2264

GEOCHEMICAL - GEOLOGICAL FIELD REPORT

GREAT NORTHERN PETROLEUMS & MINES LTD.

LEE AND OLE CLAIM GROUPS
CHURCHILL COPPER AREA, B.C.
LIARD MINING DISTRICT
SEPTEMBER - OCTOBER
1969

LEE AND OLE CLAIM GROUP:
100 mi. S. 80° W. of
Fort Nelson

58° 125° S.E.

FIELD REPORT BY: David G. Mark B.Sc.

Geotronics Surveys

517 · 602 West Hastings Street, Vancouver, British Columbia, Canada ✱ Telephone 688·4342

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Geotronics Surveys

517 · 602 West Hastings Street, Vancouver, British Columbia, Canada ✲ Telephone 688-4342

GEOCHEMICAL AND GEOLOGICAL FIELD REPORT SUBMITTED TO GREAT NORTHERN PETROLEUMS & MINES LTD., LEE AND OLE CLAIM GROUP, CHURCHILL COPPER AREA, B. C. August - September 1969

INTRODUCTION:

Soil sampling and geological mapping were undertaken on the Lee Claim Group, composed of 32 claims and on the Ole Claim Group composed of 20 claims, from August 22 to September 13, 1969.

The object was to find out if there are any copper showings existing on the property, and if the geology is similar to that of the Churchill Copper Mine.

LOCATION:

The Claims are located about 100 miles west of Fort Nelson in the Rocky Mountains, in the Liard Mining District, near the confluence of the Magnum and Delano Creeks, which is about three miles south of the Churchill Copper Mine. Access is by the Churchill Copper

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haulage road which leaves the Alaska Highway at Mile 401 and passes through the southern end of the Ole claims about 28 miles from the highway. The writer and 2 helpers stayed in an excellent cabin situated about 13 miles from the property, at the bridge crossing of the Racing River.

TOPOGRAPHY:

The topography of the whole area, in general, is extremely rugged. The elevation varies from under 3,000 feet in the broad U-shaped river valleys to over 9,000 feet on the mountain peaks. Delano Creek flows southerly through the western edge of the Ole claims. On each side of these creeks are talus slides with an incline from 30° to 45°. These slides are interspersed with minor rock bluffs and extend for approximately 1,500 to 3,000 horizontal feet to larger, often impassable, bluffs.

WEATHER:

The climate of the area could be termed sub-arctic. Temperatures can thus dip to a minimum of -60° F. in January to a maximum of about 90° F in July. Freeze-up starts approximately mid-October and break-up around

April or May. There are thus only four or five months of exploration season, and snow can fall anytime during these months. For the three weeks spent on the Ole and Lee Groups, the weather varied from hot, sunny days (70° temperatures) to rain and snow.

MAP PLOTTING:

The geochemical map was drawn on a scale of 1" =400'. It contains the lines with the stations and the claims with the claim posts. It is difficult to contour this type of map because the Holman Cu values are semi-quantitative. The anomalous areas, therefore, are circled with a solid line.

The geological map is also drawn on a scale of 1" =400'. Rock outcrops, rock bluffs, streams, roads, and the claims are marked on this map.

GEOCHEMICAL SURVEY:

1. Survey Procedure

For the Lee claims, Delano Creek was used for a baseline, which runs approximately S50° W in the survey area. Lines were chained, compassed and flagged N 40° W - S 40° E. Lines were run in this direction since it was thought that an E.M. survey using these lines would best pick-up any copper mineralization. The survey was to be done after the soil sampling if an instrument became available before winter snowfall. Soil samples were picked up on these lines every 100 ft. and marked with red flagging tape. Blue ribbon was put up where the lines crossed the baseline. Two soil sample lines were chained, compassed and marked with red flagging up the creek, one line on each side. It was hoped that these lines could catch any copper leaching draining down the hill. On the west end of the property, 4 lines were run east-west because of the increasing travel time it took the survey crew to

reach the work area. Unfortunately, this area was not finished (approximately 3 lines were not run) due to snow.

The area, because of slopes varying from 30° to 45° and because of a low brush that makes walking very difficult, is a tough one to work in. Therefore, on the Ole group, all roads and cat trails were used as soil sample lines. These were chained, compassed and flagged every 100 feet with red flagging tape. Additional lines were run to fill in the gaps.

On both groups, soil sampling was limited from one to three thousand feet above the creeks because of rock bluffs. Also, in many places, no sample was taken because of talus or outcropping.

Unfortunately, there are virtually no geochemical values for lines 36W and 44W, stations 1 - 20S. It seems the samples went missing in transit (they were shipped by truck from Fort Nelson to Vancouver).

The soil samples weredug with a rock-pick, which seemed to be more effective in this area because of the heavy moss and much rock. The type of soil collected was clayish and was probably closer to a C-type than a B.

Since the mineralization in this area is associated with the andesite dykes and since andesite is almost always more magnetic than argillite shale (through which the dikes intrude in this area), it was thought that a magnetic survey would be quite useful in picking up these dikes through overburden. However, test lines were run over 2 of the dikes, both 100 ft. or more in width, using a portable vertical component fluxgate magnetometer manufactured by Sabre Electronic Instruments Ltd. of North Burnaby, B.C., and neither one of the dikes was picked up. Therefore a magnetometer survey was abandoned.

2, Testing Procedure

The Holman copper field test was used to analyse all the soil samples. It is a simple test, and as long as

proper lab methods are utilized, reliable results can be obtained.

The Holman being a field test, the samples do not need to be dried, and silt or soil found in the field is usually fine enough to test without being screened. However, some of the samples were quite rocky and were thus sifted by an 80-mesh screen. A small portion of a fine-grained soil sample is put into a test-tube. A weak acid buffer solution is added and then a chemical indicator. It is well shaken and a color is obtained. If green, the reading is negative; if colorless (the end point) or red, the reading is positive. Measured amounts of indicator are added to a red solution until the end point is reached. The amount of indicator required for this determines the reading, and thus the units are milliliters of indicator. The results are shown in figure 1. A reading of one or more is considered as a positive result.

3. Discussion of Results

Many of the samples when being tested effervesced,

indicating a high amount of carbonate. This will give an unwanted positive reading and thus must be corrected by adding more buffer solution. There is then a certain amount of error in this, and some of the readings are probably more positive than they should be.

There are three areas that, because of their large size and high values, are of particular interest.

They are labelled A, B, and C.

Anomaly A occurs on Lee 9 and 14 M.C. It is relatively low in elevation and occurs within the fork of Delano Creek. The anomaly could be caused by a copper sulphide.

The second anomaly, anomaly B, occurs on Lee 3 M.C. From the geological map, the source seems to occur in rock unit 4. Because of the high values, it seems this anomaly may also indicate a copper sulphide source. Since the anomaly is on a southern slope, the source

would be around more northern values (uphill).

Anomaly C is found on Lee 4 M.C., and thus could easily occur on rock unit 1 (argillite-shale). The copper content of the soil has probably been leached down from a higher source. How high the source is, is hard to say.

There are quite a few interesting anomalous areas that seem to follow the direction of the survey lines. In other words, the source has been leached downhill. Specifically, these anomalies occur on the northern extensions of lines 4W, 32W, 44W and 68W. These are all found on the Lee Claim Group.

Of academic interest is a large anomaly found on Ole 11. In this area has been found much chalcopyrite float similar to the ore of Largo or Churchill Copper Mines, which would thus cause the anomaly. It is possible that this float could have been derived from the bedrock beneath. However, the soil type seems to be glacial till and thus would have come from Largo or Churchill Copper Mines.

This should be further checked out. On the base-line (Lee Claim Group) between stations 63W and 76W, are a series of silt samples (taken from the northern fork of Delano Creek) that give anomalous readings. It seems then that the copper source is further upstream and perhaps off of the Lee Claim Group. Some of the source, no doubt, is from the area around lines 68 W and 72 W.

It must be remembered that the Holman test is a semi-quantitative one and therefore is more of a copper indicator than a copper measure. If one desires greater accuracy, then the samples should be tested by hot acid extraction which measures the total number of copper ions in the soil. The Holman test measures only those ions of minerals that are easily dissolved.

GEOLOGICAL MAPPING:

The geology of the ore deposits of the Churchill Copper mine, the Davis Keays deposit and the Largo deposit are all similar. The principal sulphide, chalcopyrite, is found in a quartz-calcite vein which in turn is in a

country rock of highly contorted argillite. It seems the mineralization is associated with near-vertical basic dykes which are usually 100 feet wide, and strike about northeast-southwest.

The author made several traverses in the area of the Lee, Ole, and Shaw claims. He recognized about eight different rock types which are shown on the geological map (figure 2) and are separated according to time sequence.

The oldest rock recegnized was an argillite-shale and is of the Windermere type according to John R. Vail in his M.Sc. thesis. It is a grey-black rock with alternate light-dark bands of bedding which usually dip about 20° in a southerly direction. It has 3 sets of fractures, with one being parallel to the bedding and the strongest, usually, being approximately perpendicular to the bedding. Sometimes the fractures produce small sharp angular pieces of rock. The strike and dip vary from place to place. There are also found veinlets of calcite, and sometimes quartz, varying in width

from 1/10 inch to 1 or 2 inches. This seems to be the same rock type as the host rock for the upper ore deposits in this area. Vail feels this is of the Proterozoic age. The rock is found in outcroppings along the creeks and in the lower elevations of the mountains.

The argillite is cut by near-vertical green basic dykes, designated by rock-unit 2, that generally runs southwest-northeast. By the color, the probably mineral composition is that of andesite. The rock is fine-grained with the fabric of the rock generally becoming coarser in the larger dykes. In the larger dykes also, there is a strong set of fractures parallel to the strike of the dyke and a weaker set perpendicular to it, dipping approximately 76° to the southwest. There are also veinlets of calcite, quartz, and epidote cutting the andesite disconcordantly. Specks of pyrite and the odd speck of chalcopyrite have been seen in the andesite.

It is difficult to say what part of the sequence rock-unit 3 is in because of limited outcropping (west of Shaw

group on the Lee group). It is shale that on appearance is alternate bands of buff and grey colors. The buff bands, green below the weathered surface, are 3 to 5 feet wide, softer and break in lamellar planes parallel to the bedding. The grey bands, grey-green below the weathered surface, are 1 to 2 feet thick, harder and thus more angular. One set of fractures goes through both bands striking south with vertical dip. A second set is limited to grey bands and strikes S60 E with a dip of 60° to southwest. The whole bed seems to be approximately 100 feet thick or more.

What is called a red shale, unit 4, varies in color from red to grey and in rock type, from a metamorphosed shale to almost a quartzite. The buff-colored surface is weathered so that very thin ridges stick out, which are usually curved. Calcite and quartz stringers cut perpendicular to the bedding and contain a few specks of pyrite and chalcopyrite. There was also noticed an unidentified purple or wine-red mineral with blocky cleavage and occuring with quartz. The thickness seems to vary from 100 to about 300 feet.

Rock-units 5 and 6 were deposited in roughly the same time, since up a bluff on Mount Roosevelt there was noticed alternate bands of purple and grey conglomerate. However, they were separated because the purple conglomerate always occurred first and there is a definite contact between the two. The rocks of the purple conglomerate vary in diameter from 1/20 inch to 5 inches and almost all are dark purple. The grey conglomerate has rocks the same size but generally of a grey or green color. West of Magnum Creek, the purple conglomerate is about 30 feet thick and the grey conglomerate about 15 feet thick. The conglomerate beds, as do rock - units 4, 7, and 8 in this locality, dip approximately 20° to S 40E.

Above this, in same location, is 30 feet of a green quartzite, some of it with purple bands going through it.

Rock-unit 8 is a buff weathered grey-black shale at least 100 feet thick. It does not have any cleavage or fractures.

RECOMMENDATIONS:

An EM should pick up the massive copper mineralization found in this country. It is thus thought that an EM survey would be quit useful.. Lines should be run from the creek and uphill to the bottom of the bluffs.

Respectfully submitted,

David Mark, B.Sc.
Geophysicist

December 11, 1969.

SELECTED BIBLIOGRAPHY

MENZIES, M.M. (1951) Geology and Mineralogy of the Strangword Copper Property, South Tetsa River, B.C.

University of British Columbia, M. A. Sc. thesis.

VAIL, John R. (1957) Geology of the Racing River Area, B.C.

University of British Columbia, M. sc. thesis.

WILLIAMS, M.Y. (1944) "Geology Along the Alaska Highway, Fort Nelson to Watson Lake".

Geological Survey of Canada, paper 44.28

Geotronics Surveys

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RESUME OF TECHNICAL AND FIELD EXPERIENCE OF DAVID MARK, B. Sc.

EDUCATION:

Graduate of University of British Columbia in Science (B.Sc.) in Geophysics.

EXPERIENCE IN INDUSTRY

1. Prospecting and geological evaluation for New Taku Mines during exploration season of 1965.

2. Field supervisor for geophysical and geochemical work and prospecting for Mastadon-Highland Bell Mines Ltd. during exploration season of 1966.

3. Field supervisor in geochemical work and geological mapping for Anaconda (Can.) Company during exploration season of 1967.

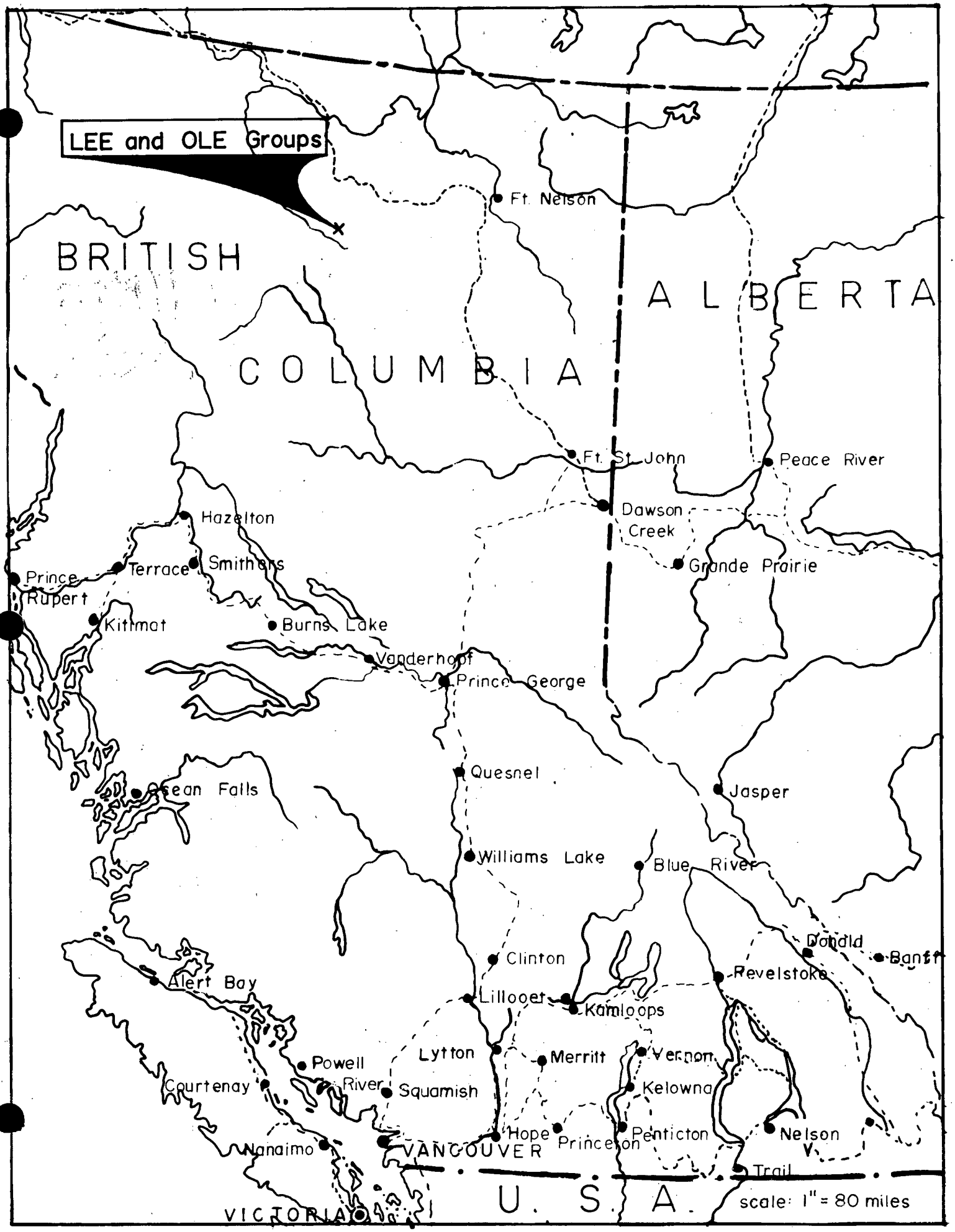
4. Field geophysicist for Geo-X Surveys Ltd. during exploration season of 1968.

5. Presently geophysicist for Geotronics Surveys Ltd., Vancouver, B.C.

6. Experience in various geophysical instrument surveys; magnetometer, electromagnetic, self potential, gravity, induced polarization, restivity and seismic methods.

7. Member of British Columbia Geophysical Society.

8. P. Eng. applied for with Association of Professional Engineers of B. C.


LEE and OLE Groups
Ft. Nelson
BRITISH
COLUMBIA
ALBERTA
Ft. St. John
Peace River
Dawson Creek
Grande Prairie
Hazelton
Smithers
Terrace
Prince Rupert
Kitimat
Burns Lake
Vanderhoof
Prince George
Quesnel
Ocean Falls
Jasper
Williams Lake
Blue River
Donald
Banff
Clinton
Revelstoke
Alert Bay
Lillooet
Kamloops
Lytton
Merritt
Vernon
Powell River
Courtenay
Squamish
Kelowna
Hope
Princeton
Penticton
Nelson
Nanaimo
VANCOUVER
Trail
VICTORIA
U. S. A.
scale: 1" = 80 miles

LEE & OIE GROUPS

Cost Breakdown
August 22 to September 13, 1969
(23 days)

WAGES	
D. Mark, B. Sc., Field Supervisor, 23 days @ $75.00	$1,750.00
D. Morris, Field Assistant, 23 days @ $40.00	920.00
P. Burjoski, Field Assistant, 23 days @ $40.00	920.00
VEHICLE RENTAL, 23 days @ $15.00 per day	335.00
CAMP MAINTENANCE, 3 men - 23 days @ $45.00	1,035.00
SURVEY MATERIALS AND SUPPLIES	75.00
GEOCHEMICAL SUPPLIES AND ANALYSIS, 1,200 samples @ $.50	600.00
GEOLOGICAL - GEOCHEMICAL MAPPING & REPORTS	600.00
ENGINEERING FEES	400.00
TOTAL	$6,635.00

Declared before me at the City of Vancouver, in the Province of British Columbia, this 12 day of March 1970, A.D.

Tom Roth

A Commissioner for taking Affidavits within British Columbia
A Notary Public

Joan Turner

SUB-MINING RECORDER

E. P. SHEPPARD & ASSOCIATES LTD.
CONSULTING GEOLOGISTS
314-402 WEST PENDER STREET,
VANCOUVER 3, B.C.

February 16, 1970

Mr. Tom Rolston
Geotronics Surveys
517-602 W. Hastings Street
Vancouver, B. C.

Dear Mr. Rolston:

At your request I have reviewed the references cited below and examined the report prepared by employees of your company, "Geochemical and Geological Field Report Submitted to Great Northern Petroleums & Mines Ltd., Lee and Ole Claim Group, Churchill Copper Area, B. C."

The claims group is located about 100 miles west of Fort Nelson in the Rocky Mountains, in the Laird Mining District, near the confluence of the Magnum and Delano Creeks, which is about three miles south of the Churchill Copper Mine. Access is by the Churchill Copper haulage road which leaves the Alaska Highway at Mile 401 and passes through the southern end of the Ole claims about 28 miles from the highway.

The geochemical report outlined three areas that, because of their large size and high values, are of particular interest:

"A" occurs on Lee 9 and 14. It lies at low elevation within the fork of Delano Creek. The anomaly may indicate the presence of copper sulphide. In this area of precipitous terrain, a considerable amount of downhill leaching and transportation may be expected. Thus, anomalies in low elevation areas should be further explored either by bulldoze trenches or geophysical survey (EM).

"B" occurs on Lee 3. The underlying rock is unit 4, a red shale. The high values may well represent copper sulphides, but since the anomaly occurs on a steep slope, the question of transportation and downhill leaching is again raised.

"C" occurs on Lee 4. Here again, downhill leaching is possible. Other anomalous areas within the claims group are also ascribed to downhill leaching.

The survey appears to have been carefully carried out and, while the anomalous areas located have been ascribed to downhill leaching and transportation, the survey has definitely located key points which will give direction for further exploration, uphill, to try and detect the source.

Geology. The claims are underlain by massive sedimentary rocks believed to be Proterozoic in age. The rocks consist of siltstones, shales and shaly argillites. The series is relatively flat-lying with considerable local folding. The only additional geologic features are gabbroic dikes. They do not appear to be related to mineralization but are thought to be part of the general zones of weakness which also permitted intrusion of vein type occurrences carrying sulphides.

On the Davis-Keays property, the veins are quartz-carbonate with chalcopyrite the chief copper sulphide. The veins dip steeply to vertical and have a general strike direction of N 40°E. They are persistent and show little local displacement or fracturing. No evidence of veins of this nature has been found on the Lee and Ole claims.

The writer spent October 16th and 17th, 1969, on an adjacent claims group and partly on the Lee and Ole group. No evidence of veins was discovered during the investigation but a good picture of the geologic setting was obtained.

It is felt that since much of the area is masked by overburden, geophysical surveys could be employed to good advantage. The massive copper mineralization typical of the mineralized veins of the district would be easily detected by the Electro-magnetic type of geophysical instrument. It is therefore recommended that an EM survey be run over the anomalous areas with additional EM survey lines across the covered areas.

The Geochemical and Geological field reports and accompanying maps submitted by your company represents data of real value and will be helpful in laying out future exploration work. and in determining the type of exploration to be followed. I am satisfied that the reports and maps are the results of competent field work performed in an efficient manner.

Respectfully submitted,

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA E. P. SHEPPARD

E. P. Sheppard

E. Percy Sheppard, P. Eng.
Consulting Geologist

EPS:d

REFERENCES

(1) Menzies, M. M. (1951) - GEOLOGY AND MINERALOGY OF THE STRANGWORD COPPER PROPERTY, SOUTH TETSA RIVER, B.C.

University of British Columbia, M.A.Sc. thesis.

(2) Vail, John R. (1957) - GEOLOGY OF THE RACING RIVER AREA, B.C.

University of British Columbia, M.Sc. thesis.

(3) Williams, M. Y.(1944) - GEOLOGY ALONG THE ALASKA HIGHWAY, FORT NELSON TO WATSON LAKE".

Geological Survey of Canada, paper 44.28

* * *

LEE CLAIM GROUP
OLE CLAIM GROUP
LARGO MINES LTD.
MUNDEE MINES LTD.
SHAW CLAIM GROUP
Baseline
Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2264 MAP #2
LEGEND
Claim post - located
Claim post - assumed
Claim post - witness
survey line with soil sample stations
border of Great Northern's claims
division between Ole and Lee claim groups
claims of Great Northern's that overlap Shaw Group
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA E. P. SHEPPARD
GREAT NORTHERN
PETROLEUMS and MINES LTD
LEE & OLE CLAIM GROUPS
CHURCHILL COPPER AREA, LIARD M.D. B.C.
GEOCHEMICAL SURVEY (soil)
type of survey
(results are semiquantitative values from Holman Cu test)
scale 1" = 400'
date Sept. 1969
job no. 69-36
sheet no. 1
drawn by JEW
Geotronics Surveys Ltd.
Geophysical Surveys, Ground & Airborne
517 - 602 West Hastings Street, Vancouver, British Columbia.

LARGO MINES LTD.

LEE CLAIMS

OLE CLAIMS

Churchill Copper approx. 3 miles

CHURCHILL COPPER mill and townsite approx. 7 miles

Delano Creek

Copper float

MUNDEE MINES LTD.
SHAW CLAIM GROUP

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2264 MAP #3

LEGEND

- rock outcropping with contact line
- rock bluff
- road
- attitude of dikes and sedimentary beds
- creek
- 8 light grey shale
- 7 green quartzite
- 6 grey conglomerate
- 5 red-purple conglomerate
- 4 red shale
- 3 shale-alternating bands of green & grey
- 2 andesite dike
- 1 grey-black shale/argillite

N

PROFESSIONAL ENGINEER
E. P. SHEPPARD
BRITISH COLUMBIA

GREAT NORTHERN
PETROLEUMS & MINES LTD.
LEE and OLE Claim Groups
CHURCHILL COPPER AREA, LIARD M.D., B.C.

type of survey: GEOLOGICAL MAP

scale	date	job no.	sheet no.	drawn by
1" = 400'	Sept. 1969	6936	2	D.Morris

Geotronics Surveys Ltd.
Geophysical Surveys, Ground & Airborne
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