

616

BLUE GROUSE GROUP

GEOLOGICAL REPORT

BY

D. C. MALCOLM, B.A. Sc. P. ENG. 2568

Vancouver, B. C.
March 8, 1965

DOMINION OF CANADA:
PROVINCE OF BRITISH COLUMBIA.
To Wit:

In the Matter of Expenditures on Geological Mapping by Cowichan Copper Co. Ltd. (N.P.L.) in the Lake Cowichan area

I, Robert C. Smith

of 620 Howe Street, Vancouver, British Columbia

in the Province of British Columbia, do solemnly declare that

\$9,228.75 was expended on wages and fringe benefits for the following employees:

Project Geologist	D.C. Malcolm	July 1/64 to August 1/64 and September 1/64 to March 1/65
Assistant	David Malcolm	July 1/64 to September 15/64
Helper	Bruce Whiting	July 1/64 to September 1/64

And I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act."

Declared before me at the City
of Vancouver, in the
Province of British Columbia, this 31st
11 day of March 1965 A.D.

R.C. Smith

Nick Friesen

A Commissioner for taking Affidavits within British Columbia or
A Notary Public in and for the Province of British Columbia.

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Surface Geology

In pocket 616-1

Geochemical & Geophysical

In pocket 616-2

**Department of
Mines and Petroleum Resources
ASSESSMENT REPORT**

NO. 616 MAP _____

BLUE GROUSE GROUP

OWNER: COWICHAN COPPER CO. LTD. (N.P.L.)

Claims:

Crown Grants: Blue Grouse L31G, Blue Grouse No. 2 32G,
Blue Grouse No. 33G, SS 1-8 incl. Lots 34G to 41G incl.

Staked: C.C. Nos. 1, 2, 9, 10, 11, 12, 13, 15, 17, 18,
23, 24, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 42, 49,
50, 53, 54, 55, 56, 57, 74, 76, 86, 88, 90, 94, 96, 98, and
100; J.D. Nos. 1 to 16 incl., Lake and Lake Nos. 1 to 5 incl.,
Lil. 1 and 2, Oslynn and Oslynn 1 to 6 incl.; SS Fraction,
Swedels and Swedels 2, 3, 4, 5 and 7; TT 1, 2, 3, 4 and 8.

Location: COWICHAN LAKE

Latitude: 48

Longitude: 124 N.E.

Victoria Mining Division

Author: D.C. Malcolm, B.A. Sc., P. Eng. 2568

Dates of Work: July 1, 1964 to March 1, 1965

SUMMARY

Cowichan Copper Company geologists mapped the claims in 1964, soil sampled the area during the summer months and remapped and studied the surface and workings on a scale of 1" = 100' and early in 1965. Previous geological work had been done by J.T. Fyles in 1948 - 1951, Don Rotherham and D.H. Simpson in 1957.

The Blue Grouse Mine has produced 273,338 tons of ore averaging 2.95% copper from high temperature chalcopyrite replacements in altered limy members of a volcanic-sediment series extensively folded and faulted and intruded by irregular feldspar porphyry dikes. There are many areas on the surface where geological conditions are favorable for other ore bodies and chalcopyrite mineralization occurs in some of these. Underground there are two low grade ore bodies unmined and six low grade diamond drill intersections in favorable rocks which could represent mineable deposits.

LOCATION

Latitude 48°50' Longitude 124°20', Victoria Mining Division, Elevation 500 to 1700 feet. The claims are located west of Honeymoon Bay on Cowichan Lake 20 miles west of Duncan.

GEOLOGY

(a) Topography

Cowichan Lake is in a broad valley several miles wide and the Blue Grouse Mine is on a rounded knoll on the south side of the

lake. The maximum relief is 2000 feet and the slopes are gentle. The climate is excellent.

(b) General Geology

The property is underlain by folded Triassic limestones, tuffs, fragmental volcanics and basic flows. Irregular feldspar porphyry bodies have been intruded into these rocks and a series of east striking thrust faults have pushed segments to the north east over underlying blocks. Northeast and southwest striking faults with relatively small movements have displaced some layered rocks. The northeast claims are underlain by Cretaceous sandstones and conglomerates which overlie the Triassic rocks unconformably. The argillites, Sutton Limestone and red beds are easily recognized markers.

The following is a stratigraphic section of the mine rocks:

Argillite	500'
Sutton Limestone	100'
Amygdaloidal basalt	100'
Red beds	150'
Basalt	200'
Tuffs and agglomerate	200'
Basalt and andesite	200'
Tuffs and agglomerate	100'
Basalt	500'

Porphyritic flows overlie the argillites conformably in some places and Cretaceous sandstones unconformably in others.

Permian limestones, cherty tuffs and volcanics underlie the rocks.

The following is a more detailed description of the rocks:

Argillites:

These are finely bedded black and dark brown soft rocks generally crushed and they contain numerous fossil casts. At the base of

the series they contain narrow continuous limestone bands and grade into the Sutton limestones. At the Sunnyside road they contain volcanic bombs. It is difficult to measure the thickness of the beds as they are crumpled but they are believed to be about 500'.

Sutton Limestone:

These are grey crystalline limestones, argillaceous limestones and in some places a black limestone basaltic mixture. The beds were evidently laid down in a shallow sea and are continuous. In some areas on the claims up to 100 feet of fairly pure grey to white limestone exists. In others there are interbeds of argillite, tuff and basalt and in some sections the rock is black and is difficult to distinguish from basalt. Areas of this black limestone and limy basalts often contain intermixed volcanic bombs.

Generally, the horizon is about 100 feet in thickness.

Basalt:

Black amygdaloidal flows underlie the Sutton horizon. The rocks are dense fine grained basalts with amygdules of feldspar, epidote or quartz. Feldspar fillings are most common and often they are grouped on rosettes or concentric circles. In some places these lavas are vesicular and in other sections they grade to a basaltic to a basaltic agglomerate. They sometimes contain hematite or chlorite filled vesicles. The flows vary from 100 to 350 feet in thickness.

Hematitic Tuffs or Red Beds:

Limy hematitic tuffs underlie the black basalt horizon on the claims. These are variable and grade from rock with 50% to 70% hematite to limestone or to bedded tuffs. There is often a 30 to 40 foot impure limestone or limestone agglomerate at the base of the formation. The

thickness of the red beds vary from 100 to over 300 feet.

Basalt:

A 200 foot thickness of black chloritic amygdaloidal basalt. This is often graphitic and is often quite soft. Sometimes it is agglomeritic.

Below the basalt or agglomerates a 100 to 250 foot thickness of limy tuff occurs. This has narrow beds of limestone in it at some horizons.

Thick beds of basalt or andesite pillow lavas underlie the tuffs and except for narrow beds of tuff and agglomerate extends to the base of the series with thicknesses of at least 500 feet.

Feldspar:Porphyry:

A widespread swarm of feldspar porphyry dikes and irregular sills cross the claims in a northwest direction. These can be traced to the Robertson River intrusions.

(c) Claim Geology:

The surface outcrops on the claims are generally good but often key areas are overburden covered (especially those sections underlain by tuffs and hematitic tuffs). The geology has been projected through these areas by measuring the layers from the marker beds or projecting beds from diamond drill holes or underground workings.

(d) Structural Geology:

The ore bodies occur in the limestones and tuffaceous members and these are folded in a series of overturned folds whose axes strike northwest, dip from 20 to 40 degrees to the southwest and plunge 20 to 40 degrees to the southwest.

A series of thrust faults with a general east strike and dips of 10 to 20 degrees to the south displace the beds. The 3 cross-cut fault, which displaces the main orebody, has a northeast movement (top block is displaced 1000 feet to the north and 150 to 200 feet to the east in relation to the lower segment). The thrusts are irregular and follow the tuff beds along their strikes and dips in many places.

A second series of reverse faults strike northeast and dip 30 to 45 degrees to the south. The Main fault in the mine has a north 60 east movement of 130 feet.

East striking normal faults with dips of 45 to 60 degrees south and small displacements.

Variable striking and dipping adjustments in the altered tuffs at the crests of folds. Movements are generally small.

(e) Alteration:

1. Skarn - actinolite-magnetite-garnet skarn occurs in limestone and limy tuffs near feldspar porphyry intrusives. This is a typical contact metamorphic skarn.

2. Siliceous epidote skarns occur in tuffs adjacent to feldspar porphyry bodies.

3. Crushed volcanics and tuffs, especially near argillaceous contacts contain chlorite and graphitic alteration.

4. Tuffs and agglomerates generally are manganese stained.

(f) Mineralization:

The mineralization on the claims is a high temperature replacement of skarns and crushed rock by pyrrhotite, chalcopyrite, sphalerite, magnetite and pyrite. Often the sulphides are bedded and have replaced

individual epidotized layers of tuff. The mineralization occurs in skarns in the limestone in a few places but generally in skarns in the limy tuffs and limy red beds. It is later than the alteration and skarn and extends into the unaltered formations but the copper values are generally lower away from the altered zones.

GEOCHEMICAL SURVEY

Soils were tested along lines at 100 feet intervals as shown on the enclosed map using Rhubeanic acid strips. The results were subdivided into strong reactions, medium reactions, weak reactions and negligible or no reaction. Some detailed testing was done in the anomalous areas but additional detailed work is necessary to fully access results. The argillites generally contain copper and the results over areas underlain by these rocks are not significant.

GEOPHYSICS

Magnetic

Some magnetic anomalies were located on compass traverses and are roughly indicated on the geochemical plan. The anomaly on claim 886 is caused by a flat lying low grade copper zinc mineral deposit in crushed graphitic tuffs and colcanics on the limb of an overturned syncline which does not outcrop.

Self Potential

The Self Potential anomalies are shown on the same plan and the anomaly on the claim 886 covers the same graphitic mineralized zone as does the magnetic anomaly.

Self Potential anomalies on TT 2, 3, Lake 4, L41 and 888 follow the red bed tuff main ore horizon and could represent a Blue Grouse type

of deposit on an overturned anticline similar to that at the mine.

The anomaly on the Lake claim represents a mineralized tuff bed which continues northwest toward the lake and dips flatly to the west.

The remaining anomalies represent known ore bodies and these demonstrate the effectiveness of this geophysical method in locating deposits similar to the Blue Grouse.

D. Elmadfa
P. Eng. 2568

BLUE GROUSE GROUP

<u>CLAIM</u>	<u>TAG NO.</u>	<u>RECORDED</u>	<u>RECORD NO.</u>
Group - Crown Grant 330			
Lake	A45079	Feb 10	5703
Lake 1	A45080	Feb 10	5704
Cowichan 2	A45081	Feb 10	5705
4	A45085	Feb 10	5707
TT 2	A86698	June 19	5671
TT 3	A86699	June 19	5672
TT 4	A86700	June 19	5673
L11 1 Fr	B38051	Feb 18	6030
L11 2 Fr	B38052	Feb 18	6031
SS 6 CG	A72420		5667
SS 8 CG	A72422		5669
CC 1	B81243	Oct 3	6443
CC 2	B81244	Sept 21	6444
CC 39 B	364553	Nov 2	9252
CC 40 B	364554	Nov 2	9253
CC 42 B	364556	Nov 3	9262
Blue Grouse			
Crown Grant 320			
Oalynn	B18914	May 25	5767
Lake 5	A45086	Feb 10	5708
CC 9	B81258	Sept 21	6435
CC 10	B81252	Sept 21	6436
CC 11 B	364525	Oct 9	9214
CC 12 B	364526	Oct 9	9215
CC 13 B	364527	Oct 9	9216
CC 15 B	364529	Oct 9	9218
Swedels	A87647	May 25	5760
Swedels 2	A87649	May 25	5762

Swedels 3	A87650	May 25	5763
Swedels 4	A87651	May 25	5764
Swedels 5	A87652	May 25	5765
Swedels 7	A87654	May 25	5766
Oalynn 2	A87668	May 25	5769
Oalynn 4	A87671	May 25	5771
Oalynn 6	A87672	May 25	5773
CC 74 B	B68503	Nov 23	9297
CC 76 B	368505	Nov 23	9299

Miller Creek

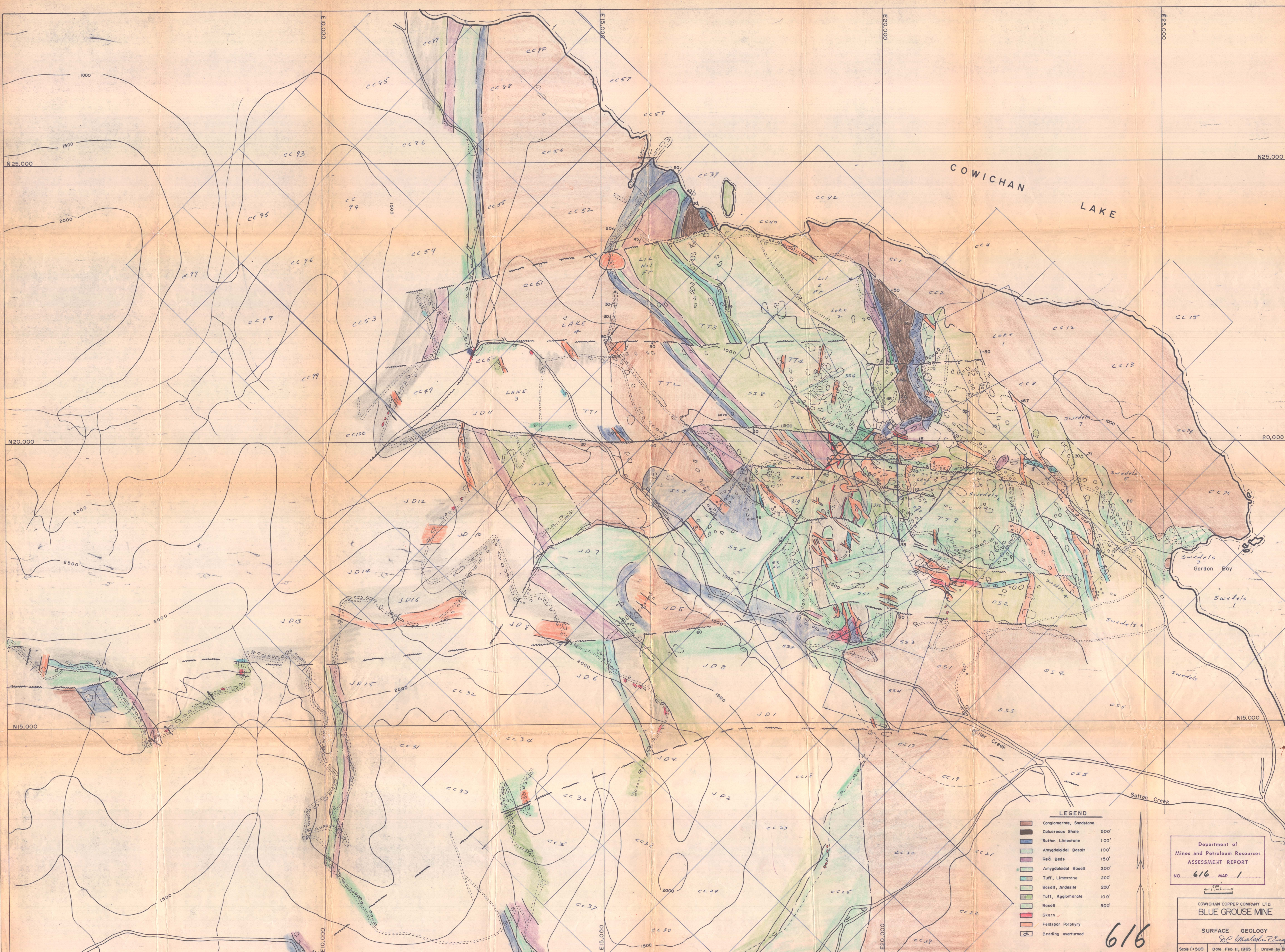
Crown Grant 31G			
CC 34	364548	Oct 28	9245
SS 5 GG	A72421		5665
SS 7 CG	A71545		5668
PT 1	A86697	June 19	5670
Lake 3	A45084	Feb 10	5706
CC 31 B	364545	Feb 10	9142
CC 32 B	364546	Oct 28	9243
CC 33 B	364547	Oct 28	9244
JD 5 A	358730	July 29	9136
JD 6 A	358731	July 29	9137
Jd 7A	358728	July 29	9138
JD 8 A	358729	July 29	9139
JD 9 A	358736	July 29	9140
JD 10 A	358737	July 29	9141
JD 11 A	358738	July 29	9142
JD 12 A	358739	July 29	9143
JD 14 A	358740	July 29	9145
JD 15 A	358743	July 29	9146
JD 16 A	358741	July 29	9147

Sunnyside

TT 8.	A67804	June 19	5677
SS 1 CG	A76979		5662
SS 2 CG	A76978		5663
SS 3 CG	A76992		5664
SS 4 CG	A76977		5565

Oalynn 1

	A87669	May 25	5768
CC 17 B	304531	Oct 28	9228
CC 18 B	364532	Oct 28	9229
CC 23 B	364531	Oct 28	9234
CC 24 B	364538	Oct 28	9235
CC 30 B	364544	Oct 28	9241
CC 35 B	364549	Oct 28	9246
CC 36 B	364550	Oct 28	9247
CC 37 B	364551	Oct 28	9248
CC 38 B	364552	Oct 28	9249
SS Fr	368587	Feb 18	9396
JD 1 A	358734	July 29	9132
JD 2 A	358735	July 29	9133
JD 3 A	358732	July 29	9134
JD 4 A	358733	July 29	9135



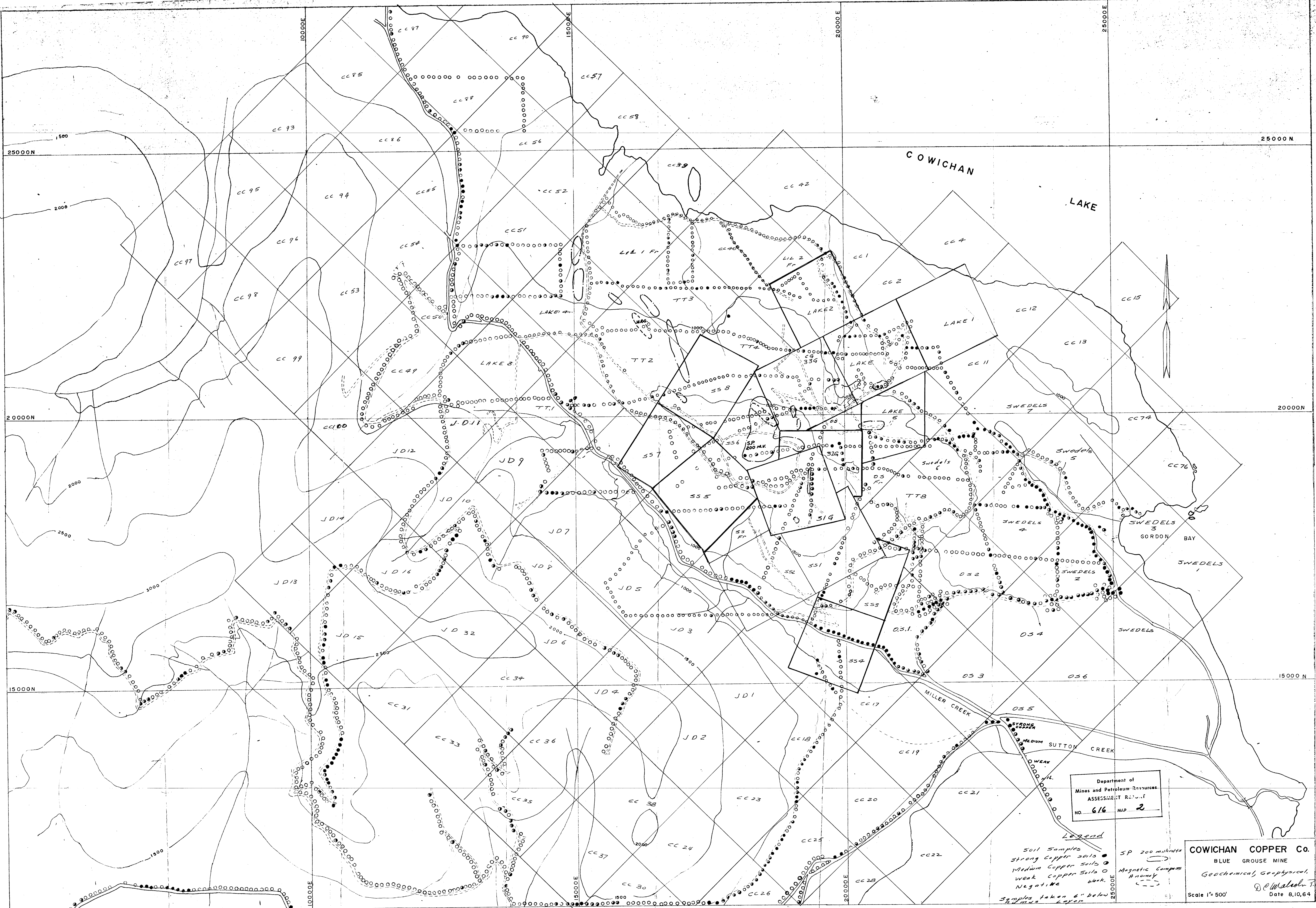
LEGEND

	Conglomerate, Sandstone	500'
	Calcareous Shale	500'
	Sutton Limestone	100'
	Amygdaloidal Basalt	100'
	Red Beds	150'
	Amygdaloidal Basalt	200'
	Tuff, Limestone	200'
	Basalt, Andesite	200'
	Tuff, Agglomerate	100'
	Basalt	500'
	Skarn	
	Feldspar Porphyry	
	Bedding overturned	

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 616 MAP 1

COWICHAN COPPER COMPANY LTD.
BLUE GROUSE MINE
SURFACE GEOLOGY
Scale 1"=500' Date Feb. 11, 1965 Drawn by J.M.

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616



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 616 MAP 2

Legend
 Soil Samples
 Strong Copper soils ●
 Medium Copper soils ○
 Weak Copper soils ◊
 Negative blank
 Samples taken 2" below surface
 SP 200 millites
 Magnetic Compass Anomaly

COWICHAN COPPER Co.
 BLUE GROUSE MINE
 Geochemical, Geophysical,
 Assessment Report
 Scale 1" = 500'
 Date 8.10.64

616 616

