

3620

92H/6E&W
GEOCHEMICAL REPORT

JESSICA PROPERTY, COQUIHALLA AREA, B.C.

MOUNTAIN PASS MINES LTD.

NEW WESTMINSTER MINING DIVISION

Claim Sheet No. 92H/6

<u>Red Group</u>	N 1, N 2 Fr, N 3, N 4, N 5 Eve 1 - Eve 10 incl. Toy 3 - Toy 16 incl. A 3, A 4, A 5 N 31 Fr, N 33 Fr Eve 73	35 claims
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<u>Green Group</u>	N 7, N 9, N 11, N 18, N 20, N 22, N 24 - N 27 incl., N 28 Fr, N 29 Fr N 30 Fr A 1 - A 2 Eve 22, 24, 26, 28, 63, 65, 67 Eve 68 Fr Tax 51 - Tax 56 incl. Tax 57 - Tax 60 incl. Tax 61 Fr	34 claims
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<u>Blue Group</u>	N 14 - N 17 incl. N 19, 21, 23 Tax 1 - Tax 16 incl. Tax 37 - Tax 46 incl. Mak 1, 3, 5, 7	37 claims
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REPORT BY

J. A. Chamberlain, P.Eng., Ph.D.
on work completed between June 15, 1971 and April 30,
1972

May 3, 1972

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Assay Certificate: total rock nickel
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INTRODUCTION

At the request of Mr. M. Menzies, president of Mountain Pass Mines Ltd., the writer carried out a geochemical study of the distribution of nickel and sulphur in ultramafics occurring in their Coquihalla property during the period from June 15, 1971 to April 30, 1972. The present report summarizes the results of this work.

GENERAL

Geological mapping and geochemical sampling were carried out in June-July, 1971, using one field assistant. A main base camp was established near the junction of Sowaqua and Coquihalla rivers and a fly camp set up near a small lake south of the Coquihalla (see Figure 71-1). Follow-up sampling and laboratory work were carried out during the period from August, 1971 to April, 1972.

Results were plotted on a federal 1:50,000 topographic map-base enlarged to a scale of 1 inch = 1000 feet. Altimeters were used for control, in conjunction with air photos. Sample stations are believed to be plotted with an accuracy of 200 feet (0.2 inches on the map scale).

Contacts of the mafic-ultramafic complex with host rocks are in many localities obscured by overburden. The airborne magnetic survey referred to above materially aided in contact-interpretation as well as in helping to outline the main lithologies and structure of the Coquihalla belt itself.

ROCK GEOCHEMISTRY

One hundred and fourteen samples of ultramafic rock were collected during the mapping program. The sample sites are indicated as precisely as possible in Figure 71-1. Each sample was collected as an "area chip" over 100 to 500 square feet of outcrop area in order to be as representative of as large an area (and hence volume) of rock as possible. Samples were thus collected as a series of randomly located chips, each sample consisting of 20 to 50 rock fragments having an aggregate weight of 3 to 4 pounds.

SULPHUR

A split from each miniature bulk sample of ultramafic rock collected was assayed for total rock sulphur. Volatilization of the sulphur prior to analysis was accomplished by the LECO furnace method by Bondar-Clegg. (See Appendix for Assay Certificate).

Sulphur values in the ultramafics range from 0.004 to 0.128 percent. Results plotted on a frequency diagram (Table 1) show a reasonably normal distribution with a peak at around 0.045 percent. On this curve, values above 0.080 percent can be considered anomalous. A second small peak on the diagram suggests a separate population in the range of values between 0.10 and 0.14 percent, though there is nothing geological to suggest this. It seems more likely that additional sampling would tend to smooth out the second peak, leaving the population as a whole negatively skewed. In any event, the values above 0.10 percent can be considered anomalous to a higher degree than those in the 0.08 to 0.099 percent range. This two-stage break-down is illustrated in Table 1. Its application to the present study is discussed in the section on Nickel Potential.

NICKEL

Total-rock nickel assays were obtained on those ultramafic samples assaying 0.08 percent sulphur and greater. One additional nickel assay on

non-ultramafic sample containing 0.46 percent sulphur was obtained. This resulted in a total of 18 nickel determinations, as tabulated in the Appendix.

Nickel values of the ultramafics ranged from 0.09 to 0.24 percent, with a mean of 0.21 percent. Neglecting the single aberrant low value of 0.09 percent, the nickel content of this high-sulphur group ranged between 0.18 and 0.24 percent.

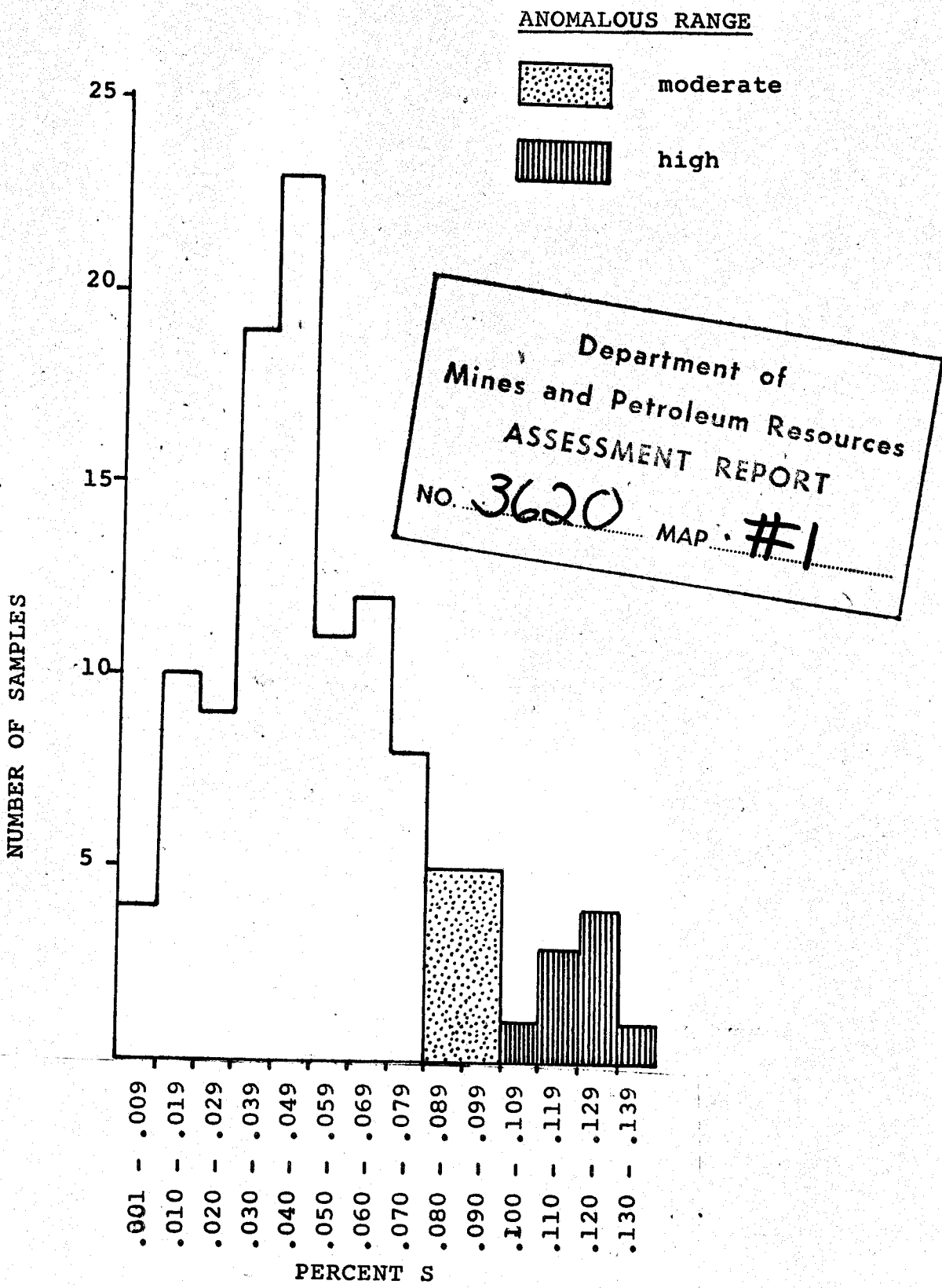


TABLE 1
FREQUENCY DIAGRAM FOR 114 TOTAL ROCK
SULPHUR VALUES, COQUIHALLA ULTRAMAFICS

MICROSCOPY

The eighteen sample rejects selected for nickel assay as described on the preceding page were submitted for machine-polishing. This resulted in the mounting of 20 to 40 rock fragments in cold-setting plastic from each sample. The mounts, which were subsequently ground and machine-polished in the usual manner, were thus much more truly representative of the original sample than any single rock specimen could have been.

The sections were examined under reflected light using a Carl Zeiss Photomicroscope. Observations recorded during this study are summarized in Table 2. The following conclusions can be drawn:

1. Rocks containing abundant magnetite tend to carry sulphides in a more finely dispersed form than those deficient in magnetite.
2. Pentlandite is present in all the ultramafic samples, generally as free grains less than 75 microns in diameter.
3. The abundance of chromite shows no particular correlation with sulphide abundance and grain size.
4. Above average sulphur content correlates reasonably well with overall sulphide abundance, but sulphide grain size is a variable independent of total-rock sulphur.

ECONOMIC POTENTIAL

The purpose of the present study is to employ rock geochemistry in locating possible zones containing anomalously high sulphur and normal nickel values which would point the way to more detailed follow-up work. In addition, geological mapping was carried out to delimit and resolve the distribution of ultramafic rocks within the Coquihalla belt. The latter work was described under "Major Rock Units" where it was shown that more than 50 percent of the complex is underlain by rocks in the diorite compositional range rather than ultramafics.

The diorite rocks themselves are not considered to be nickel targets under the present exploration concept. Nor are ultramafic bodies of relatively small tonnage considered to be of economic potential. The present geologic mapping has thus narrowed the exploration targets on the basis of rock-type and size to a few ultramafic bodies within the complex.

The geochemical data given in the preceding section has been used as an indicator of nickel potential in the following manner. Samples containing sulphur values in the "high" anomalous range (Table 1) and containing nickel in the range of 0.18 to 0.24 percent were rated Favourable and coloured red on the map (Figure 71-1). Samples containing sulphur in the "moderate" anomalous range (Table 1) and containing nickel in the range 0.18 to 0.24 percent (as above) were rated Moderate and coloured orange on the map.

Examination of Figure 71-1 shows that several Favourable sample sites occur within ultramafic bodies of moderate to large tonnage potential. These are listed below:

1. West and northwest of upper lake. Tonnage potential large.
2. South end of belt, east side. Tonnage potential large (?).
3. Upper reaches of 15 Mile Creek. Tonnage potential large (?).
4. Quarry area near junction of Dewdney and Coquihalla rivers. Tonnage potential moderate.

TABLE 2: SUMMARY OF MICROSCOPIC OBSERVATIONS

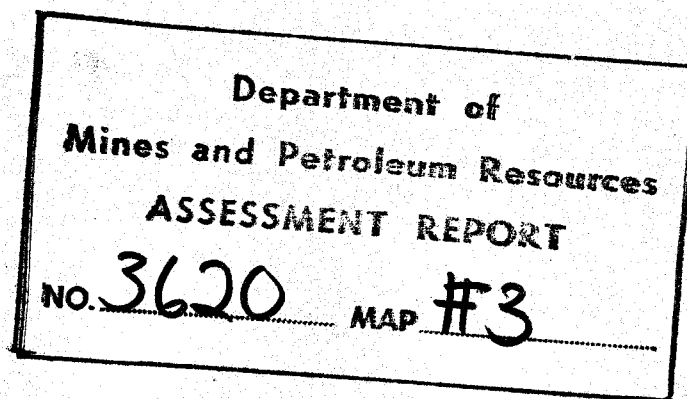
Sample	JAC Sect. No.	HOST SILICATES	OXIDES		SULPHIDES							SULPHIDE-OXIDE REL.			
			chrome spinel	mag-netite	Free	Locked	species	Sulfide Grain Size			Textures			Few sulps w. mag.	Large gr. sulp only w. mag.
								% total sulphide:	over 200 μ	75 - 200 μ	under 75 μ	Euhe-dral	Anhe-dral		
1522	J1-17	Sheared serpentinite	●	●	✓	✓	pn	10	0	90			✓		✓
1523	J1-18	Serpentinized dunite	●	●	✓	✓	pn	0	10	90		✓	✓		✓
1525	J1-19	Contact rock: meta sed.	○	○	-	-	py graph.?	0	5	95	✓			-	-
1532	J1-20	Magnesite-talc rock	○	●	✓		pn, cp	0	5	95		✓		✓	
1534	J1-21	Serpentinite	●	⊖	✓		cp, pn	5	15	85		✓	✓	✓	
1536	J1-22	Serpentinite	○	●	✓		pn	0	10	90	Some rod-like	✓		✓	
1537	J1-23	Serpentinite	⊖	●	✓		pn	0	0	100	"	✓		✓	
1545	J1-24	Serpentinite	⊖	●	✓		pn	0	0	100	"		✓	✓	
1546	J1-25	Serpentinite	●	⊖	✓		pn (py)	0	0	100		✓	✓	✓	
1548	J1-26	Serpentinite	⊖	●	✓		pn	0	0	100	✓		✓	✓	
1574	J1-27	Serpentinite	●	●	✓		pn	0	0	100		✓	✓	✓	
1581	J1-28	Serpentinite	●	●	✓		pn	0	0	100		✓		✓	
1584	J1-29	Serpentinite	●	●	✓		pn	0	5	95	Some rod-like	✓	✓	✓	
1587	J1-30	Sheared serpentinite	●	⊖	✓		pn, cp	20	10	70			✓	✓	
1589	J1-31	Serpentinite	⊖	⊖	✓		pn	10	5	85		✓	✓	✓	
1594	J1-32	Serpentinite	⊖	⊖	✓		pn	0	5	95	Some rod-like	✓		✓	
1595	J1-33	Serpentinite	⊖	⊖	✓		pn	0	0	100			✓	✓	
1596	J1-34	Serp'd. Peridotite	⊖	●	✓		pn	0	5	95	Some rod-like	✓		✓	

○ Absent; ⊖ Little <1%; ● Moderate 1-5%; ● Abundant >5%; pn=pentlandite; py=pyrite; cp=chalcopyrite; J.A. Chamberlain

TABLE 3

Cold Leach Results with
Increasing Depth in Drill
Hole H-5 (ppm)

<u>Footage</u>	<u>Ni</u>	<u>Co</u>	<u>Cu</u>
1	1270	43	4
4	1310	42	5
8	1170	34	5
12	1150	30	3
16	1240	32	5
20	1360	32	4
24	1200	37	4
28	1490	39	5
32	1040	32	5
36	1120	25	4
40	1240	31	5
44	1090	33	4



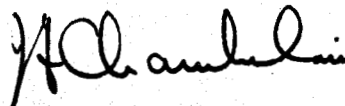
SUMMARY AND CONCLUSIONS

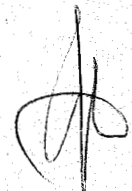
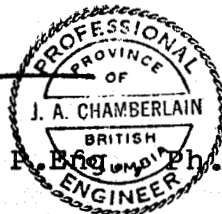
Within the ultramafics, total rock sulphur assays in excess of 0.08 percent are considered anomalous. Where anomalous sulphur values are accompanied by total rock nickel assays in the 0.2 to 0.25 percent range, the nickel potential is believed to be above average. Microscopic examination of sample rejects from anomalous sample-sites has confirmed the presence of nickel sulphide (pentlandite) in quantities sufficient to account for the most or all of the total rock nickel. The sulphide grain size, however, remains 70 to 100 percent below 75 microns (Table 2). Some of the fineness of sulphide grain size appears to be due to shearing of the host rock with concomittant fragmentation of the sulphides. There is also a suggestion that sulphides are finer grained and possibly less abundant in zones containing relatively large quantities of secondary magnetite.

The reconnaissance work completed to date has outlined four zones on which more concentrated work is required (see page 5 of this report where the four zones are described and listed in decreasing order of priority). The objective of the follow-up work will be to check whether the indicated zones consistently contain better-than-average quantities of nickel sulphide and, if so, to determine the amenability of the material to metallurgical treatment.

The required information can best be obtained by employing a three-stage program of (1) concentrated sampling, as a direct extension of the work already undertaken, (2) I.P. surveying in conjunction with ground magnetic measurements and (3) diamond or percussion drilling of indicated targets.

Respectfully submitted


J. A. Chamberlain, B. Eng. Ph.D.



STATEMENT OF CHARGES AND EXPENDITURES

(June 15, 1971 to April 30, 1972)

GEOCHEMICAL SURVEY FOR TOTAL ROCK SULPHUR, TOTAL ROCK NICKEL, COLD LEACH EXTRACTABLE COPPER, NICKEL, COBALT; CORRELATION WITH MINERALOGY; REPORT; ALL CARRIED OUT ON COQUIHALLA PROPERTY, MOUNTAIN PASS MINES LTD.

GEOCHEMICAL CONSULTING SERVICES

June 15 to June 30, 1971: 15 days field	\$2100.00	
July, 1971 Laboratory 1 3/4 days	175.00	
August, 1971 Laboratory 11 days	1100.00	
September, 1971 Laboratory 4.5 days	450.00	
February, 1972 Laboratory 1.3 days	130.00	
March, 1972 Laboratory 0.3 days	30.00	
April, 1972 Laboratory, Field 2.4 days	290.00	
	<hr/>	
Sub-total	\$4275.00	\$4275.00

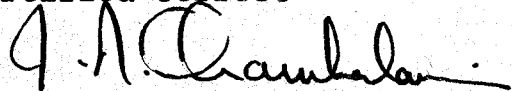
EXPENDITURES

Equipment Rentals, Vehicles, Trailers, Field Expenses	924.74	
Assays, Microscope Sections	1024.55	
Helicopter Charter	512.00	
Reproductions, Drafting	37.87	
	<hr/>	
Sub-total	\$2499.16	2499.16
		<hr/>
	Total	\$6774.16

Work Apportioned as Follows:

Red Group	\$2395.00
Green Group	2144.00
Blue Group	2235.16
	<hr/>
Total	\$6774.16

Certified Correct



J. A. Chamberlain, P.Eng., Ph.D.



BONDAR-CLEGG & COMPANY LTD.

geochemists • assayers • analytical chemists

1500 PEMBERTON AVENUE, NORTH VANCOUVER, B.C.
PHONE: 988-5315 TELEX: 04-54554

REPORT OF: Sulphur Content of Rock Samples

REPORT No. IT 21-86

PROJECT: _____

DATE: July 26, 1971

REPORTED TO: J. A. Chamberlain Consultants Ltd.

875 Esquimalt Avenue

West Vancouver, B. C.

Sample Number	% S		Sample Number	% S	% Ni
1451	-0.064	(J1-19)	1524	0.046	(0.01)
1454	0.004		1525	0.403	
1457	-0.077		1526	0.041	
1460	-0.063		1527	0.043	
1461	0.049		1528	0.044	
1462	0.036		1529	0.046	
1463	0.022		1530	0.051	
1464	0.030	(J1-20)	1531	0.048	(0.09)
1465	-0.066		1532	0.080	
1466	0.044	J1-21	1533	-0.072	
1467	0.048		1534	-0.094	(0.18)
1468	0.031		1535	0.056	
1469	0.020	J1-22	1536	0.102	(0.22)
1501	0.010	J1-23	1537	-0.091	(0.22)
1502	0.032		1538	-0.066	
1503	0.018		1539	0.047	
1504	0.030		1540	0.036	
1505	0.015		1541	0.050	
1506	-0.067		1542	0.052	
1507	0.009		1543	0.048	
1508	0.044		1544	0.025	
1509	0.033	J1-24	1545	-0.098	(0.22)
1510	0.036	J1-25	1546	-0.092	(0.24)
1511	-0.067		1547	0.059	
1512	0.010	J1-26	1548	0.122	(0.22)
1513	0.035		1549	0.037	
1514	0.047		1550	0.047	
1515	-0.062		1551	0.041	
1516	0.011		1552	0.042	
1517	-0.060		1553	0.052	
1518	0.054		1554	0.059	
1519	0.051	% Ni	1555	-0.078	
1520	0.045		1556	0.047	
1521	0.028		1557	0.008	
J1-17 1522	0.121	(0.22)	1558	0.027	
J1-18 1523	0.118	(0.22)	1559	0.035	

1500 PEMBERTON AVENUE, NORTH VANCOUVER, B.C.
 PHONE: 988-5315 TELEX: 04-54554

REPORT OF: Sulphur Content of Rock Samples REPORT No. IT 21-86

PROJECT: _____ DATE: July 26, 1971

REPORTED TO: J. A. Chamberlain Consultants Ltd.

875 Esquimalt Avenue


West Vancouver, B. C.

Page 2

Sample Number	% S	% Ni	Sample Number	% S	% Ni
1560	0.040		1582	0.033	
1561	0.075		1583	0.073	
1562	0.079		Jl-29 1584	0.097	(0.24)
1563	0.058		1585	0.035	
1564	0.052		1586	0.017	
1565	0.039		Jl-30 1587	0.112	(0.23)
1566	0.049		1588	0.072	
1567	0.026		Jl-31 1589	0.120	(0.24)
1568	0.013		1590	0.081	
1569	0.030		1591	0.040	
1570	0.019		1592	0.027	
1571	0.019		1593	0.076	
1672	0.021		Jl-32 1594	0.086	(0.20)
1573	0.012		Jl-33 1595	0.082	(0.21)
Jl-27 1574	0.088	(0.23)	Jl-34 1596	0.115	(0.21)
1575	0.032		1597	0.030	
1576	0.049		1598	0.031	
1577	0.029				
1578	0.033		71-11 (shale)	0.005	
1579	0.061		71-17 1508 not in place	0.065	
1580	0.069		71-24 1515	0.046	
Jl-28 1581	0.128	(0.23)	71-26 1517	0.068	

QUARRY AREA

Samples 71-11,17,24,26 were rocks with these numbers on them, found on the bottom of the shipping container.


 R. J. Sawyer
 Chief Chemist

Vancouver Geochemical Laboratories Ltd.

1521 PEMBERTON AVENUE NORTH VANCOUVER, B.C., CANADA TELEPHONE 604-988-2172

GEOCHEMICAL ANALYTICAL REPORT

REPORT No. 72-25-004 DATE 3 March, 1972
Job No. 72-30
SAMPLES SUBMITTED BY J.A. Chamberlain COMPANY J.A. Chamberlain Consultants Ltd.

SHIPPED VIA delivered FROM _____

REPORT ON 12 rock samples for sulphide Cu, Ni, Co by the Lynch Cold Leach Method DATE SAMPLES ARRIVED 29 February, 1972
* * *

COPIES OF THIS REPORT SENT TO:

- (1) J.A. Chamberlain Consultants Ltd.
- (2) (for Mountain Pass Miner Ltd)
- (3) _____

TRANSMITTED BY:

mail

SAMPLES SIFTED OR GROUND TO -80 MESH, WEIGHT USED 0.10 g

FINAL VOLUME 10 ml ALIQUOT USED n/a
* * *

METHOD OF ANALYSIS: Instrumental - Atomic Absorption

EXTRACTION: Leach with cold ascorbic acid and H₂O₂ for 18 hours

DETECTION: Techtron AA5

SAMPLES ASSIGNMENT: (a) PREPARED SAMPLES: filed

(b) REJECTS: discarded
* * *

ANALYST(S) L.N. TYPIST ln

SUPERVISING CHEMIST L. Nicol CHECKED BY S. BROWN

COSTS:

SHIPPING CHARGE	\$ --
SAMPLE PREPARATION	\$ 10.20
ANALYSIS	\$ 24.00
OTHER	\$ --
TOTAL	\$ 34.20

Vancouver Geochemical Laboratories Ltd.

1521 PEMBERTON AVENUE

NORTH VANCOUVER, B.C. CANADA

TELEPHONE 604-988-2172

COMPANY J.A. Chamberlain Consultants REPORT No. 72-25-004 PAGE 1 OF 1

MARKING	Sulphide		
	Cu	Ni	Co
5-1	4	1270	43
5-4	5	1310	42
5-8	5	1170	34
5-12	3	1150	31
5-16	5	1240	32
5-20	4	1360	32
5-24	4	1200	37
5-28	5	1490	39
5-32	5	1040	32
5-36	4	1120	25
5-40	5	1240	31
5-44	4	1090	33

MARKING				

REMARKS

*standards checked out ok.
 samples were done in duplicate. 6*

All values are reported in parts per million unless specified otherwise. All values are believed to be correct to the best knowledge of the analyst based on the method and instruments used.

J. A. CHAMBERLAIN CONSULTANTS LTD.
 875 ESQUIMALT AVE.
 WEST. VANCOUVER, B. C.
 CANADA

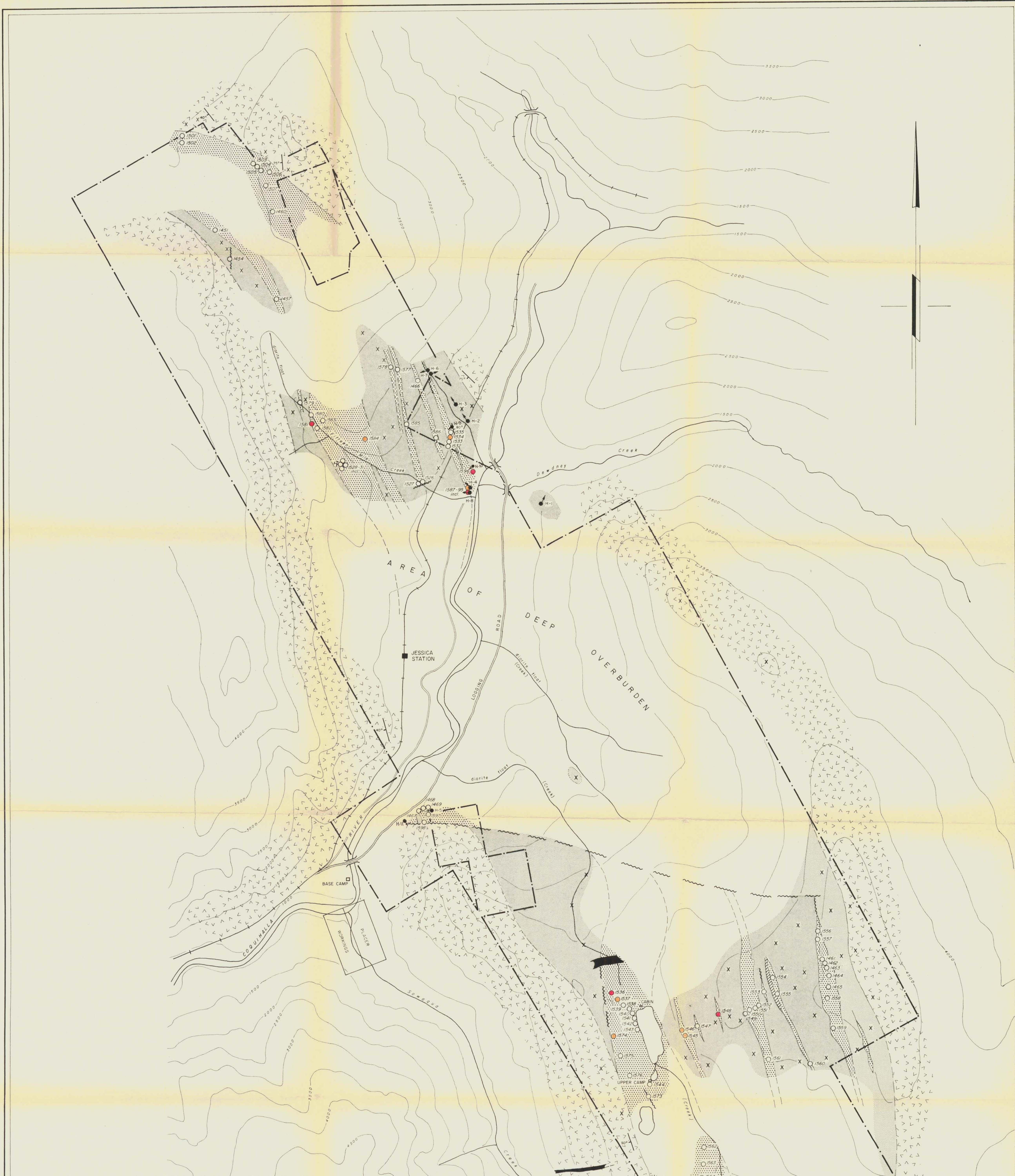
COQUIHALLA PROJECT: MOUNTAIN PASS MINES LTD.
 Location: Rail Grade, east ct. ultramafic
 Azimuth: 275°
 Dip: -55°

DH 9 Page 1

FOOTAGE		ROCK TYPE	DESCRIPTION	CORE LOSS		
FROM	TO			FROM	TO	LOST
0	3	Casing				
3	27	Diorite, Alt'd	Pale greenish grey, med. to f. g. Rust coated vugs 0-14' probably represent leached sulphides, 1 to 2%. Weakly alt'd appearance generally. Massive fabric.			
27	29	Serpentinite	Blk, f.g. massive, broken core. Cts. not visible.			
29	36.5	Diorite, Alt'd	Similar to 3-27, but less altered. Few scattered sulp (<0.2%)			
36.5	51	Serpentinite	Blk, f.g. Rare scattered sulps to 0.5 mm. Apparently chloritic. Much broken core. Narrow quartz-carbonate str. locally.			
51	52	Fault	6" talc, mud, lost core?			
52	56	Serpentinite	Dk. grn. to blk., chloritic, mottled. Much broken core. Rare dissem. sulps, less than 0.2% of rk.			
56	83	Diorite, Alt'd	Pale grn.-grey, mottled, m.g. Cut by occ'l carb. str. Rock has vaguely alt'd appearance, effervesces in most places with HCl. Probable pervasive carbonate alteration of entire zone. Rare sulps noted. Ma.			
83	133	Serpentinite	Blk., f.g. dense serpentinite. Much broken core. Gouge at 84-85 (fault). Occ'l white talc threads and stringers. Dissem. sulps up to 1% at 123-124 (sampled). In remainder of section, sulps very scarce.			
133	150	Alteration zone	Pale grn-grey, m.g., massive fabric. Again characterized by pervasive interstitial carbonate alteration. Mafic minerals 60% of rock seem to be mainly chlorite-serpentine. Paler grains (40%) are mainly carbonate. Possibly this represents an original diorite, completely altered during serpentinitization of adjacent ultramafics.			
		End of Hole				

Project

Hole No.



LEGEND

- OVERBURDEN
- ANDESITE
- PERIDOTITE, SERPENTINITE
- PYROXENITE
- DIORITE
- CHERTS, SLATES, METAVOLCANICS
- STRIKE, DIP OF FEATURE
- FAULT, Observed, Inferred
- CONTACT, Observed, Inferred
- CLAIM GROUP BOUNDARY
- OUTCROP
- DRILL HOLE
- SAMPLE STATION
- NICKEL POTENTIAL (See text for explanation)
 - FAVOURABLE
 - MODERATE
 - BACKGROUND

3620 M-4

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3620 MAP #4

J. A. CHAMBERLAIN CONSULTANTS LTD.
WEST VANCOUVER, CANADA
MOUNTAIN PASS MINES LTD.
VANCOUVER, B.C.
COQUIHALLA AREA
GEOLOGY & GEOCHEMISTRY
SCALE: 1 Inch = 1000 Feet AUGUST 1971 FIG. 71-1