2611

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 2611 MAP

ELECTROMAGNETIC SURVEY
J. H. CONROY
CAROLE CLAIM GROUP
INVERMERE AREA, GOLDEN M.D., B.C.
SEPTEMBER 4-8, 1970

Carole Claim Group: 15 miles S35°W of Invermere,
50° 116° SE

N.T.S. - 82K/8W ✓

Report by: GEOTRONICS SURVEYS LTD.
David G. Mark, B.Sc.
Geophysicist
October, 1970

Submitted to: J. H. CONROY
Box 325
Invermere, B.C.

Geotronics Surveys

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

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SUMMARY

The Carole group of claims, owned by J. H. Conroy, are located approximately 15 miles southeast of Invermere, B.C. at 7650 feet elevation and is accessible best by helicopter. The terrain is moderate and water is available for all phases of exploration and development.

The property is also located 8 miles east of the Mineral King Mine and adjoins the Yornoc property prospect which apparently shows interesting promise.

Previous to the EM survey, a geochemical survey was conducted in which the soil samples were tested for copper, lead and zinc. Many anomalous values were obtained.

The EM survey, done by a fixed transmitter, vertical loop instrument, showed one very definite conductor of weak conductivity through the center of the survey and 2 lesser ones on each side. The western and central conductor could be due to the 2 shear zones on the property. It is just as possible the conductors are due to galena and copper mineralization because of favourable geological environment, small showings of galena, sphalerite and copper sulphides on the property, and correlation with geochemistry results.

CONCLUSIONS AND RECOMMENDATIONS

For the reasons cited above and in the main body of the report, the EM results show definite promise and, therefore, warrant further exploration.

It is recommended to diamond drill the main central conductor at approximately 100 feet west of it on line 8N. The angle of the hole should be 45° east. If this hole does not uncover the cause of the conductor, then

(1) steeper dip should be tried to cover the possibility of a greater depth

(2) a hole should be drilled 100 feet east of the conductor to cover the possibility of a dip to the east

(3) Different holes should be tried north and south of L-8N to cover the possibility of a "hole" in the conductor.

If positive results are obtained, then a diamond drill program is further warranted along with more EM survey work.

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GEOPHYSICAL REPORT ON ELECTROMAGNETIC SURVEY ON THE CAROLE MINERAL CLAIMS INVERMERE AREA, B. C. OCTOBER, 1970

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INTRODUCTION

A vertical loop electromagnetic survey was carried out by the writer on the Carole 1-3 and 6 mineral claims, southwest of Invermere, between September 4 and September 8, 1970.

Object of the survey was to locate any massive silver-lead sulphides that might occur in the area.

LOCATION

The claims are located 15 miles S35°W of Invermere at approximately 50° 19'N and 116° 15'W. The elevation is approximately 7650 feet above sea level.

Access is best by helicopter but the property can be reached by an arduous hike up the Ben Abel Creek.

LOCATION MAP

fig. 1

TOPOGRAPHY

The Carole claims are centered around a small lake, 600 ft. by 200 ft., just above timber level. Much of the survey area is then on alpine meadow that is sparsely treed with small, stunted evergreens.

East and south of the lake are steep mountain slopes. However, the elevation difference in the survey area was only approximately 100 feet.

PREVIOUS WORK

The survey area was covered previously by a geochemical survey completed by J. H. Conroy. The soil samples were tested for copper, lead and zinc.

No other work is known to have been done on the property.

INSTRUMENTATION

A Crone VEM vertical loop electromagnetic instrument (fixed source) manufactured by Crone Geophysics Limited of Mississauga, Ontario was used for the survey. The transmitter uses a large coil, 9 feet high and 8 feet wide that rotates about a vertical axis. There are 3 power output positions giving a survey range up to 2000 feet. The EM unit has 2 frequency ranges: 480 Hz and 1800 Hz. The 1800 Hz frequency was used for all stations and the 480 Hz frequency was used only in checking the conductivity of a conductor.

In general, an EM instrument is designed to pick up conductive zones through electromagnetic induction. The EM transmitter sets up an alternating magnetic field, called the primary, by passing an alternating current through the transmitter coil. If a conductive mass is nearby, the primary magnetic field induces electric currents in the mass which produces a secondary magnetic field. This secondary field distorts the primary field, and it is a measure of this distortion that constitutes the results of the electromagnetic survey. The angle of this distorted field, called the dip angle, is what is measured by the Crone VEM receiver (some instruments measure field strength).

With a vertical loop instrument (and the convention employed here), a conductor is indicated by west readings on the west side of the conductor and east readings on the east side. The zero point (where west readings change to east readings) is then usually directly over the top edge of the conductor (certain transmitter locations and certain geologic conditions may change this) and this is called a "true crossover." If west readings are east of the crossover and east readings west of the crossover, then this type is called a "reverse crossover" and does not indicate a conductor.

SURVEY PROCEDURE

The baseline was compassed in along a direction of S18E - N18W (320° mag.) and red flags (4 ft. sq. vinyl on 3 feet of wire) placed every 100 feet. Perpendicular crosslines (N72E - S72W) were then compassed in every 200 feet except for L-5S as the survey progressed and red flags were placed every 100 feet.

The transmitter was placed in 2 locations, first at (L-0, 0) and second at (L-6N, 0). For each reading the transmitter coil was 'aimed' so that the point of observation was contained within the plane of the coil. Readings were taken every 100 feet by the VEM receiver and 50 feet around cross-overs.

MAP PLOTTING

All readings are shown on the Survey Plan map (Figure 3) which has a scale of 1" = 200'. Shown also on this map are the claim posts, lake and creek.

Profiles were then drawn of the readings with a horizontal scale of 1" = 200' and vertical scale of 1" = 20° and are shown on Figure 4. West readings were plotted above the zero line and east readings below.

GEOLOGY

Geology is taken from Reesor and personal communication with J. Conroy.

The claim group seems to be underlain by rocks of the Dutch Creek Formation of Proterozoic Time. West of the base line, the rock type is an argillite dipping 15° westerly. Just east of the base line (see accompanying diagram - Figure 2) is a limy or dolomitic slate (argillite?). As shown it is cut by a vertical dipping andesite dike. This limy slate has numerous occurrences of galena and sphalerite in a barite gangue. South of the lake about a 1000 feet is an outcrop of dolomite.

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NO. 2611 MAP #2

shear zone

baseline

15°

argillite

LAKE

L-0

dolomitic slate

andesite dike

dolomite outcrop

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GEOLOGY
CAROLE GROUP
GOLDEN M.D.
J. H. CONROY

D. MARK

scale: 1"=400'

fig. 2

Shown on the geology map are 2 parallel shear zones (perhaps collectively, they can be called 1 shear zone). These are seen on the property as 2 parallel zones of depression, the larger one more depressed (thus forming the lake) than the smaller, easterly one. The base line was set up along the smaller one.

The Mineral King Mine, 8 miles west of the property on Toby Creek, occurs in dolomitic limestone of the Mount Nelson Formation. Its sulphides are sphalerite and galena with smaller amounts of chalcopyrite and argentiferous tetrahedrite in a barite gangue. Similar mineralogy is found on the advanced Yornoc prospect, adjacent to the Carole claims.

INTERPRETATION

As can be seen on the profiles, and as shown on Figure 3, a strong conductor positively indicated by crossovers runs through the middle of the survey area. Also of positive identification were very narrow nulls in the readings around the crossovers.

There are shown also on Figure 3, additional crossovers on each side of the main central one. The western conductor was deduced mainly by 'dips' in the profiles and very sharp nulls on lines 4S, 5S and 6S. The eastern conductor was not so positively identified (except on L-2N which was shown by a weak crossover) because of only slight 'dips' in the profiles.

It was attempted to calculate the dip and depth to top of the main conductor. For many of the profiles it would not work out according to formula (Grant and West), and for the ones it did, the dip varied from 30° to 70° to the west (it was also tried assuming dip to east and it only worked for one profile which gave a dip of 55°). The depth, thus, was not attempted, since its correct answer depends on a correct dip angle. The reasons for the profiles not fitting to formula are probably as follows:

(1) topography is not flat which will cause

  (a) misorientation and thus a small error in dip angle readings

  (b) masking effect from increasing topographical slope (especially on east side)

(2) multiple conductors.

It is possible, also, that topography could have caused some of the smaller 'dips' in the profiles, especially on east side, that were used to indicate possible conductors. It will, therefore, have to be assumed that the conductor is vertical. The depth to top, from comparing with model curves, is probably within 50 ft. of the surface.

The depth extent is also difficult to say for the above same reasons. However, the writer feels it safe to assume at least 100 feet.

It is noted that the profiles increase in amplitude as the lines increase in distance from the transmitter. This is a phenomenon peculiar to a vertical loop, fixed transmitter

survey and does not mean that the conductor has good depth extent or conductivity.

The amplitude ratio between low and high frequency ($\frac{L}{H}$) on lines 6N, 4N, 5S and 6S indicate a conductor of low conductivity. The low frequency readings were hardly above noise level, if at all. It is therefore quite possible that the conductor is only the shear zone mentioned above filled with water. It is noted that the conductor axis starts on line 12S between the 2 shear zones and crosses the east one at (L-0, 0) to hug the east side of it from line 2N to 10N. This is entirely possible since a shear zone will often have a 'braiding effect' in which a water-filled or sulphide-filled zone within the shear will cross from one side to the other. It is also possible the western conductor is due to the west side of the west shear zone.

However, the main conductor from line 2N to 10N coincides fairly well with anomalous copper and lead geochemistry values as shown on the rough field map drawn by J. H. Conroy. There is also some correlation on line 6S with the main conductor, and on line 2N with the eastern conductor. Because of this and in addition to the following reasons, it is also entirely possible that the conductor is due to lead, copper and zinc sulphides.

(1) Sphalerite is a non-conductor and thus will have an insulating effect on galena or copper sulphides.

(2) There are numerous small prospects of galena, sphalerite and copper sulphides in a barite gangue on the east side of

the base line. None of these were noted, however, to contain a sufficient quantity of sulphides to give an EM conductor.

(3) The Carole group has a similar geological environment to that of the Mineral King Mine and the adjoining Yornoc claim group prospect.

Respectfully submitted,

GEOTRONICS SURVEYS LTD.

DAVID G. MARK, B.Sc.
Geophysicist

DGM:ly

October 6, 1970

SELECTED BIBLIOGRAPHY

Evans, C. S.: Brisco-Dogtooth Map-Area, B.C.; Geol. Surv., Canada, Sum. Rept. 1932 pt. AII, pp. 106-176 (1933).

Grant, F. S., and West, G. F.: Interpretation Theory in Applied Geophysics; New York, McGraw-Hill Book Company, Inc., 1965.

Little, H. W.: Salmo Map-Area, British Columbia; Geol. Surv., Canada, Paper 50-19 (1950).

Reesor, J. E.: Geology Map 12-1957, Lardeau (East Half); Geol. Surv., Canada, 1957.

Walker, J. F.: Geology and Mineral Deposits of Windermere Map-Area, B.C.; Geol. Surv., Canada, Mem. 148 (1926).

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 Ltd. 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 (Canada) 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 and Vancouver Branch of The Canadian Institute of Mining and Metallurgy.
8. P. Eng. applied for with Association of Professional Engineers of B. C.

COST BREAKDOWN: Job #70-58

Geophysicist, 4 days @ $100.00/day	$ 400.00
Instrument rental, $300.00/month	150.00
Engineering fees	100.00
Geophysical mapping and report	450.00
Survey material	10.00
TOTAL COSTS	$1,110.00

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 8th day of October, A.D. 1970

A Commissioner for taking Affidavits within British Columbia

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

October 6, 1970

Mr. Tom Rolston
Geotronics Surveys, Ltd.
514 - 602 W. Hastings St.
Vancouver 2, 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, "Geophysical Report on Electromagnetic Survey, Carole Mineral Claims, Invermere Area, B.C."

The claim group is located approximately 15 miles S35°E of Invermere at approximately 50° 19'N and 116° 15'W. The elevation is approximately 7650 feet above sea level. Direct access is by helicopter.

GEOLOGY

The claim group is underlain by rocks of the Dutch Creek Formation of Proterozoic Time. West of the base line the rocks are argillites which strike northerly and dip 15° to the west. East of the base line is a limy or dolomitic slate, cut by a vertically dipping andesite dike. Two parallel shear zones striking northerly are reflected on surface as two parallel lines of depression. The base line for the EM survey was set up along the easterly depression.

Electromagnetic Survey: A continuous conductor with a northerly trend was outlined. This conductor begins on line 12-S, 250' west of base line and crosses the base line

at L-0. On L10N the conductor lies 150 feet East of base line. A second conductor is indicated on L-0, L4S, L5S and L6S at 450' west of base line. This conductor is represented by dips in the curves.

The first conductor coincides roughly with the shear zones and are assumed vertical.

It is felt that this anomaly is geologically significant and should be further investigated by diamond drilling.

The geophysical report and maps submitted by your Company show careful preparation and professional preparation. I am satisfied that the field work performed was of the same high quality as that carried out on assignments where your crews were under my supervision.

Respectfully submitted,

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA E. P. SHEPPARD

E. P. Sheppard

E. Percy Sheppard, P.Eng.
Consulting Geologist

EPS:ly

References:

Walker, J.F. Geology and Mineral Deposits of Invermere Map-Area, B.C., Geol. Survey of Canada Mem. 148 (1926).

J. E. Reesor, G.S.C. Map 12-1957, Lardeau.

at L-0. On L10N the conductor lies 150 feet East of base line. A second conductor is indicated on L-0, L4S, L5S and L6S at 450' west of base line. This conductor is represented by dips in the curves.

The first conductor coincides roughly with the shear zones and appears to pass through the shears at a flat angle to the east.

It is felt that this anomaly is geologically significant and should be further investigated by diamond drilling.

The geophysical report and maps submitted by your Company show careful preparation and professional preparation. I am satisfied that the field work performed was of the same high quality as that carried out on assignments where your crews were under my supervision.

Respectfully submitted,

E. P. Sheppard.

E. Percy Sheppard, P.Eng.
Consulting Geologist

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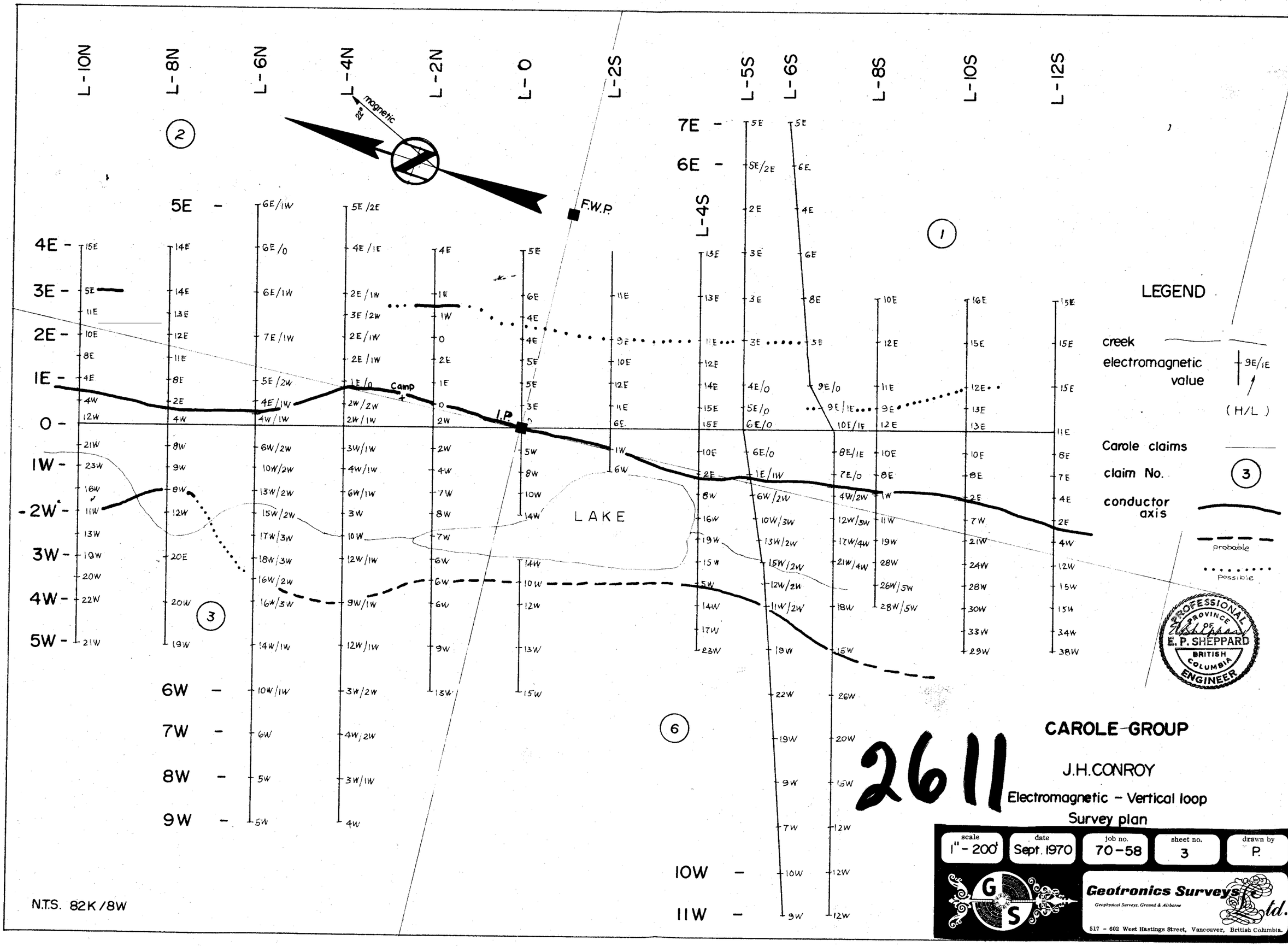
References:

Walker, J.F. Geology and Mineral Deposits of Invermere Map-Area, B.C., Geol. Survey of Canada Memo 148 (1926).

J. E. Reesor, G.S.C. Map 12-1957, Lardeau.



LEGEND

creek

electromagnetic value 9E/1E (H/L)

Carole claims

claim No. (3)

conductor axis

probable

possible

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J.H. CONROY

Electromagnetic - Vertical loop

Survey plan

scale	date	job no.	sheet no.	drawn by
1" - 200'	Sept. 1970	70-58	3	P.

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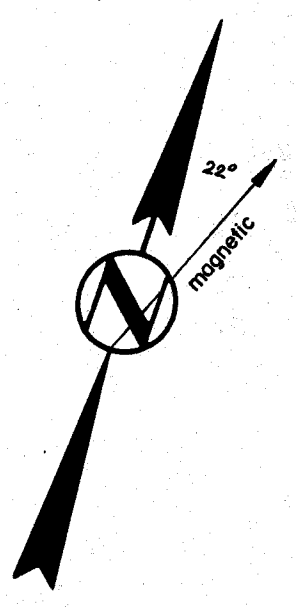

W E

L - 10N from 1'

L - 8N from 1'

L - 6N from 1'

L - 4N from 1'

L - 2N from 2

L - 0 from 2

L - 2S from 2

L - 4S from 2

L - 5S from 1'

L - 6S from 1'

west stations east stations

L - 8S from 1'

L - 10S from 1'

L - 12S from 1'

W E

LEGEND

1800 Hz readings

480 Hz readings

1' transmitter location

crossover indicating a conductor

INSTRUMENT

CRONE V.E.M. - vertical loop

NOTE: Readings are in degrees

SCALE 1" - 200'

To accompany geophysical report by D. Mark, B.Sc.

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CAROLE GROUP

J. H. CONROY

PROFILES

N.T.S. 82K/8W

fig. 4

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