture controlled pyrite	rock	grab								DS
X19967	trench; L 102+50E Δ 98+90N to Δ 99+40N; same as above; prominent	rock	grab								DS

NORANDA EXPLORATION COMPANY, LIMITED

N.T.S. 93L/13E

DATE 30/07/83

PROPERTY Louise Lake - 10312

Central B.C. District

SAMPLE REPORT

SAMPLE NO.	LOCATION & DESCRIPTION	TYPE	WIDTH	ASSAYS							SAMPLED BY
	fracture and quartz vein controlled pyrite										
X19968	trench; L 102+50E Δ 100+40N; same as above; prominent fracture controlled pyrite	rock	grab								DS
X19969	trench; L 102+50E Δ 100+55N; same as above; prominent fracture controlled pyrite	rock	grab								DS
X19970	trench; BL 102+10E to BL 102+40E; same as above; prominent fracture controlled pyrite	rock	grab								DS
X19971	trench; BL 101+80E; same as above; minor molybdenum mineralization	rock	grab								DS

APPENDIX 5

PETROGRAPHIC REPORT

BY DR. J.F. HARRIS

1031-2

VP

Vancouver Petrographics Ltd.

SEP 13 1983

JAMES VINNELL, Manager
JOHN G. PAYNE, Ph. D. Geologist

P.O. BOX 39
8887 NASH STREET
FORT LANGLEY, B.C.
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PHONE (604) 888-1323

Project 1031-2 Louise Lake
NTS 93 L /13E

Invoice No. 4060

Report for: Del Myers,
Noranda Exploration Co. Ltd.,
P.O. Box 2169,
Smithers, B.C. VOV 2VO

Samples:

Field No.	Slide No.
9460N/9750E	NN 1
9440N/10000E	NN 2
Y 3167	NN 3
Y 3168	NN 4
10112N/10004E	NN 5
X 19962	NN 6
X 19963	NN 7
X 19966	NN 8
X 19969	NN 9
X 19971	NN 10

Summary:

This report refers to the 10 rocks submitted with your letter of August 22nd, 1983. For convenience the samples are referred to in the report by their NN series numbers (cross referenced to your field numbers as above).

All samples except NN 1 were prepared as polished thin sections to facilitate description of the opaque phases. In fact only 4 samples (NN 4, 8, 9 and 10) have significant sulfides. 2 More (NN 6 & 7) have traces. NN 1, 3 & 5 contain considerable limonite.

All but one of this suite appear to be of volcanic origin. NN 1 is a quartz-poor dacite-andesite showing a fine-grained holocrystalline texture suggestive of a sub-volcanic intrusive.

NN 2 is a dacite, this time strongly porphyritic with a glassy matrix (probably an extrusive). It is distinctive in its content of rounded quartz phenocrysts and the abundance of carbonate.

NN 3 is a quartzose greywacke.

NN 4 to 10 are generally similar in texture and mineralogy and are tentatively classified as altered, recrystallised dacite-andesite crystal tuffs. They consist of varying proportions of quartz-rich felsitic material of patchily variable grain size, with

abundant interstitial sericite. Sericite and chlorite also form sub-angular patches up to several mm which appear to be pseudomorphous after original crystal fragments.

Alteration is moderate in NN 1 with variable kaolinization and sericitisation of plagioclase. It is much more intense in NN 2 where only the quartz remains unaltered. The other constituents are now represented by sericite, chlorite and carbonate.

The greywacke NN 3 shows no obvious post-formational alteration.*

The presumed tuffs are totally altered and recrystallised. The groundmass is represented essentially by quartz/sericite and original porphyroclasts by sericite and chlorite.

The rocks show no deformation effects. Veining is very minor and confined to redistribution of quartz during recrystallisation. Possible hydrothermal effects are the presence of traces of dumortierite and topaz in NN 4 and of tourmaline in NN 5.

The sulfides in NN 4 are pyrite, and in NN 6 - 10 pyrite, sometimes with marcasite, together with tetrahedrite and minor chalcopyrite. Molybdenite occurs in NN 10.

The sulfides are randomly disseminated discrete grains, mainly independent of veins or fractures. They have the appearance of having formed during the alteration and recrystallisation of the host rocks.

J.F.Harris

J.F.HARRIS Ph.D.

September 7th, 1983

* except for recrystallisation of the groundmass to sericite.

NN 1 (9460N/9750E) DACITE-ANDESITE (INTRUSIVE?)

Estimated mode:

Plagioclase (phenocrysts)	45
Plagioclase (felsitic groundmass)	30
Quartz	5
Chlorite	5
Limonite/clay	15
Apatite	trace

Abundant stumpy subhedral plagioclase crystals 0.1 - 2.0mm set in a very fine-grained feldspathic groundmass (0.02 - 0.05). The phenocrysts are variably altered to fine-grained sericite; some are almost 100% pseudomorphed, others are only mildly altered. On average they are c. 20% altered.

Quartz occurs as a minor constituent of the felsitic groundmass and also as scattered anhedral grains up to 0.2mm

Very fine-grained chlorite form scattered small patches 0.2 - 0.4mm in the groundmass.

Apatite forms small disseminated prisms.

The rock is strongly impregnated with blotches and moss-like patches of sub-opaque, structureless brown material. This appears to be a mixture of limonite and clay. It tends to occur interstitially to the plagioclase phenocrysts, moulding around and including them. To a lesser degree it permeates and replaces plagioclase crystals along micro-fractures. It appears to be a superimposed component (weathering effect?).

NN 2 (9440N/10,000E) ALTERED PORPHYRITIC DACITE

Estimated mode:

Glass (groundmass)	30
Chlorite	25
Quartz	15
Carbonate	15
Sericite	10
Rutile) Sphene) Limonite)	5
Pyroxene	trace

The texture of this rock is unmistakably that of a porphyritic volcanic, though the original minerals (with the exception of quartz) have been largely replaced.

It consists of a cryptocrystalline felsitic or clayey groundmass which probably represents devitrified glass. This accepts a faint cobaltinitrite stain so probably includes some K-spar. In this are set phenocrysts of quartz (subhedral to rounded, 0.2 - 8.0mm), prismatic pseudomorphs now composed largely of sericite, and abundant pseudomorphs 0.5 - 5mm of very fine-grained chlorite with patches of coarse carbonate. Sub-opaque limonite with fine-grained sphene and rutile forms granular patches and rims to many of the pseudomorphs.

Patches of remnant augite occasionally survive in some of the carbonate-chlorite pseudomorphs.

NN 3 (Y 3167) QUARTZ WACKE

Estimated mode:

Fragments :	
Quartz	60
Altered feldspar	10
Chert, felsite, devitrified glass	10
Matrix:	
Sericite	15
Limonite	5

Rock is composed of close-packed angular clasts 0.1 - 1mm (dominantly c. 0.5mm) in size, set in a matrix of fine-grained sericite. The clasts are dominantly monocrystalline grains or coarse composites of quartz. Other fragments are composed of fine-grained mosaic quartz, chert, and cryptocrystalline felsite (which probably represents devitrified glass). Feldspar (untwinned plagioclase) clasts are kaolinized and weakly sericitised.

Pockets of limonite are developed sporadically throughout the rock, interstitial to the larger clasts and including the smaller ones.

This rock has the classic angular fragments and abundant sericitic matrix of a greywacke. It is, however, somewhat better sorted, and is deficient in lithic fragments. It thus grades to an arenite.

NN 4 (Y 3168) ALTERED TUFF

Estimated mode:

Quartz	40
Plagioclase	10
Sericite	30
Chlorite	14
Sphene) Rutile)	1
Dumortierite) Topaz)	1
Sulfides	4

The rock consists dominantly of a fine-grained felsitic groundmass with abundant sericite or chlorite. Rather sparse sub-angular fragments of quartz and lesser feldspar 0.2 - 1mm in size are scattered through this mass.

The groundmass felsite varies in grain size from c. 0.01 - 0.2mm Some areas are essentially siliceous; others have abundant fine-grained sericite; others have no sericite, are very fine-grained, appear more feldspathic and have interstitial chlorite. Often these variations define angular pseudomorph-like shapes. Pockets of coarser sericite, quartz and, rarely, chlorite occur. Tiny granules of sphene and rutile occur throughout. Locally there are clusters of tiny, high-relief, colourless needles (? dumortierite) and patches of (?) topaz.

Cross-cutting fractures show more intense marginal sericitization.

Sulfides consist of clusters and trains of anhedral pyrite grains 0.2 - 2.0mm, frequently corroded and partially replaced or fractured and cemented by the silicate matrix. Silicate inclusions occur in the pyrite. The pyrite is associated with fractures and coarse sericite/quartz pockets.

Rare tiny blebs of chalcopyrite occur within the pyrite.

The origin of this rock (and similar ones making up the rest of the suite) is obscure. It is texturally unlike the granular crystalline NN 1 and the obviously porphyritic NN 2, yet it has a distinctly volcanic flavour. It is tentatively classified as a tuff.

KN 5 (10112N/10004E) ALTERED TUFF

Estimated mode:

Quartz	40
Plagioclase	20
Sericite	35
Limonite	5
Tourmaline	trace

Rock consists largely of a fine-grained aggregate of anhedral quartz and untwinned plagioclase (0.05 - 0.2mm) with interstitial sericite. This matrix is set with rather abundant rounded to sub-rectangular patches, 0.5 - 2.0mm, of highly sericitic composition which have the appearance of pseudomorphs.

The rock is permeated with limonitic patches which locally replaces the sericite and forms an interstitial cement to the felsite. Here and there limonite forms boxworks and apparent pseudomorphs after sulfides, often in pockets of coarser quartz and sericite. Small clusters of tourmaline needles occur in this association.

Reflected light examination reveals rare tiny blebs of chalcopyrite within quartz as the only sulfides.

The felsite/sericite matrix of this rock looks almost metasedimentary. The sericitic pseudomorphs suggest volcanic origin however.

NN 6 (X 19962) ALTERED TUFF

Estimated mode:

Quartz	27
Plagioclase	10
Sericite	30
Chlorite	30
Sphene) Rutile)	1
Sulfides	2

Rock consists of patchy irregular alternations of three components; granular felsite of grain size 0.05 - 0.2mm with interstitial fine-grained sericite; felted sericite; and very fine-grained cryptocrystalline felsite with abundant chlorite. Sometimes these variants form vaguely prismatic patches, 0.5 - 2.0mm, which may be pseudomorphs; often they are intergrown in an irregular manner, one forming a local matrix to the others. Tiny granules of sphene and rutile occur throughout.

This description is also applicable, with slight variations, to the rest of the rocks in the suite (NN 7 - 10).

The sulfides occur rather evenly disseminated as small individual grains, 0.05 - 0.2mm. They consist of anhedral pyrite, often with intergrown marcasite (sometimes in rounded colloform masses); tetrahedrite as subhedral to ragged grains, frequently monomineralic but occasionally with intimate intergrowths or rim textures of fine-grained pyrite or chalcopyrite.

NN 7 (X 19963) ALTERED TUFF

Estimated mode:

Quartz	35
Plagioclase	5
Sericite	30
Chlorite	30
Sulfides	trace

Description generally as for NN 6. Some areas of felsite show increased development of interstitial sericite or chlorite so that the latter form a matrix studded with individual separate quartz/feldspar grains. One end of the slide shows a vein or segregation of essentially monomineralic coarser mosaic quartz of 0.4 - 1.0mm grain size.

The traces of sulfides are mainly pyrite with subordinate tetrahedrite and chalcopyrite. The two latter are frequently intimately intergrown but usually not associated with the pyrite.

NN 8 (X 19966) ALTERED TUFF

Estimated mode:

Quartz	28
Plagioclase	5
Sericite	40
Clays	8
Chlorite	15
Sphene) Rutile) Zircon)	1
Sulfides	3

Similar to NN 6, 7. Felsite mosaic of grain size 0.05 - 0.4mm as clumps, strings and networks alternating with areas of felted sericite which forms irregular or sub-angular (pseudomorphic?) patches up to 4mm. These often have cores of finer-grained sericite with clay. Some areas of sericite form a matrix to "floating" felsite grains. Fine-grained chlorite forms irregular patches throughout (and, less commonly, small pseudomorphic shapes). Scattered rather rounded quartz grains, 0.4 - 0.6mm, distinct from the felsitic mosaic, appear to be original crystal fragments.

Sulfides consist predominantly of pyrite with minor intergrown marcasite. This forms irregular to subhedral grains and aggregates 0.1 - 1mm, often interstitial to silicates, moulding around and including felsite grains. It is commonly fractured and cemented by silicates. Tetrahedrite is a very minor constituent of the sulfide suite, mainly forming tiny discrete grains. Traces of chalcopyrite occur as blebs in pyrite and in tetrahedrite.

NN 9 (X 19969) ALTERED TUFF

Estimated mode:

Quartz	25
Plagioclase	5
Sericite	30
Clay	5
Chlorite	30
Sulfides	5

Similar to NN 6,7,8. Felsite (dominantly quartz with probable minor feldspar) as mosaics and individual grains).05 - 0.1mm. Coarser quartz to 0.4mm occurs as veniform segregations. Fine-grained sericite occurs interstitial to the felsite, and also as irregular to sub-angular patches. Chlorite occurs as sub-opaque Streaks associated with the sericite and chlorite patches.

Sulfides are rather evenly disseminated, with no special relation to the silicate components. They are dominantly rounded to subhedral individual pyrite grains 0.1 - 0.8mm. Tetrahedrite is relatively abundant (in a ratio of c. 1:5 relative to the pyrite). It typically forms discrete grains or, rarely, simple composites with pyrite. The tetrahedrite very commonly contains intimately intergrown chalcopyrite, often as rim textures. Some of the tetrahedrite grains also contain minute spherulitic pyrite inclusions.

NN 10 (X 19971)   ALTERED TUFF

Estimated mode:

Quartz	55
Plagioclase	5
Sericite	27
Chlorite	10
Rutile	trace
Sulfides	3

Quartz forms mosaics of widely varying grain size, 0.05 - 1.0mm. It differs somewhat from the felsite of earlier rocks of this type in being generally coarser and having much less interstitial sericite. The sericite here is mainly concentrated in irregular streaks and pockets up to several mm; the pseudomorphic shapes seen in other slides appear absent. Chlorite occurs in similar mode to the sericite.

Sulfides are dominantly pyrite, as irregular corroded-looking often brecciated grains, 0.1mm to several mm in size. Some have intergrown marcasite. Tetrahedrite forms generally smaller, very irregular-shaped grains, commonly full of silicate and very fine-grained spherulitic pyrite. Chalcopyrite is comparatively less abundant in this slide. Molybdenite is a prominent constituent, disseminated throughout as stubby grains, 0.2 - 0.8mm. These are usually discrete but occasionally in simple intergrowth with tetrahedrite.

The relative proportions of sulfides are estimated as:

pyrite	50
marcasite	7
tetrahedrite	25
chalcopyrite	3
molybdenite	15

SEP 2 1 1983

Vancouver Petrographics Ltd.

8887 NASH STREET — P.O. BOX 39 — FORT LANGLEY, B.C. V0X 1J0
Telephone (604) 888-1323

INVOICE № 4060

Customer Order No. FX2979
Customer Charge Code Louise Lake prop.
Ordered By: Del Myers

FOR
Noranda Exploration Co. Ltd
P.O. Box 2169
Smithers, B.C.
VOJ 2N0

QUANTITY	DESCRIPTION	COST
	THIN SECTIONS	
10	POLISHED THIN SECTIONS @ $16.00 ea.	$160.00
	POLISHED ORE MOUNTS	
10	GROUND & LABELLED THIN SECTION REJECT SLICES 75¢ ea	7.50
	POLISHED MINERAL GRAIN MOUNTS	
	MINERAL GRAIN THIN SECTIONS	
	MINERAL GRAIN POLISHED THIN SECTIONS	
	THIN SECTION K-SPAR STAINS	
10	ROCK K-SPAR STAINS @ $1.00 ea	10.00
	CERAMIC PULVERIZER PLATES LAPPED	
	PETROGRAPHIC REPORT on 10 P.T.S. by J. Harris	460.00
	5 refl. light exam. @ $15.00 ea	75.00
	4 " " " @ $ 6.00 ea	24.00
	FED. TAX	
	PROV. TAX	
	SHIPPING	
	TOTAL	$736.50

APPROVED FOR PAYMENT

1031-01-30

Receiving Date Aug 24,1983 Shipping Date Sept 1983

Via del by J. Harris

ROCK GEOCHEMISTRY

SAMPLE Nº	ROCK TYPE	Au	Ag	Cu	Pb	Zn	Mo	Mn	Fe
		ppm							%
Y 3167	PORPHYRY	0.030	0.2	194	10	20	5	110	3.2
Y 3168	FELSIC	0.020	0.2	450	2	6	10	40	3.8
X 19962	FELSIC	0.110	0.4	760	12	50	106	40	1.0
X 19963	FELSIC	0.270	1.2	2260	28	106	48	50	1.2
X 19964	FELSIC	0.080	0.6	1300	10	36	70	40	1.9
X 19965	FELSIC	0.040	0.8	900	10	48	62	40	1.4
X 19966	FELSIC	0.070	0.6	860	8	102	18	30	1.6
X 19967	FELSIC	0.030	0.4	850	4	82	86	40	2.6
X 19968	FELSIC	0.140	0.4	1600	2	40	72	30	3.0
X 19969	FELSIC	0.240	0.4	900	4	72	100	30	1.8
X 19970	FELSIC	0.030	0.4	980	22	50	130	30	1.1
X 19971	FELSIC	0.470	1.2	3580	12	58	1200	50	1.4
9440N - 10000 E	PORPHYRY	0.010	0.2	140	14	440	8	850	2.3
9460N - 9750 E	FELSIC	0.010	0.2	8	4	136	4	1320	3.9
9950N - 9990 E	FELSIC	0.010	0.2	10	2	4	14	40	2.2
10000N - 10190 E	FELSIC	0.170	0.6	1100	20	68	104	40	1.2
10112N - 10004 E	FELSIC	0.010	0.4	200	6	8	18	30	1.1

LEGEND

- Lake / stream
- Outcrop boundary
- Small outcrop
- Frost heave
- Float
- Geological contact (defined, approximate, assumed)
- Fault (defined, assumed)
- Bedding; strike & dip
- Foliation; strike & dip
- Fold axis
- Trench
- DDH A-1-83 Diamond drill hole location, inclination
- Rock sample location & number
- Soil sample location
- Swamp
- Claim boundary with Legal Corner Post
- Traverse with station location

GEOLOGICAL BRANCH
ASSESSMENT REPORT

11,772

SCALE

0 100 200 300 400 Metres

TOPO CONTOUR INTERVAL = 100 Feet

REVISED	
NOV. 83	E.C.

LOUISE LAKE

ROCK GEOCHEMICAL SURVEY

1031 - 2

E

M.H., D.H., D.S., DEMJr.

DATE JULY 30, 1983

E.C.

SCALE

NORANDA EXPLORATION

SMITHERS

Figure 4