COMINCO LTD. 77-#99-#6224

EXPLORATION WESTERN DISTRICT

NTS: 92I/9W MARCH 1977

1976 GEOLOGICAL REPORT ON THE AND CLAIMS IN THE KAMLOOPS AREA KAMLOOPS MINING DISTRICT BRITISH COLUMBIA

LATITUDE: 50°34'N LONGITUDE: 120°35'N

Report by: M.J. OSATENKO
R.U. BRUASET

COMINCO LTD.

EXPLORATION
N.T.S. 92I/9W

WESTERN DISTRICT
14 March 1977

6224

ASSESSMENT REPORT

1976 GEOLOGICAL REPORT

ON

THE AND 1 - 10

MINERAL CLAIMS IN THE SHUMWAY

LAKE AREA

KAMLOOPS MINING DIVISION, BRITISH COLUMBIA

LATITUDE: 50°33' - LONGITUDE: 120°17'

PERIOD OF FIELD WORK

June 5 - September 1, 1976

M.J. Osatenko, M.Sc.
R.U. Bruaset, B.Sc.
D.W. Heddle, M.Sc., P. Eng.

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COMINCO LTD.

EXPLORATION

WESTERN DISTRICT
17 March 1977

GEOLOGICAL ASSESSMENT REPORT

ON THE AND PROPERTY

(CLAIMS 1-10)

Lat. 50°33' Long 120°17'

Kamloops Mining Division

SUMMARY

Cominco's AND property, located 13 km (8 miles) south of Kamloops, B.C., straddles the southeastern contact of the Iron Mask batholith where it intrudes coeval Upper Triassic Nicola volcanics. Miocene or earlier Kamloops volcanic rocks cap portion of the Iron Mask batholith in the area.

Work done during 1976 included geological mapping over the whole property and I.P. and magnetic surveys over parts of the property. Data collected shows that the Iron Mask rocks are highly fractured and brecciated diorites of the younger Cherry Creek and Sugarloaf phases. Coincident with the structurally disturbed areas is a zone of propylitic and minor K-feldspathic alteration centered on the Phil showing. At the Phil showing fairly abundant chalcopyrite and bornite occur in a narrow zone of strong faulting and alteration. The mineralization is bounded by exposed faults on both sides. Albitization appears to have developed locally. Strong K-feldspathization and quartz veining is also present.

INTRODUCTION

The report describes the results of a geological mapping project on the AND property. Mapping was conducted by R.U. Bruaset assisted by R. Webb during the period June 5 to June 22, 1976 and by M.J. Osatenko assisted by B. Ames during the period August 19 to September 1, 1976. The data is presented at a scale of 1:12,000 for the whole property and 1:1,200 for the Phil showing area.

LOCATION, ACCESS AND GLACIATION

The property is located eight miles south of Kamloops along the Kamloops-Merritt highway (Plate 1). Access to the central and southern part of the property is off the Jackson road while the McLeod Lake road provides easy access to the northern part.

The elevations of the area range from 2,250 feet (683 metres) at Shumway Lake to 3,625 feet (1104 metres) atop Shumway Hill. On the east side the property is a deeply incised plateau with elevations up to 2,900 feet (883 metres). A north-northwesterly trending ridge on which Shumway Hill is located has an escarpment-like aspect on the east side. This ridge is underlain by Kamloops volcanics which cap the Upper Triassic formations and extend north-northeasterly to Anderson Creek.

The glacial direction as indicated by prominent drift ridges is towards the southeast (Cockfield, Map 887A).

PREVIOUS WORK

A number of exploration projects have been carried out by other companies on the ground encompassed by the AND claims. These are listed below:

REFERENCES	TYPE OF WORK	CLAIMS OR PROPERTY NAME	OPERATOR	YEAR
Assessment Report 1965	Geophysical	A, C, CLE	Pinnacle Mines Ltd.	1967
Assessment Report 1746	Geochemical	C, Pin, A, CLE	"	1969
Certificate of Work 70894/983	Diamond Drilling		KALAMALTA Resources Ltd.	1969
Assessment Report 4024	Geophysical (EM)	NY	Estey Agencies Ltd.	1972
Assessment Report 4160	Geological, Geophysical (mag), soil geochemical	JD	Flagstone Mines Ltd.	1972
Assessment Report 4036	Geophysical (IP)	JEAN	Joy Mining Ltd.	1972
Pentland, A.	Percussion drilling (21 holes total 6320 ft).2 diamond drill holes total approximately 1475 feet.	JEAN	Joy Mining Ltd.	1972

The attached geological maps (Plates 2 and 3) show the location of all known drill holes and trenches on the property.

PROPERTY AND OWNERSHIP

The AND property (Kamloops Mining Division) is 100 percent owned by Cominco and consists of the following claims:

CLAIM	RECORD NO.	NUMBER OF UNITS	DATE RECORDED
AND 1	313	20	March 26, 1976
AND 2	314	20	March 26, 1976
AND 3	315	16	March 26, 1976
AND 4	316	16	March 26, 1976
AND 5	317	4	March 26, 1976
AND 6	358	8	April 15, 1976
AND 7	359	4	April 15, 1976
AND 8	419	4	June 15, 1976
AND 9	420	4	June 15, 1976
AND 10	421	4	June 15, 1976

Location of these claims is shown in Plate 1 and more precisely in Plate 2

GEOLOGY

The AND property is located in the southeastern end of the Iron Mask batholith. A major fault is believed to extend along the southwestern side of the batholith. This structure projects into the AND area. Geology of the whole property is presented on Plate 2 while Plate 3 is a detailed map of the Phil showing area. Mapping was sufficiently detailed to examine virtually every outcrop of Iron Mask and Nicola rocks on the property.

AND Property

The rock units on the AND property are described below from oldest to youngest.

(1) Nicola Group (Units 1a and 1b)

Rocks of the Upper Triassic Nicola group are principally fine to medium grained, massive basalts, often with augite pheocrysts up to 1cm in length (Unit 1a). They are green and for the most part are fairly fresh. However, the northern part of the Joy I.P. anomaly shows highly fractured and weakly chloritized basalts with much less than one percent pyrite along fractures and abundant calcite veinlets. Basalts 600 metres east of the Phil showing are brecciated and cemented mainly with chalcedony but with minor amounts of malachite and azurite (less than 0.05% copper). Elsewhere only trace amounts of pyrite and chalcopyrite occur in the basalts.

The eastern part of the property consists mainly of argillite, argillite breccias, greywacke, impure quartzite and volcanoclastic sediments (Unit 1b). Argillaceous rocks contain minor disseminated pyrite and are rusty weathered. Locally, stockworks of quartz-calcite veinlets (30x15 metres) are present and contain up to 10% pyrite. No base metal sulfides were noted.

(2) Iron Mask batholith (Units 2a, 2b, and 2c)

The Iron Mask batholith is divided into three phases on the basis of texture and mineralogy (Northcote, 1974). The oldest phase (Hybrid, Unit 2a) consists of medium to coarse grained gabbro with coarse blebs of magnetite. They are often very heterogeneous in grain size, texture and mineralogy and are cut by the Cherry Creek phase. These rocks outcrop about 800 metres east-northeast of legal corner post for AND 5 and in the vicinity of the Phil showing (Plate 3).

Rocks of the Sugarloaf phase (Unit 2b) occur in the vicinity of the Phil showing. They are fine to coarse grained, porphyritic and are characterized by medium to coarse grained pheocrysts of hornblende in a plagioclase-rich matrix (overall 85% plagioclase and 15% hornblende). Brecciated zones are common wherever this rock unit outcrops (Plate 3), often accompanied by propylitic and K-feldspathic alteration and traces of pyrite and chalcopyrite.

The youngest phase of the batholith is the Cherry Creek (Unit 2c). Rocks of this phase are typically fine to medium grained diorites and monzonites that are characterized by fine and medium grained, ragged mafic minerals, principally biotite. Typically the diorites contain 80% plagioclase and 20% mafics (biotite, augite and magnetite) while the monzonites have 75% plagioclase, 10% K-feldspar and 15% mafics (biotite, augite and magnetite). These rocks outcrop mainly in the northern part of the claim group.

The Iron Mask batholith rocks are propylitized from the exposed southern end of the batholith through the Phil showing to a point 400 metres north of the AND 1 claim (Plate 2). Beyond this point biotite and feldspar are only very weakly altered. Propylitic alteration is defined by extensive alteration of biotite to chlorite and by weak alteration of feldspar to clay, sericite and epidote. Within this propylitic zone are areas of K-feldspathic alteration both of which may carry minor amounts of pyrite and chalcopyrite (Plate 3).

(3) Quartz monzonite porphyry (Unit 3)

A small plug of fresh quartz monzonite porphyry outcrops in the deep canyon on the east side of the property. Rocks are fine to medium grained and consist of roughly equal amounts of K-feldspar and plagioclase with about 25% quartz.

(4) Kamlooops Group (Units 4a, 4b, and 4c)

The Kamloops group (Miocene or earlier) consists of basaltic flows (Unit 4a), breccias (Unit 4b) and very minor sediments (Unit 4c). Flat-lying lavas are the principal rock type and cover the Triassic formations on the west side of the property. They are fine grained, non-magnetic, chocolate brown, vesicular and columnar jointed. The Kamloops group probably reaches its maximum thickness in the western part of the property. In this area rocks of the Iron Mask and Nicola may be capped by 125 metres or more of Kamloops volcanics. Prominent breccias occur on Shumway Hill and these are probably more than 150 metres thick in places. These breccias consist of subrounded basalt blocks (up to 40 cm across) in a fragmental basaltic matrix and may represent lahar deposits off an escarpment or a volcanic vent. Tertiary sediments (sandstone and siltstone) outcrop, just a short distance to the north of the Phil showing, at the base of the Kamloops flows and show grading bedding. The exposed thickness is in the order of one metre.

PHIL Showing

The Phil showing (00-30W on the AND Grid) denotes an area 100 by 125 metres on AND 1 in which copper mineralization is expressed in outcrops and old trenches (Plates 2 and 3). Hybrid phase is exposed in trenches in the western part of the showing while the Sugarloaf phase underlies the rest of the showing. Kamloops volcanics cap the Iron Mask rocks a short distance to the west.

Pyrite, chalcopyrite and bornite are erratically distributed in the showing occurring mainly in small zones of brecciation and in relatively well fractured areas. Mineralization is associated with widespread propylitic (epidote along fractures and as floodings and chloritization of mafics) alteration and with local patches of K-feldspathic alteration.

Extreme fracturing is evident in the western most trenches where a number of faults are indicated by intense shearing, gouge and slickensides. The dominant structural direction is northerly (170 to 185°) with moderate to steep westerly dips. This structural direction is evident in two prominent faults one expressed in the lower trench and the other in the top trench. A second fault system strikes 230° and dips 70° northerly.

The best zone of copper mineralization (6x0.75 metres) occurs in the footwall of one of the faults. This mineralization consists of chalcopyrite and bornite with which albite appears associated. Intense alteration has made rock identification difficult. The host rock a short distance away from the mineralization resembles the Hybrid phase. Accordingly it is believed that this mineralization is hosted by strongly altered Hybrid phase.

STRUCTURE

An evaluation of the regional structure of the property is hampered by lack of outcrops, however, a number of faults are evident (see Plate 2 and Phil showing discussion). The most demonstrable fault, besides those on the Phil showing, is located just northwest of Shumway Lake (along highway). It strikes 300° and apparently displaces a basalt-argillite contact approximately 400 metres. More speculative is the presence of a major fault (striking 320°) projected along the southwest side of the Iron Mask batholith from Afton and through Ajax Monte-Carlo Property. The extension of this fault into the AND area is obscured by the Tertiary volcanic capping and scarce outcrops.

GEOPHYSICS

The I.P. and magnetic survey on the AND grid is reported in a separate, attached report by D. Olson.

CONCLUSIONS

1. The AND property occurs in fractured and brecciated, younger phases of the Iron Mask batholith that are known to host significant copper mineralization elsewhere in the batholith. Kamloops volcanics cap the favourable Iron Mask rocks to the west.

2. Fracturing and brecciation is accompanied by widespread propylitic alteration with patches of K-feldspathic alteration which locally carries pyrite, chalcopyrite and bornite.

3. Mineralization in the Phil showing consists of chalcopyrite, bornite occurs in a K-feldspathized, albitized, and sericitized block of Hybrid phase gabbro.

4. A weak I.P. response occurs in Iron Mask rocks in a covered, central part of the property.

REFERENCES

1. Cockfield, W.E., 1948, Geology and Mineral deposits of the Nicola map area, B.C.,; G.S.C. Mem 249.

2. Northcote, K.E., 1974, Preliminary map of the west half of the Iron Mask batholith, B.C. Department of Mines.

3. Pentland, A., 1973 - Summary report for Joy Mining 1972.

ATTACHMENTS

1. Plate 1 - Location of AND Property, 1" - 4 miles (1:250,000).
2. Plate 2 - Geology of AND Property, 1":1000' (1:12,000).
3. Plate 3 - Geology of the Phil Showing, 1"=100' (1:12,00).

Appendix A Exhibit A
Statement of Expenditures

Appendix B Statutory Declaration in Support of Expenditures

Appendix C Statement of Qualifications
M.J. Osatenko

Appendix D Statement of Qualifications
R.U. Bruaset

Report by: M.J. Osatenko

Report by: R.U. Bruaset

MJO/RUB/isb

Approval for release
G. Harden
Manager

A P P E N D I X "A"

EXHIBIT "A"

STATEMENT OF EXPENDITURES FOR A GEOLOGICAL AND GEOPHYSICAL SURVEY ON THE AND MINERAL CLAIMS
1976

GEOLOGY		
Salaries		
R.U. Bruaset	June 5 - June 22, 1976 (18 days at $126/day)	$ 2,268
R. Webb	June 5 - June 22, 1976 (18 days at $57/day)	1,026
M.J. Osatenko	August 19 - September 1, 1976 (14 days at $140/day)	1,960
	Report writing and drafting 3 days at $110/day)	330
B. Ames	August 19 - August 26, 1976 (8 days at $57/day)	456
Supervision		
S.J. Pedley		400
Expense Accounts		
Accommodation and food in Kamloops (58 man days at $25/person/day)		1,450
TRANSPORTATION		
Truck for 1 month plus gas		800
GEOPHYSICS		
Line cutting, I.P. survey (includes all expenses)		12,374
	TOTAL EXPENDITURES	$21,064

A P P E N D I X "B"

IN THE MATTER OF THE
B.C. MINERAL ACT

AND

IN THE MATTER OF A GEOLOGICAL AND GEOPHYSICAL PROGRAM CARRIED OUT ON THE AND 1 - 10 MINERAL CLAIMS

Located in the Kamloops Mining Division

of the Province of British Columbia

More Particularly N.T.S. 92I/9W

A F F I D A V I T

WE, MYRON J. OSATENKO AND RAGNAR U. BRUASET, OF THE CITY OF VANCOUVER IN THE PROVINCE OF BRITISH COLUMBIA, MAKE OATH AND SAY:

1. THAT WE ARE EMPLOYED AS PROJECT GEOLOGISTS BY COMINCO LTD., AND AS SUCH HAVE A PERSONAL KNOWLEDGE OF THE FACTS TO WHICH WE HEREINAFTER DEPOSE;

2. THAT ANNEXED HERETO AND MARKED AS "EXHIBIT A" TO THIS OUR AFFIDAVIT IS A TRUE COPY OF EXPENDITURES OF A GEOLOGICAL AND GEOPHYSICAL PROGRAM CARRIED OUT ON THE AND 1-10 MINERAL CLAIMS;

3. THAT THE SAID EXPENDITURES WERE INCURRED BETWEEN THE FIFTH DAY OF JUNE 1976 AND THE 1st DAY OF SEPTEMBER 1976 FOR THE PURPOSE OF MINERAL EXPLORATION ON THE ABOVE NOTED CLAIMS.

Sworn Before Me at the City of Vancouver in the Province of British Columbia this 24th day of March, 1977

Myron J. Osatenko
MYRON J. OSATENKO

A NOTARY PUBLIC IN AND FOR
THE PROVINCE OF BRITISH COLUMBIA

Ragnar U. Bruaset
RAGNAR U. BRUASET

A P P E N D I X "C"

COMINCO LTD.

EXPLORATION WESTERN DISTRICT

STATEMENT OF QUALIFICATIONS

I, MYRON J. OSATENKO, OF THE CITY OF VANCOUVER, BRITISH COLUMBIA, HEREBY CERTIFY:

1. THAT I AM A GEOLOGIST, RESIDING AT 6437 - 116th STREET,DELTA, BRITISH COLUMBIA WITH A BUSINESS ADDRESS AT 2200-200 GRANVILLE SQUARE, VANCOUVER BRITISH COLUMBIA.

2. THAT I GRADUATED WITH B.SC. and M.SC. DEGREES IN GEOLOGY FROM THE UNIVERSITY OF BRITISH COLUMBIA IN 1965 AND 1967 RESPECTIVELY.

3. THAT I HAVE PRACTISED GEOLOGY WITH COMINCO LTD. FROM 1967 TO 1977.

DATED THIS 18th Day of March 1977 at Vancouver, British Columbia

SIGNED Myron Osatenko

Myron J. Osatenko, M.Sc.

A P P E N D I X "D"

COMINCO LTD.

EXPLORATION WESTERN DISTRICT

STATEMENT OF QUALIFICATIONS

I, RAGNAR U. BRUASET, OF THE CITY OF VANCOUVER, BRITISH COLUMBIA, HEREBY CERTIFY:

1. THAT I AM A GEOLOGIST, RESIDING AT 6137 RUMBLE STREET, S. BURNABY, B.C. WITH A BUSINESS ADDRESS AT 2200-200 GRANVILLE SQUARE, VANCOUVER, BRITISH COLUMBIA.

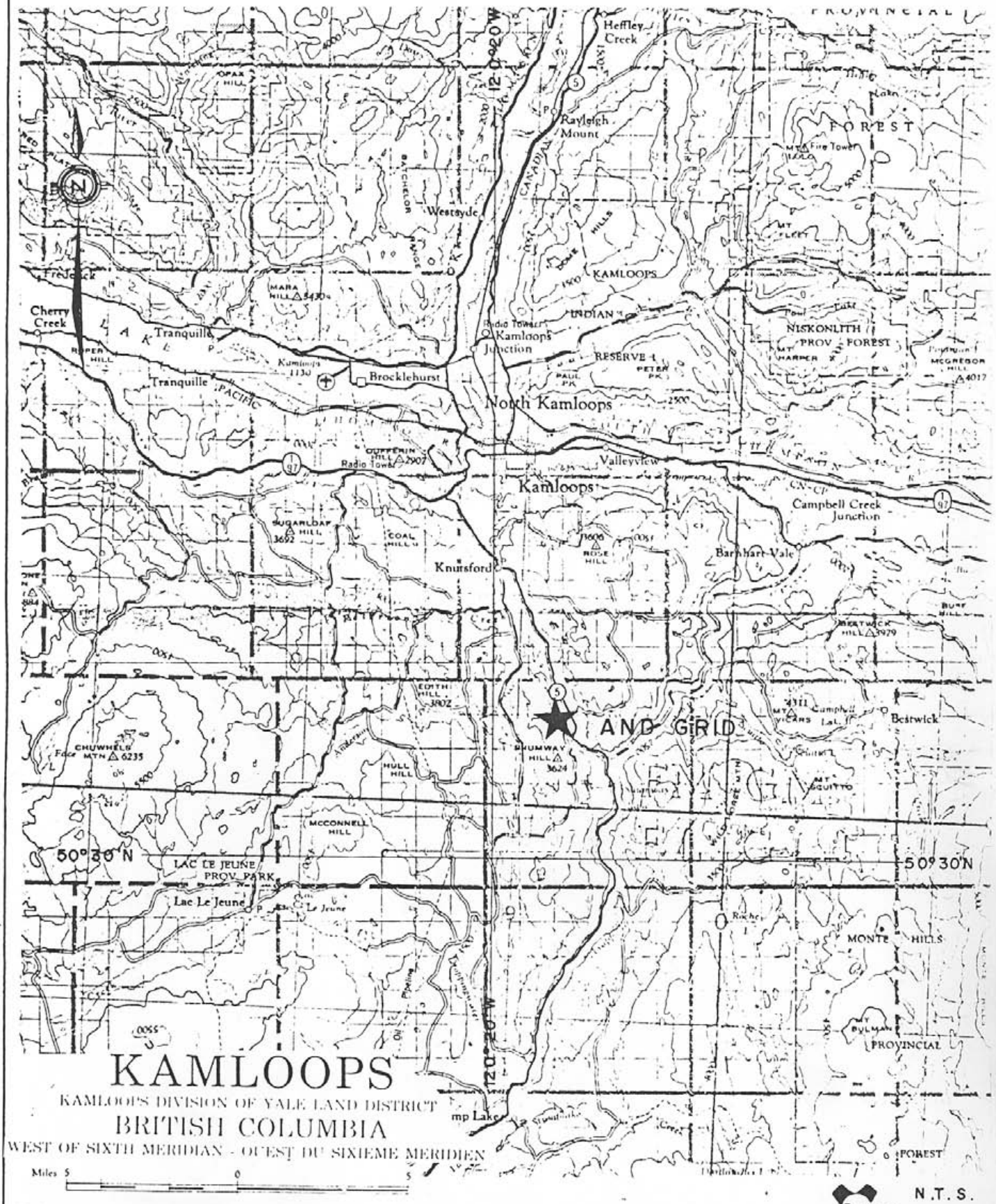
2. THAT I GRADUATED WITH A B.SC. DEGREE IN GEOLOGY FROM THE UNIVERSITY OF BRITISH COLUMBIA IN 1967.

3. THAT I HAVE PRACTISED GEOLOGY WITH COMINCO LTD. FROM 1967 to 1977.

4. THAT I HAVE BEEN INVOLVED IN ALL PHASES OF PORPHYRY COPPER EXPLORATION AND DEVELOPMENT WITH COMINCO LTD. SINCE 1968.

DATED THIS 18th DAY OF MARCH 1977 AT VANCOUVER, BRITISH COLUMBIA

SIGNED _____
Ragnar U. Bruaset



KAMLOOPS

KAMLOOPS DIVISION OF YALE LAND DISTRICT

BRITISH COLUMBIA

WEST OF SIXTH MERIDIAN - OUEST DU SIXIEME MERIDIEN

Miles 5 0 5

TO ACCOMPANY A REPORT BY D. P. OLSON _____

N.T.S. 92 I/9W

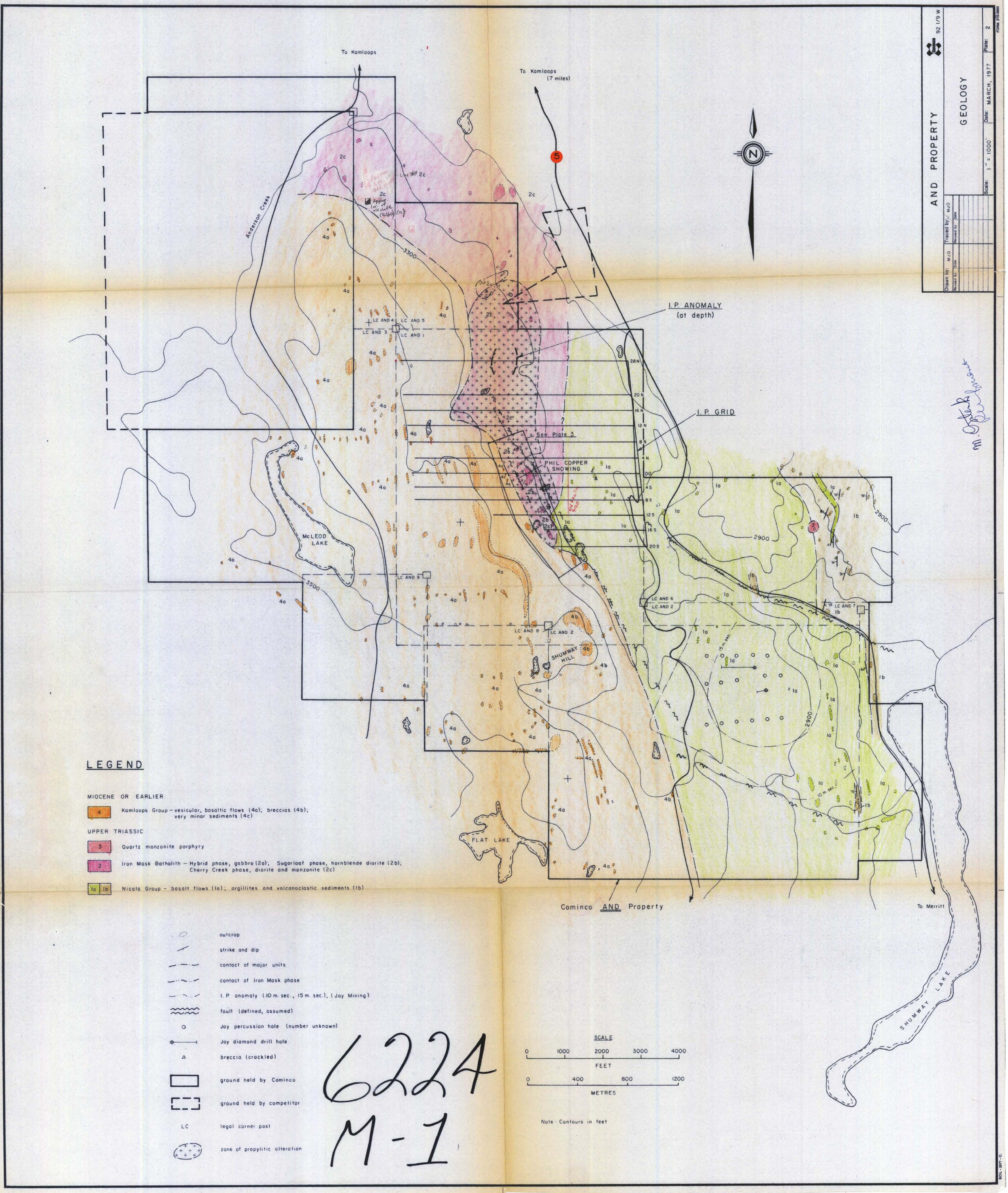
Drawn by:		Traced by:	
Revised by	Date	Revised by	Date

AND GRID

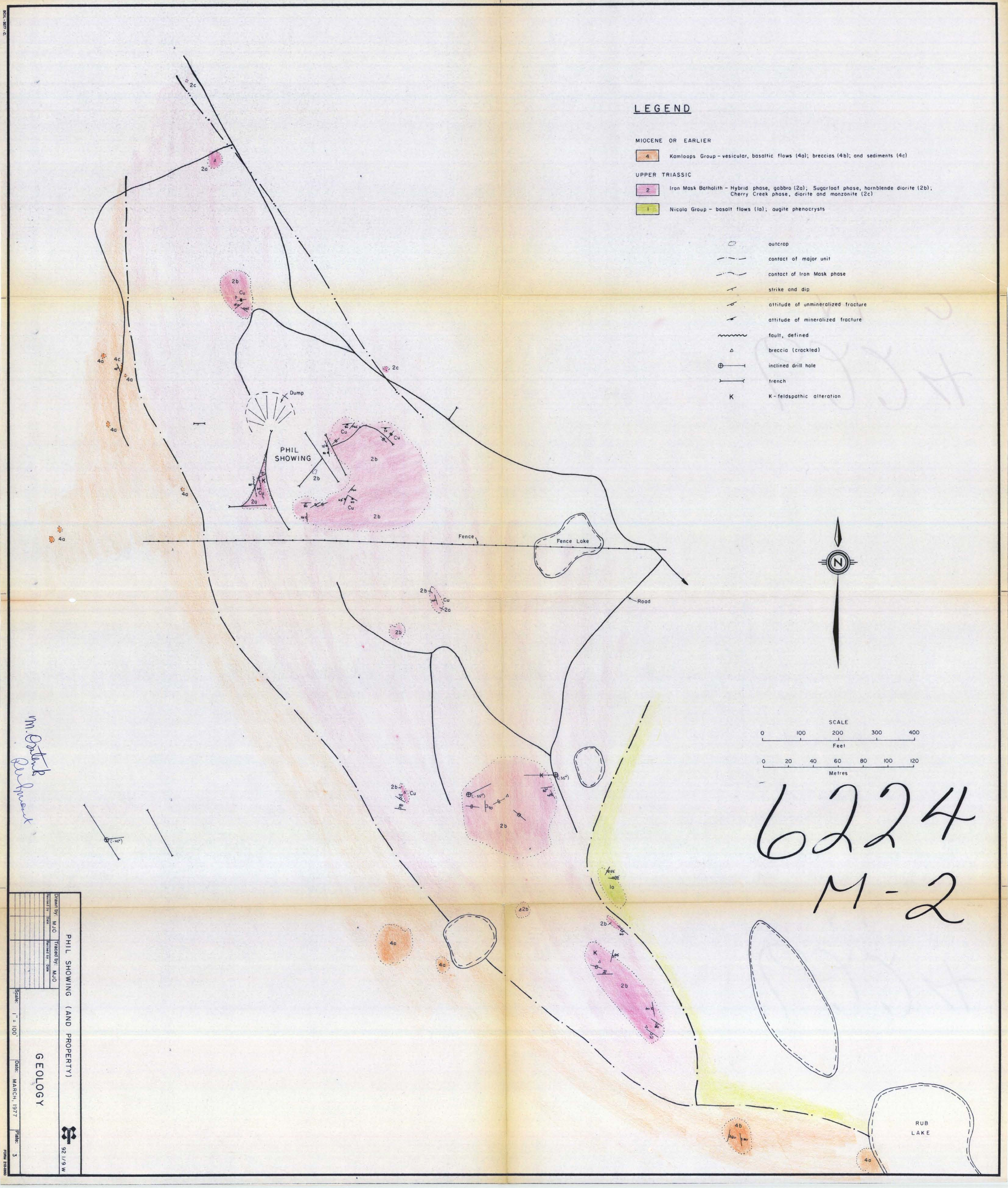
LOCATION MAP

KAMLOOPS AREA, KAMLOOPS M.D., B.C.

Scale: Scale 1:250,000 Date: MARCH 1976 Plate



AND PROPERTY
GEOLOGY
92 I/9 W
Drawn by: MJO
Traced by: MJO
Scale: 1" = 1000'
Date: MARCH, 1977
Plate: 2
FORM 210-0660
To Kamloops
To Kamloops (7 miles)
Anderson Creek
Appr. loc. of old shaft (4160)
Line 76N
2c
2b
4a
4b
1a
1b
3300
3500
2900
I.P. ANOMALY (at depth)
I.P. GRID
See Plate 3
PHIL COPPER SHOWING
old base line 4160
LC AND 4
LC AND 5
LC AND 3
LC AND 1
LC AND 9
LC AND 8
LC AND 2
LC AND 6
LC AND 7
28N
20N
16N
12N
8N
4N
00
4S
8S
12S
16S
20S
15 m. sec.
10 m. sec.
McLEOD LAKE
SHUMWAY HILL
FLAT LAKE
SHUMWAY LAKE
Cominco AND Property
To Merritt
LEGEND
MIOCENE OR EARLIER
4 Kamloops Group – vesicular, basaltic flows (4a); breccias (4b); very minor sediments (4c)
UPPER TRIASSIC
3 Quartz monzonite porphyry
2 Iron Mask Batholith – Hybrid phase, gabbro (2a); Sugarloaf phase, hornblende diorite (2b); Cherry Creek phase, diorite and monzonite (2c)
1a 1b Nicola Group – basalt flows (1a); argillites and volcanoclastic sediments (1b)
outcrop
strike and dip
contact of major units
contact of Iron Mask phase
I. P. anomaly (10 m. sec., 15 m. sec.), (Joy Mining)
fault (defined, assumed)
Joy percussion hole (number unknown)
Joy diamond drill hole
breccia (crackled)
ground held by Cominco
ground held by competitor
LC legal corner post
zone of propylitic alteration
SCALE
0 1000 2000 3000 4000
FEET
0 400 800 1200
METRES
Note: Contours in feet
6224
M-1
BCIL - 2077 - C.


LEGEND
MIOCENE OR EARLIER
4 Kamloops Group - vesicular, basaltic flows (4a); breccias (4b); and sediments (4c)
UPPER TRIASSIC
2 Iron Mask Batholith - Hybrid phase, gabbro (2a); Sugarloaf phase, hornblende diorite (2b); Cherry Creek phase, diorite and monzonite (2c)
1 Nicola Group - basalt flows (1a); augite phenocrysts
outcrop
contact of major unit
contact of Iron Mask phase
strike and dip
attitude of unmineralized fracture
attitude of mineralized fracture
fault, defined
breccia (crackled)
inclined drill hole
trench
K - feldspathic alteration
PHIL SHOWING
Dump
Fence
Fence Lake
Road
RUB LAKE
N
SCALE
0 100 200 300 400
Feet
0 20 40 60 80 100 120
Metres
6224
M-2
PHIL SHOWING (AND PROPERTY)
GEOLOGY
Drawn by: MJO
Traced by: MJO
Revised by Date
Revised by Date
Scale: 1" = 100'
Date: MARCH, 1977
Plate: 3
92 I/9 W
FORM 210-0660
BCIL - 2077 - C