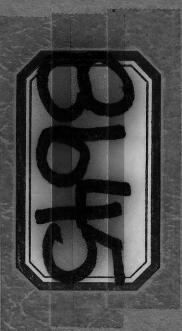
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Geological and Geochemical Report on the MAKALU Mining Claim, Slucan Mining Division, B.C. NTS 82 - K - 14E Oct, 1980 Union Oil Co. of Can. Ltd.



GEOLOGICAL AND GEOCHEMICAL REPORT ON THE

MAKALU MINING CLAIM

SLOCAN MINING DIVISION, BC

Lat: 50° 48' N Long: 117° 10' W

NTS 82-K-14E

October, 1980

H.M. Wise, P. Eng. Union Oil Company of Canada Ltd. Calgary, Alberta

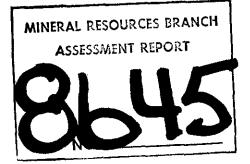


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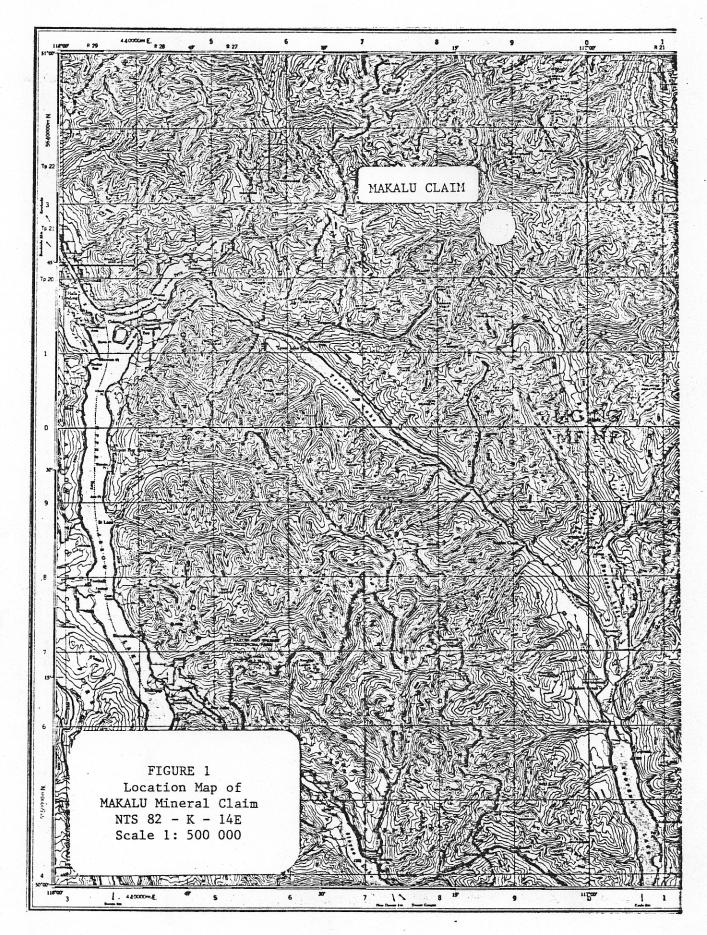
GEOLOGICAL AND GEOCHEMICAL REPORT ON THE MAKALU MINING CLAIM, SLOCAN MINING DIVISION, B.C.

Summary

An equigranular biotite granodiorite stock has intruded a mixed sequence of clastic and calcareous sedimentary rocks. Near the contact, the clastic rocks have been metamorphosed to various types of phyllite, schist or gneiss, and the calcareous rocks have been metamorphosed to tremolite-actinolite-garnet skarn.

Small greisen-like zones of quartz-muscovite alteration occur within the biotite granodiorite. Very minor molybdenite is associated with these quartz-muscovite zones. Quartz and sericite also occur along widespaced joints throughout the stock.

Scheelite and powellite were found within garnet skarn at one location on the property and within massive pyrrhotite-chalcopyrite pods within tremolite skarn. Highbackground tungsten occurs in soil near the margin of the granodiorite. The highly anomalous tungsten values occur in close proximity to the known occurrences of scheelite and powellite.



- 2 -

Introduction

<u>General</u>

This report summarizes work performed on the MAKALU Claim, Slocan Mining Division from August 25 to September 2, 1980.

Location and Access

The MAKALU claim is located on the east side of the Duncan River approximately 2 km north of the mouth of the Westfall River. (Figure 1).

Access to the property is by the Duncan River Forest Access Road from Cooper Creek on Highway 31. This is a distance of 90 km, and takes 2 hours. The road is suitable for a 2-wheel drive vehicle.

The terrain is steep, with a relief of almost 2000 meters over a horizontal distance of 3000 meters. Treeline occurs at about the 1800 meter elevation. There is a small glacier at the head of Plug Creek, and a larger icefield to the east and south of the claims.

Mineral Claims

The MAKALU property consists of the following mineral claims:

MAKALU (20 units):	Record No.	1554	
Mak 1-7 (7 claims):	Record Nos.	1555 -	1561

This totals 27 claim units. All work was done on the MAKALU claim.

Geology

General

The regional geology of the MAKALU area has been mapped by J.O. Wheeler of the GSC and published at a scale of 1 inch = 2 miles as Open File Report 432. The sedimentary rocks that occur on and near the MAKALU claim block are part of the Upper Division of the Horsethief Creek Group of Proterozoic age.

Wheeler mapped the Marsh Adams quartzite, part of the Hamill Group of Proterozoic or Cambrian age as occurring in the bottom of the Duncan River Valley, but there was no outcrop of this rock type on the Makalu claims. A smaller outlier of Marsh Adams quartzite has also been mapped on the ridge southeast of the MAKALU claim.

The sedimentary rocks have been intruded by a biotite granodiorite stock that Wheeler has dated as Cretaceous in common with the nearby Battle Range,Sugar Plum and Bugaboo batholiths. The intrusion of the stock has caused adjacent strata to be metamorphosed.

Clastic Sedimentary Rocks (Unit 2)

The dominant facies within the clastic succession is a grey-brown siltstone. This unit has been generally metamorphosed to biotite phyllite, quartz-mica-chlorite schist, and quartz-biotite-chlorite gneiss.

The siltstone that forms the eastern edge of the claim group is well-bedded and does not contain any pyrite.

A second unit of siltstone is separated from the main clastic succession by a limestone-bearing unit 150 meters thick. The central siltstone formation is approximately 300 meters thick and consists of black calcareous siltstone. Pyrite is ubiquitous within this unit. The unit also undergoes a marked facies change on the Makalu claim. On the cliffs at the head of Plug Creek it is a foliated calcareous siltstone, while in the creek bed further northwest it changes to a thin-bedded siltstone.

White quartzite that might be part of the Marsh Adams Formation was mapped at an elevation of 5500 ft. south of Plug Creek and also 400 m further west at 5000 ft elevation. The latter occurrence may have been a boulder as exposure was poor.

Carbonate Rocks (Unit 3)

There are three formations of limestone that occur on the Makalu claims; only two have been mapped and appear on the accompanying geologic plan. The third is exposed high on the cliffs that parallel the south boundary of the claim.

The limestone band that occurs furthest to the northeast consists of two formations containing actinolite-tremolite skarn and a central zone that contains biotite phyllite and an amphibolite gneiss unit. The skarn is discussed in more detail later in this report.

The central limestone unit is well-exposed along the base of cliffs forming the south side of Plug Creek. In a similar manner to the central clastic unit, the central carbonate unit has a facies change from grey, thick-bedded silty limestone in the southeast to a grey, thin-bedded limestone with a high shale content to the northwest. This unit also is altered to skarn close to the intrusive contact.

Intrusive Rocks (Unit 1)

A plug of equigranular biotite granodiorite is exposed over the northwestern half of the property. The rock is generally fresh, but occasionally shows weak development of kaolin within the feldspars.

Fracturing and jointing are not well developed. The greatest density observed was up to 10 fractures per meter in an outcrop near the bottom of North Creek. Most fractures on the property showed weak sericite and some quartz as a thin selvage along the fracture. Very rarely quartz veins were observed that appeared to cut the quartzsericite joints. These quartz veins were noted most commonly near the east contact of the stock. Small greisen-like zones of massive quartz-sericite alteration were observed infrequently. Two locations where these zones occurred were 700 meters southwest of the northeast claim post and at the 4000 foot elevation on Center Creek. Very minor molybdenite was seen in the miarolitic quartz-sericite zone at the first location; a picked highgrade sample (1609) ran 211 ppm Mo. The greisen zone at this location measured less than 2 meters square. The lower area of massive quartzsericite alteration had several pods over a much larger area, but prospecting failed to locate any molybdenite.

Aplite dykes that are too narrow to be mappable occur occasionally both within the granodiorite and in the sedimentary rocks. They are more common near the east contact of the stock. There is an outcrop of thin bedded pyritic black siltstone in Plug Creek at the 5700 foot elevation in which 2 aplite dykes cut across a white quartz vein. The aplite dykes follow the foliation of the siltstone.

Skarn (Unit 4)

The limestone units on the property have been altered to skarn near the contact of the batholith. While the central unit is altered to about 300 meters from the contact, the northeastern unit is altered to at least 900 meters from the surface expression of the granodiorite.

The most common alteration is a pale green and white banded skarn that likely consists of tremolite and actinolite. Locally, and generally next to the contact, the skarn contains appreciable garnet.

The northeastern unit contains a bed of tremolite skarn approximately 3 meters thick that has been traced for 900 meters. No sulphides have been seen within this unit. Within the tremolite skarn are pods of massive pyrrhotite up to 2 meters wide and 5 meters along strike. These pods also contain minor chalcopyrite, pyrite and scheelite.

Economic Geology

Sulphides are very rare within the granodiorite. Pyrite occurs in fractures on North Creek near the northwest claim corner and also southwest of the northeast corner. As mentioned earlier, very minor molybdenite was seen in a small miarolitic quartz-sericite zone in the northeastern quadrant of the property.

Some fractures contained limonite, probably due to weathering of the biotite content of the granodiorite.

Garnet skarn from the central carbonate unit contained some scheelite in specimens that also contained 1% disseminated pyrrhotite. Samples without sulphide did not lamp any scheelite. Sample 1678 is a composite of garnet skarn from this area; it assayed 780 ppm tungsten.

The tremolite bed in the northeast carbonate unit contains pods of massive pyrrhotite with minor chalcopyrite and pyrite. Samples of pure sulphide taken near the granodiorite contact lamped scheelite. Sample 1478, which assayed 0.33% W, is a picked sample of pyrrhotite-chalecopyrite scheelite. Sample 1479, from the same area, contained more gangue minerals and ran 0.09% W. The massive sulphide pods were also seen in the cirque at the head of Plug Creek, but here no scheelite was found. Sample 1696 ran only 20 ppm W.

Soil Geochemistry

The soils on the Makalu property appear to be derived in place. Rock fragments within the soil accurately reflect the nearby outcrop, although the surface is so steep that downslope migration is inevitable.

Soil samples were collected from the B horizon as much as possible, generally at a depth of about 18 cm. Organic samples were avoided, but in some cases C Horizon samples were included. Soil colours were generally grey-brown to red-brown.

All samples were analyzed for molybdenum and tungsten by Bondar-Clegg and Company Limited in Vancouver. The results are listed in Appendix IV and the method of analysis is listed in Appendix V. The results are plotted at a scale of 1:5000 on the map "Soil and Rock Geochemistry" which is the map folder.

Molybdenum values on the property are very low. 85% of the samples are below 10 ppm, and the 95th percentile occurs at 25 ppm. The maximum value recorded was 40 ppm. The most consistent anomaly occurred east of Plug Creek, coincident with the garnet skarn outcrop. Minor molyscheelite and powellite in the skarn can account for this anomaly.

Two samples at the 4000 foot elevation of Center Creek had anomalous molybdenum. These are coincident with the zone of quartz-sericite alteration and provide evidence that the zone is very limited in size.

Elsewhere on the property the anomalous samples are very weak and scattered.

In contrast to the molybdenum, tungsten values are quite high. 46% of the samples contain 10 ppm W or more. The 95th percentile occurs at 50 ppm tungsten. The maximum value recorded was 1575 ppm.

The largest and strongest tungsten anomaly is coincident with the pyrrhotite-bearing tremolite skarn. Samples are highly anomalous for 600 meters along strike. (Samples 1560-1564; 1453-1455)

The garnet skarn in the central carbonate unit also is geochemically anomalous. The values here no doubt reflect the scheelite content of the skarn.

Elsewhere on the property the tungsten values are low, and the anomalies are scattered.

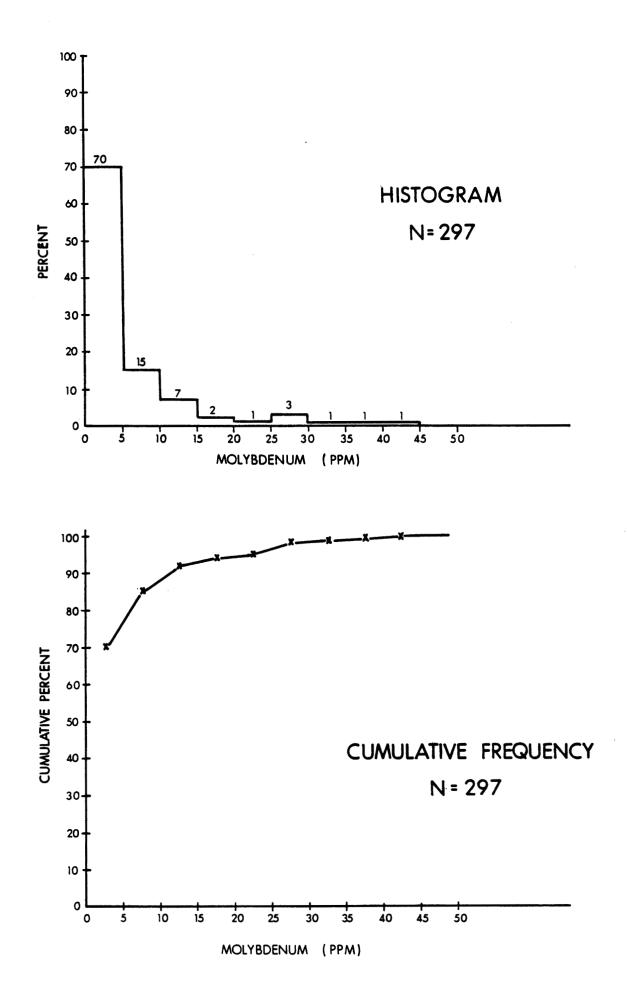
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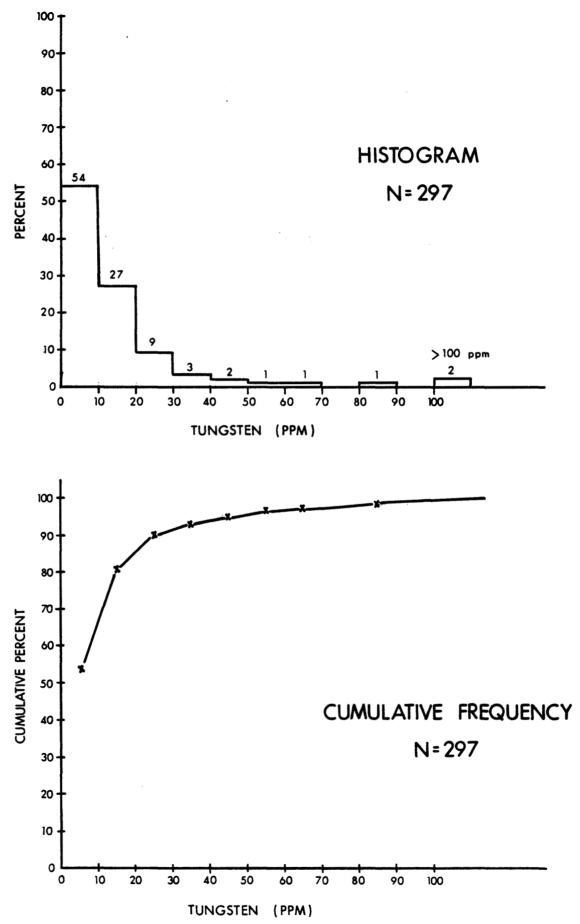
Conclusions

A strong tungston soil geochemical anomaly can be traced for at least 600 meters alon the strike of a bed of tremolite skarn that contains pods of massive pyrrhotite-chalcopyrite. The skarn is developed close to and in an embayment within a stock of equigranular biotite granodiorite. Scheelite has been observed within the massive sulphide pods.

Only a trace of molybdenite has been seen on the property. Molybdenum soil values are generally low.

Future work should be confined to the tungsten-bearing skarn zone.





APPENDIX I

STATEMENT OF QUALIFICATIONS

I, H. Michael Wise, P. Eng. of the City of Calgary, Alberta, do hereby certify as follows:

- 1. That I am a Geological Engineer registered in the Province of Alberta.
- 2. That I am a graduate of Queen's University, Year 1968, and the University of California, Year 1970, and that I have been practising my profession since that time.
- 3. That the foregoing report on the MAKALU claims is based on field work carried out under my direction and my personal examination of the claims.

1)is

H. Michael Wise, P. Eng.

APPENDIX II

Names and addresses of all persons employed in performing work.

- H. Michael Wise
 1200 335 8th Ave. S.W.
 Calgary, Alberta
- Brian Meyer
 1200 335 8th Avenue S.W.
 Calgary, Alberta
- 3. James Bland 86 Mill St South Brampton, Ontario
- Neil Warner
 412 17th Avenue N.W.
 Calgary, Alberta

All the above persons were engaged in work on the MAKALU claims from August 25, 1980 to September 2, 1980

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APPENDIX III

STATEMENT OF EXPENDITURES

MAKALU CLAIMS

Salaries

Dataites			
B. Meyer 8 da N. Warner 7 da	ays @ \$222/day ays @ \$105/day ays @ \$ 86/day ays @ \$ 86/day	= \$1,776.00 = 840.00 = 602.00 = <u>602.00</u> \$3,820.00	\$3,820.00
<u>Camp Costs</u>			
24 man-days @ \$40.00/day			060.00
24 man-days @ \$40.00/day			960.00
Helicopter			
Okanagan Helicopters Ltd. (H	Bell 206 B)		
2.7 hrs. @ \$380.00/hour Fuel @ \$40.00/hr.		\$1,026.00 <u>108.00</u> \$1,134.00	\$1,134.00
Vehicle			
Tilden Rentals Ltd. (Chev Bl	lazer)		
8 days @ \$21.67/day 1000 km @ 10¢/km Fuel @ 3¢/km Insurance @ \$5/day		$ \begin{array}{r} $ 173.30 \\ 100.00 \\ 30.00 \\ \underline{40.00} \\ $ 343.30 \\ \end{array} $	\$ 343.30
<u>Geochemical Assays (Mo, W)</u>			
Soil Samples: 297 samples @ Rock Samples: 14 samples @ Shipping	@ \$5.90/sample \$7.40/sample	\$1,752.30 103.60 <u>10.00</u> \$1,865.90	\$ 1,865.90
Report Preparation			
Senior Geologist 3 days @ \$2 Junior Geologist 3 days @ \$1 Drafting		\$ 666.00 315.00 <u>500.00</u> \$1,481.00 TOTAL	\$ 1,481.00 \$ 9,604.20

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AMW:

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Extraction						Report No.	20 -	2078 PR	OJECT:	P.O. #	<u>106716</u> 17 WISE
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Fraction Used					Date September 12					19 80	
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SBS	1370	2	5			SBS	1517	3	11		
	1371	< 1	5				1518	4	15		
	1372	1	5				1519	3	10		
	1373	1	6				1520	3	10		
	1374	1	5				1521	4	15		
	1375	4	7				1522	4	9		
	1376	5	9				1523	2	10		
	1377	4	6				1525	4	10		
	1378	5	11				1526	3	14		
	1379	6	10				1527	2	30		
·	1380	6	10				1528	6	21		
	1381	3	5				1529	4	19		
· ·	1382	4	5	·			1530	3	12		
	1500	2	5				1531	4	15		
	1501	2	8				1532	4	8		
	1502	5	30				1533	6	8		
	1503	6	14				1534	3	9		
	1504	12	25				1535	2	9		
	1505	11	23		-		1536	4	11		
	1506	25	50				1537	7	12		
	1507	7	17				1538	4	12		
	1508 /	4	20				1539	3	10		1
	1509	6	20				1540	1	9		
	1510	4	19			SHS	1600	6	10		
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Page No._____2

SAMPLE NO.	Mo ppm	W ppm	SAMPLE NO.	Mo ppm	W ppm	
SHS 1607	5	6	SHS 1644	24	14	
1608	11	38	1645	2	5	
1610	2	14	1646	4	5	
1611	3	15	1647	10	6	
1612	2	10	1648	2	5	
1613	3	20	1649	1	5	
1614	1	5	1650	2	5	
1615	1	5	1651	2	6	
1616	< 1	4	1652	1	5	
1617	2	4	1653	3	9	
1618	< 1	5	1654	1	10	
1619	3	15	1655	3	11	
1620	5	15	1656	3	7	
1621	2	5	1657	1	9	
1622	1	9	1658	4	4	
1623	1	10	1659	2	4	
1624	_ < 1	8	1660	3	3	
1625	1	5	1661	3	13	
1626	2	6	1662	15	63	
1627	1	6	1664	15	43	
1628	5	5	1665	7	80	
1629	2	5	1666	13	43	
1630	1	6	1667	11	30	
1631	< 1	5	1668	11	23	
1632	2	12	1669	7	20	
1633	4	6	1670	5	16	
1634	1	9	1671	3	45	
1635	< 1	4	1672	4	3	
1636	1	4	1673	4	4	
1637	1	5	1674	5	14	
1638	2	5	1675	25	145	
1639	1	5	1676	33	68	
1640	2	4	1677	25	20	
1641	< 1	5	1679	12	8	
1642	2	6	1680	25	9	

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Geochemical Lab Report

Page No._____3

SAMPLE NO.	Mo ppm	W ppm			SAMP	LE NO.	Mo	, W ppm	
SHS 1681	23	18			SMS	1388	4	11	1
1682	12	23				1389	5	23	
1683	15	17				1390	3	23	
1684	3	12				1391	3	6	
1685	7	28				1392	4	18	
1686	2	15				1393	28	25	
1687	3	18				1394	4	13	
1688	5	6				1396	2	6	
1689	9	6				1397	2	6	
1690	3	4				1398	3	13	
1692	7	7				1399	1	6	
1693	19	16				1400	2	6	
1694	7	5				1401	2	5	
1695	2	6				1402	2	3	
1891	37	13				1403	4	16	
SHL 1354	3	3	Not M	ARKAL	<u>ى</u>	1404	4	3	
1355	2	3	J CIN			1405	2	13	
SMS 1356	2	4				1406	1	3	
1357	1	3				1407	7	3	
1358	2	3				1408	3	3	
1359	2	4				1409	3	3	
1360	2	4				1410	2	6	
1361	2	6				1411	2	6	
1362	2	6				1412	4	11	
1363	2	4				1413	2	11	
1364	3	6				1414	4	. 13	
1365	3	4				1415	5	8	
1366	3	6				1416	3	11	
1367	1	6				1417	5	8	
1368	1	8				1418	1	9	
1369	3	6				1419	3	8	
1384	4	3				1420	3	3	
1385	5	11				1421	1	6	
1386	4	6				1422	2	4	
1387	3	11				1423	2	7	

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Geochemical Lab Report

SAMPLE NO.	p par Mo	рўш	SA	MPLE NO.	Mo ppm	ррш. W	
SMS 1424	2	6	SM	IS 1461	3	9	
1425	3	8		1462	5	6	
1426	3	7		1463	7	8	
1427	2	6		1464	2	23	
1428	3	6		1465	1	4	
1429	3	• 3		1466	5	9	
1430	3	3		1467	< 1	6	
1431	2	6		1468	9	3	
1432	1	7		1469	3	6	
1433	1	4		1470	28	6	
1434	1	4		1471	18		
1435	2	4		1472	5	4	
1436	2	8		1473	11	3	
1437	2	12		1474	4	3	
1438	2	6		1475	25	3	
1439	<1	6		1476	28	4	
1440	2	6	s	WS 1541	1	3	
1441	< 1	4		1542	1	3	
1442	1	13		1543	2	3	
1443	1	7		1544	7	4	
1444	1	11		1545	2	21	
1445	1	6		1546	2	13	
1446	5	7		1547	4	21	
1447	2	16		1548	3	13	
1448	2	25		1549	4	33	
1449	6	45		1551	3	43	
1450	4	3		1552	4	20	
1453	23	270		1553	10	55	
1454	13	1575		1554	11	45	
1455	13	610		1555	5	38	
1456	2	11		1556	6	26	
1457	4	11		1557	11	45	
1458	1	13		1558	12	23	
1459	10	55		1559	4	15	
1460	3	25		1560	8	180	

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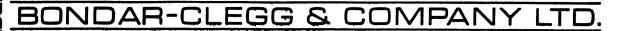
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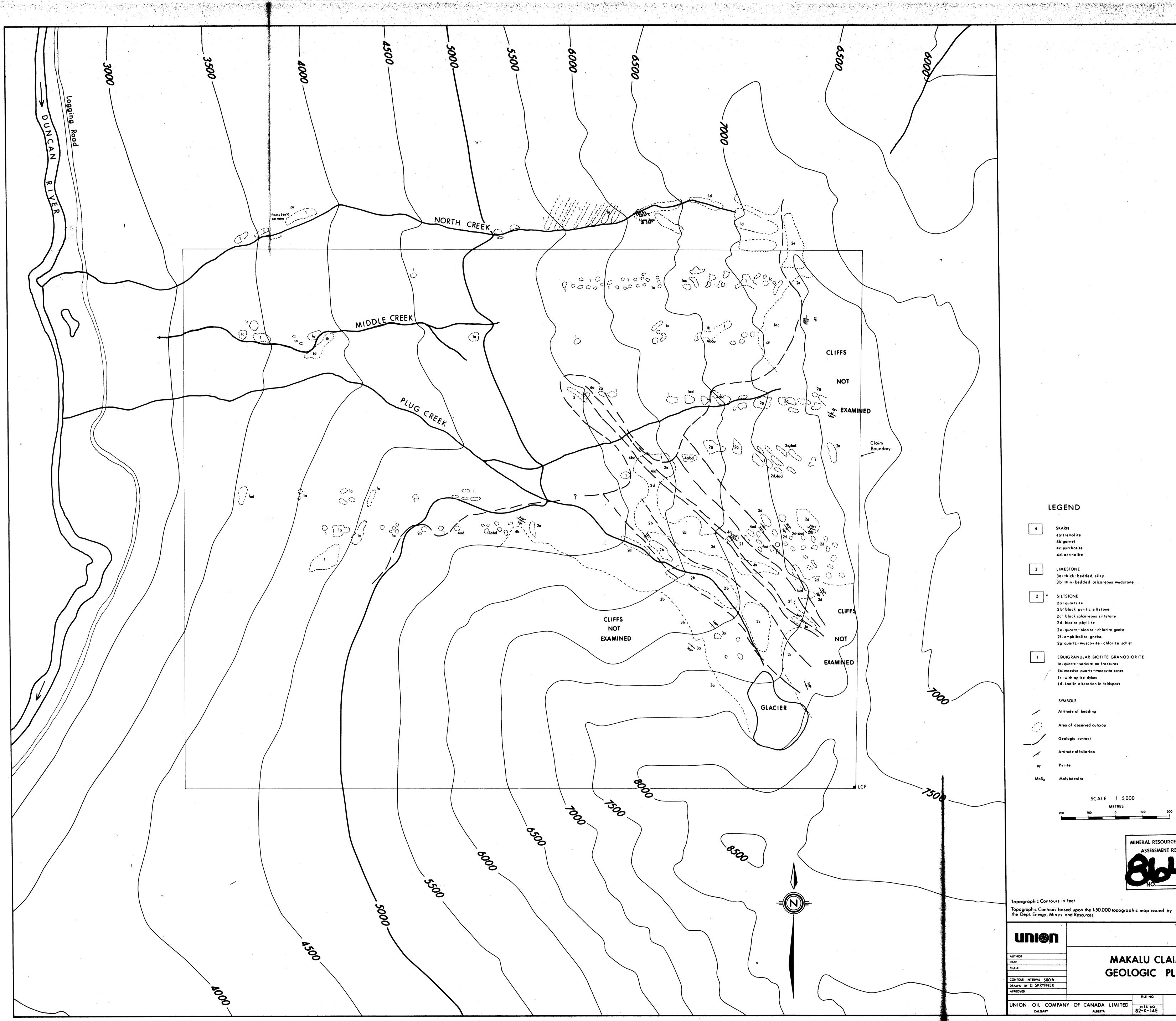
SAMPL	EŅO.	Мо ррш	ppm			SAMPLE NO.	Mo ppm	W ppm	
SWS	1561	23	115			SMR 1383	2	6	
	1562	3	33			1451	2	30	
	1563	5	80			1452	1	3	
	1564	5	80			1478	9	>2000	
	1565	4	6			14 79	10	945	
	1566	2	4			SWR 1550	2	25	
	1567	2	6			1583	4	8	
	1568	3	13						
	1569	1	6						
	1570	1	3						
	1571	1	6						
	1572	< 1	6						
	1573	9	18						
	1574	10	23						
	1575	11	33						
	1576	10	. 18						
	1577	16	23						
	1578	14	13						
	1579	1	3						
	1580	< 1	3						
	1581	4	13						
	1582	40	16						
	1584	1	3						
	1585	4	3						
	1586	4	8						
	1587	7	13						
	1588	6	8						
SBR	1704 ROCKS	1	21						
SHR	1609	211	43						
	1643	3	4						
	1663	13	6						
	1678	6	750						
	1696	2	20						
	1697	3	3						
SMR	1353	3	1440	N.H	MAK	ALU Claims			



130 PEMBERTON AVE., NORTH VANCOUVER, B.C. V7P 2R5 PHONE: 985-0681 TELEX: 04-352667

Fraction used for analysis: Rocks - 100 mesh; soils/sediments - 80 mesh unless otherwise noted.

ELEMENT Cu, Pb, Zn, Mo, Ag, Cd, Ni, Co, Mn, Fe	EXTRACTION Hot Lefort Aqua Regia Multi Acid	METHOD OF ANALYSIS Atomic Absorption
U	Hot Conc HNO ₃ Hot Multi-Acid 1% Sodium Bicarbonate; 20°C Basic Oxidizing; 20°C 1% Acetic; 20°C 0.1N HNO ₃ ; 20°C	Fluorimetric
		Delayed Neutron Activation
W	Basic oxidizing fusion	Colorimetric
F	Basic Fusion	Citrate Buffer-Specific Ion
Au, Pt, Pd	Fire Assay and Hot Aqua Regia	Atomic Absorption
As	HC10 ₄ - HNO ₃ Arsine	Colorimetric
Hg	Aqua Regia	Closed Cell, Flameless Atomic Absorption
Sn, Sb, Ba, Rb, Sr, Y Zr, Nb, La, Ce, Ti	*********	Energy dispersive XRF
Th, Se, Ta, Ga, In		Discrete angle/cathode XRF
Bi	Hot Conc HNO ₃	Atomic Absorption
	Multi Acid	
V, Be, Li	Multi Acid	Atomic Absorption
Cr	Sodium Peroxide Fusion	Atomic Absorption
TI, Re	Multi Acid + Organic	
	Extraction	Atomic Absorption
В		Emission Spec
	Fusion + H ₂ SO ₄	Colorimetric
P	Multi Acid	Colorimetric
S		Leco Induction Furnace
WHOLE ROCK ANALYSIS		
SiO ₂ P ₂ O ₅	Multi Acid + Fusion	Gravimetric
K ₂ O Na ₂ O	Multi Acid + Fusion	Atomic Emission
CaO MgO MnO Fe Al ₂ O ₃	Multi Acid + Fusion	Atomic Absorption
TiO2	Multi Acid + Fusion	Colorimetric
S		Leco Induction Furnace
Other:		



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MAKALU CLAIMS GEOLOGIC PLAN

FILE NO.

MINERAL RESOURCES BRANCH ASSESSMENT REPORT

SCALE 1 5,000

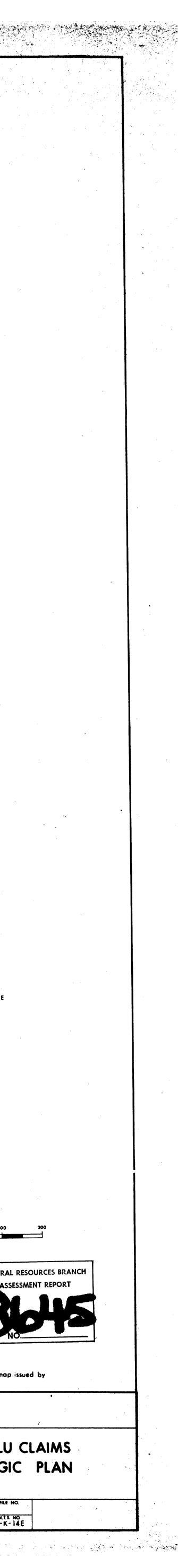
SYMBOLS Attitude of bedding

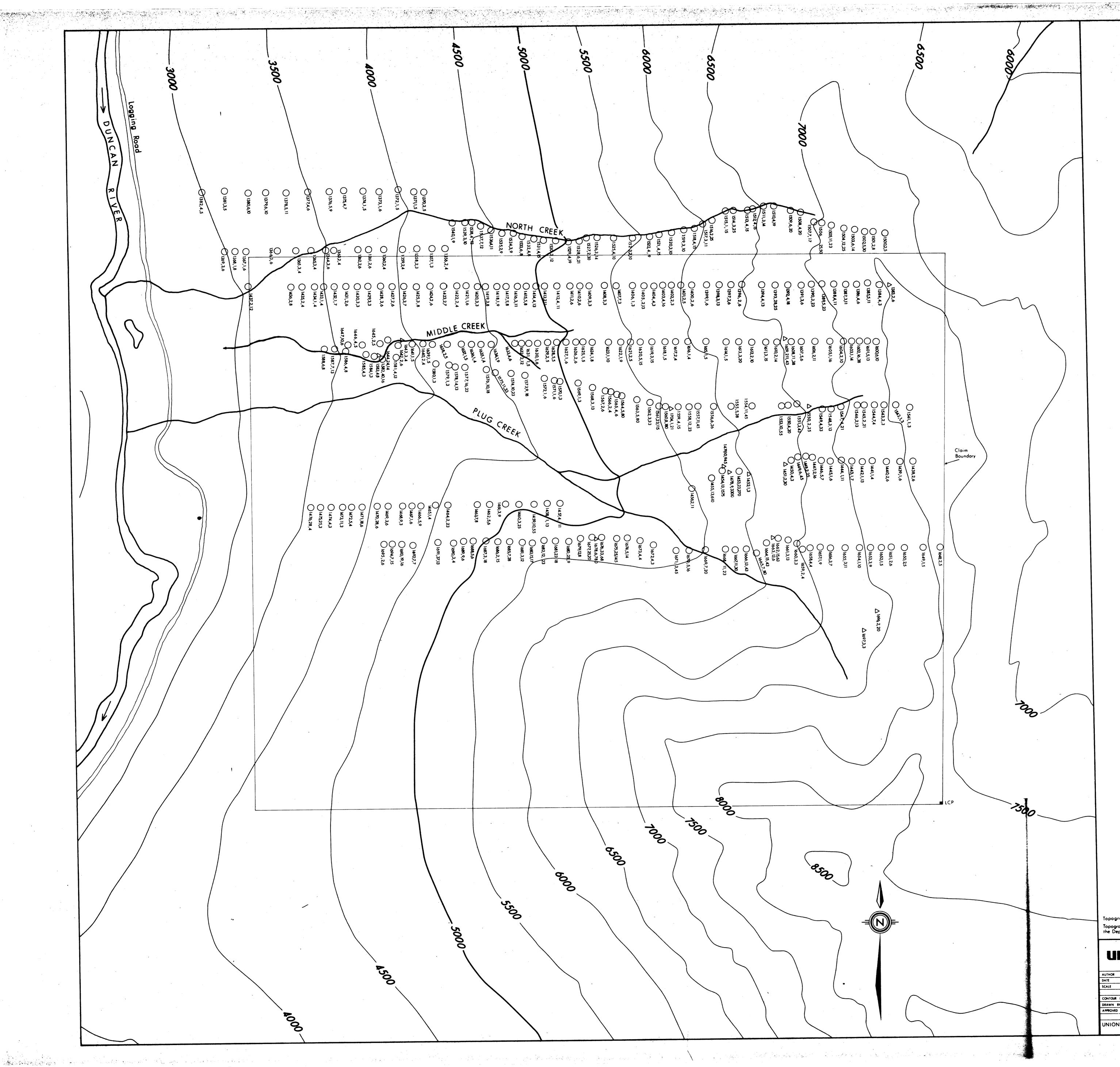
2g:quartz-muscovite-chlorite_schist EQUIGRANULAR BIOTITE GRANODIORITE la: quartz-sericite on fractures 1b: massive quartz-muscovite zones

4d:actinolite LIMESTONE 3a: thick-bedded, silty SILTSTONE 2a: quartzite 2 b: black pyritic siltstone

3b:thin-bedded calcareous mudstone

SKARN 4a:tremolite 4b:garnet 4c:pyrrhotite





LEGEND SOIL SAMPLE ROCK SAMPLE 1473,18,6 SAMPLE NO., ppm Mo, ppm W

AUTHOR DATE SCALE CONTOLR INTERVAL 500 ft. DRAWN BY D. SKRYPNEK APPROVED UNION OIL COMPANY OF CANADA LIMITED CALGARY ALBERTA

