

1892

REPORT ON  
GEOLOGIC MAPPING, DIAMOND DRILLING  
AND GEOPHYSICAL SURVEY, ON THE  
JOHN CLAIMS

LIARD MINING DIVISION  
BRITISH COLUMBIA

FOR  
CHURCHILL COPPER CORPORATION LIMITED

BY  
E. S. HOLT, GEOLOGIST  
AND  
STANLEY H. WARD, Ph.D., P. Eng.

MAY, 1969

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Department of	
Mines and Petroleum Resources	
ASSESSMENT REPORT	
NO. ....	<b>1892</b>
MAP .....	

## GENERAL DESCRIPTION

The John property consists of 10 mineral claims which were staked for Churchill Copper Corporation Ltd. in 1966. During that year the showings were sampled and four bulldozer trenches were attempted along the apparent strike of the veins. Permafrost prevented the bulldozer from exposing bedrock in each of the trenches.

The John claims are located approximately two miles west of Churchill Copper's Magnum deposit, through a 6000-foot pass. Access to the Alaska Highway is presently via a three-mile tote road to the Churchill camp and hence via a roughly constructed 39-mile dirt road to Mile 419 on the Alaska Highway. The nearest town is Fort Nelson, B.C., which is located at Mile 300, a distance of 132 miles by road from the property.

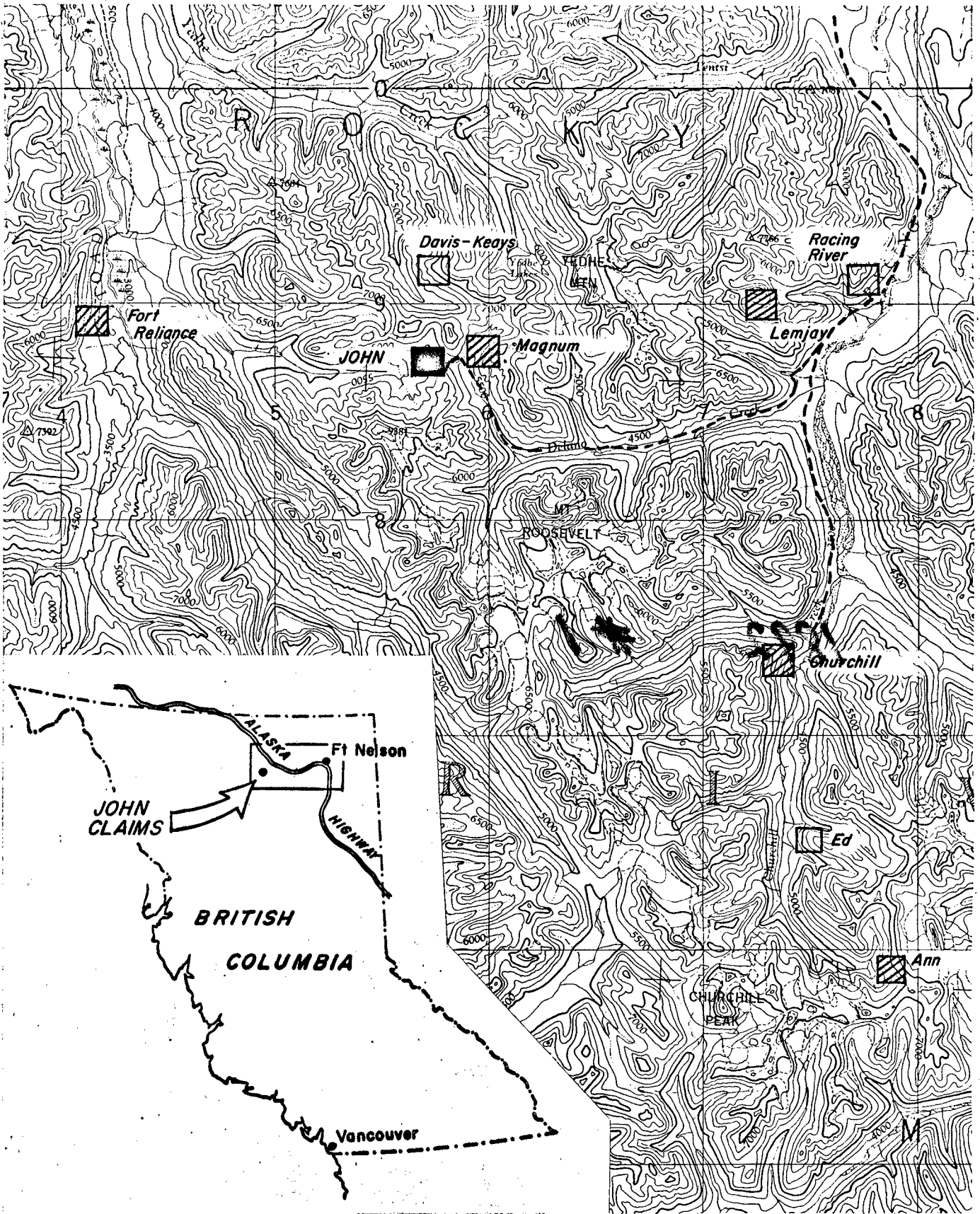
The claims lie within the Liard Mining Division of British Columbia, six miles northwest of Mt. Roosevelt. They are located near the headwaters of a drainage system in a broad glacial valley at an elevation greater than 5000 feet. The topography of the area is typical of the Rocky Mountain terrain. Precipitous mountain slopes rise steeply on either side of broad U-shaped valleys. The main streams are meandering and in part braided with numerous gravel bars. Mountain peaks in the area rise to an elevation of 10,000 feet while the valleys are generally between 3000 and 5000 feet above sea level. Retreating glaciers are common at the head of the valleys.




The John claims are located above timberline and are entirely overburden-covered except for a limited number of rock exposures in the shallow gorge

of Ringarooma Creek and its tributaries. Beyond the property limits excellent rock exposures exist in the rugged surrounding mountains.

The John property consists of the following ten mineral claims:

Claim Name	Record Number
John 1	23171
John 2	23172
John 3	23173
John 4	23174
John 5	23175
John 6	23176
John 7	23177
John 8	23178
John 9	23179
John 10	23180



-  Property under study
-  Other properties owned by Churchill
-  Other known mineral occurrences



**CHURCHILL COPPER CORPORATION LTD.**

**LOCATION MAP  
JOHN CLAIMS**



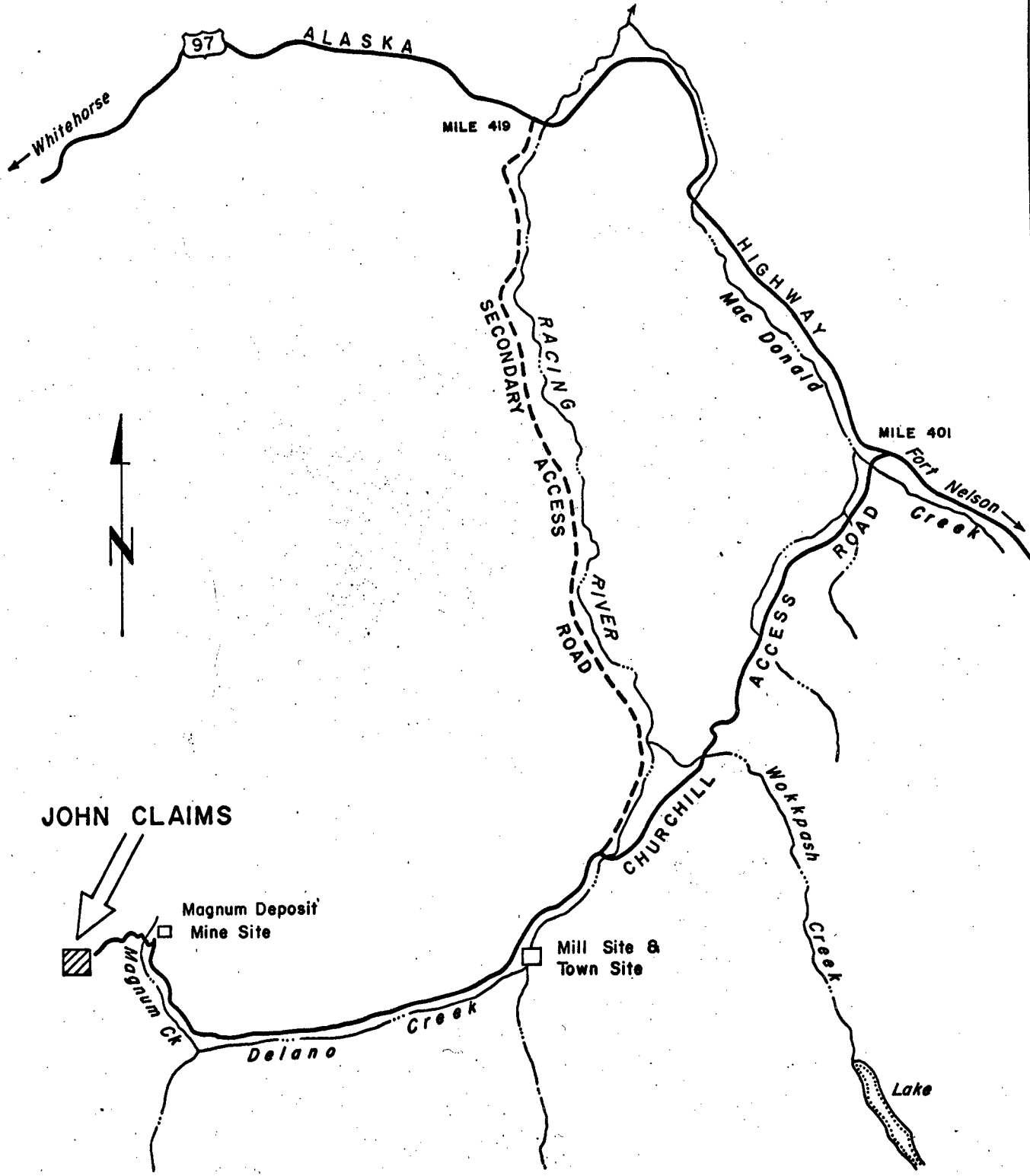
DRWG. NO. 1370

APRIL, 1969.

Department of  
Mines and Petroleum Resources

ASSESSMENT REPORT

NO. 1892 MAP #1



Department of  
 Mines and Petroleum Resources.  
 ASSESSMENT REPORT  
 NO. **1892** MAP **#2**

CHURCHILL COPPER CORPORATION LTD  
 LOCATION MAP  
 JOHN CLAIMS

0 2 4 8 12  
 MILES  
 DRWG. N° 1369 C.W. & G LTD APRIL, 1969

## GEOLOGY

### REGIONAL ENVIRONMENT

The John claims lie within the eastern edge of the Rocky Mountains where exceptional exposures above timberline reveal flat to locally contorted sedimentary rock formations, dislocated by extensive regional faulting. The rock formations of the area are typical marine sediments; shale, argillite, limestone, quartzite and conglomerate. They range in age from Precambrian to Upper Cretaceous, with those in the immediate area of the property being classed as Precambrian.

Intrusive into the Precambrian strata is a series of basic dykes. They are persistent along strike and can often be traced for several miles, forming prominent structures running up or among mountain slopes. Petrographic analysis of the dykes classify them as fine grained diabase. The basic dykes appear to have intruded major fault zones. At a later stage quartz veins, containing chalcopryrite mineralization, invaded many of these same zones of weakness, occupying positions in or near the hanging or footwall of the dykes.

Openings for the quartz veins were formed by faulting, shearing and folding and possibly by the contraction of the dykes during cooling. The association of the mineralized quartz veins with the basic dykes appears to be structural only.

At the John claims the only exposures of vein material lie within a major basic dyke. This, however, is inconsistent with other dyke-vein relationships observed in the area.



## GEOLOGY OF THE JOHN CLAIMS

Rock formations on the John claims consist of calcareous and non-calcareous shales grading into siltstones and argillites. The sediments reveal considerable folding. The shales are separated by prominent bedding planes which vary in thickness from less than  $\frac{1}{4}$ -inch to several inches. The beds are generally homogeneous and as yet no marker beds have been established.

The vein exposures on the property are limited to three small outcrops in the Ringarooma Creek bottom. They appear to be steeply dipping, parallel, quartz-carbonate veins with a general north 30° east strike indicated. Extensions along strike are masked by overburden, and previous attempts to trench the vein apices were prevented by permafrost.

The veins are somewhat irregular as is the copper mineralization within them. Widths of the veins are approximately 8, 3 and 10 feet respectively going from west to east.

The John showings would be classed as an epithermal, highgrade, vein type deposit. The vein walls are irregular and the vein matter is "frozen" to the walls. Inclusions of wall rock material in the veins is common and almost no alteration of the inclusions or wall rock exists. Some silicification of the wall rock does extend outward from the veins for a distance of several feet.

The veins consist almost entirely of quartz and coarsely crystalline carbonate with abundant fragments of wall rock within the matrix.

The copper mineralization is in the form of chalcopyrite and occurs as erratic patches, blebs and disseminations. Some massive veins of chalcopyrite have widths of up to several inches. Minor amounts of bornite have been noted in the veins.

Chip samples taken across the veins in 1966 revealed the following assay results:

Vein 1	-	5.57% Cu across 8.0 feet
Vein 2	-	4.61% Cu across 3.0 feet
Vein 3	-	2.10% Cu across 6.0 feet and 0.35% Cu across 4.5 feet.

A 1.5-foot section visually estimated to be barren separated into two sections in Vein 3.

Pyrite is the only accessory sulphide mineral noted in the veins. Its presence is erratic, and although generally absent, its content is estimated to be approximately one-tenth that of the chalcopyrite.

Sulphide mineralization is restricted to the quartz vein host. The quartz veins, however, have stringers and lenses protruding into the host rocks.

No sign of replacement of the wall rock exists. The minor silicification mentioned above is the only form of alteration noted in the wall rocks.

The small amount of bedrock exposed on the property limits any structural interpretation at this time. Enough information is revealed, however, to indicate many similarities between the John showings and the other major showings of the area, namely the Magnum, Churchill,

Fort Reliance and Davis-Keays deposits. All these deposits consist of narrow, near vertical quartz-carbonate veins containing chalcopyrite mineralization as patches and blebs. They are all closely associated with basic dykes and have a general N30°E strike. All of the deposits have the same Precambrian shale host and show the characteristics of being epithermal, high grade, vein-type deposits.

Geologic mapping on the John property indicates that the showings are within a complex structural zone. Although direct evidence of faulting was not noted, offsets of dykes and veins are evident.

A 100 scale surface geologic plan of the John claims is enclosed in the envelope. The information shown on the plan was compiled by the writer during three days of surveying, two days of geologic mapping and four days of diamond drill supervision on the property.

#### DIAMOND DRILLING

One diamond drill hole, J-1, was drilled during September of 1968 to test the strike and depth extensions of the veins. It was collared at 9000N and 9300E with a bearing of S60°E and a minus 45° dip.

The hole was abandoned at 383 feet due to mechanical breakdown and severe weather conditions. The hole did not test the full target area. No economic mineralization was encountered in the hole. The drill log of hole J-1 appears on the following page.

The drilling was done by T. Connors Diamond Drilling Co. Ltd.  
The hole was BQ in size and excellent recovery was attained.



**STANLEY H. WARD**  
*Geophysical Engineer*

Report on the John Claims of  
Churchill Copper Corporation Limited  
Liard Mining Division  
British Columbia

1. Introduction

As noted by Holt (1969), the John property consists of 10 mineral claims which were staked for Churchill Copper Corporation Limited on the basis of three small outcrops of quartz-carbonate veins bearing chalcopyrite.

An electromagnetic survey of the property, discussed herein, has indicated that this mineralization is unlikely to be continuous. The survey was carried out by personnel from Chapman, Wood and Griswold Limited, operating under the general supervision of the writer.

The John claims are located 132 miles by road from Fort Nelson, B.C. The claims lie within the Liard Mining Division of British Columbia, six miles northwest of Mt. Roosevelt. Holt (1969) has described the geologic setting of the property.

11. Description of Survey

The electromagnetic survey of the John claim group was performed with the Crone "shootback" electromagnetic system. The shootback system has been described in the literature (Crone, 1966). In field operation, the transmitter and the

receiver are moved in unison and readings taken every 100 feet. At every station two measurements are made. First the transmitter coil is held such that the coil axis is at an angle of  $15^{\circ}$  to the horizontal. The receiving coil is then used to determine the angle at which the magnetic field tilts away from the vertical in that plane which contains both the axis of the transmitting coil and the traverse lines. The roles of the transmitter and receiver are then interchanged and a second angular field reading is obtained. The two "tilt angle" readings are obtained at both 480Hz and 1800Hz. Comparison of the profiles at each of these two frequencies may be used to determine the pertinent electrical parameters of the subsurface conductor. For the survey reported upon herein, the horizontal separation between transmitter and receiver was 200 feet.

Tilt angles were measured to the nearest half degree. Both the transmitter and the receiver were carried along the same traverse line. One anticipates a "noise" level of about 2.5 degrees under average conditions with this method.

The data is plotted on the plan-profile map of Dwg. no. 1 at a vertical scale of  $1" = 10^{\circ}$  and a horizontal scale of  $1" = 100'$ .

#### 111. Results of the Survey

The tilt angles have been plotted in plan-profile form on Dwg. no. 1. It is evident from the results that that no significant anomalous reading has been obtained; that is, only 15 readings exceed the assumed noise level of 2.5 degrees. Some of these 15 readings were obtained at 480Hz, the remainder at 1800Hz; none is as much as twice the assumed noise level.

The profiles of Dwg. no 1 do not display correlation from traverse to traverse so that no along-strike conductor continuity is expected.

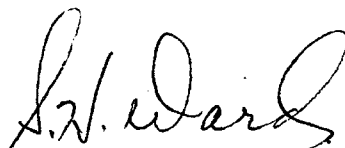
#### IV. Conclusions

Two alternate conclusions may be drawn from the results of the electromagnetic survey. Either the three showings are very local or the showings represent copper mineralization which is not electrically continuous along strike. Use of electromagnetic systems employing higher frequencies and larger separations between transmitter and receiver might permit distinction between these two alternatives.

#### V. Recommendations

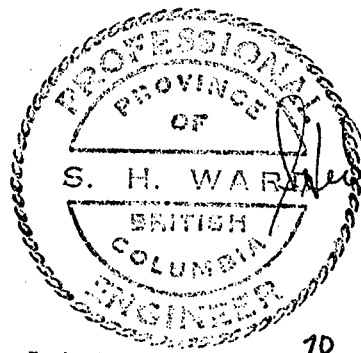
Further geophysical surveying on these claims does not appear to be warranted at this time, unless the induced polarization method is employed. Recognition of disseminated sulphide mineralization is possible with this latter method.

Respectfully submitted,



S. H. Ward, Ph.D., P. Eng.

Dated: May 24, 1969



Expiry Date: January 25, 1968

## VI. References

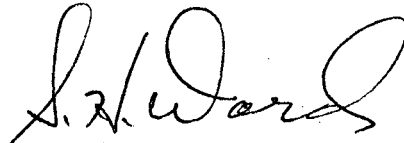
1. Holt, E.S., 1969, Geologic Report on the John Property, Churchill Copper Corporation Ltd., Chapman, Wood and Griswold, Ltd.
2. Crone, J.D., 1966, The Development of a New Ground EM Method for Use as a Reconnaissance Tool, Vol.1, Mining Geophysics, Society of Exploration Geophysicists; Tulsa, Okla., 1966.



CERTIFICATE

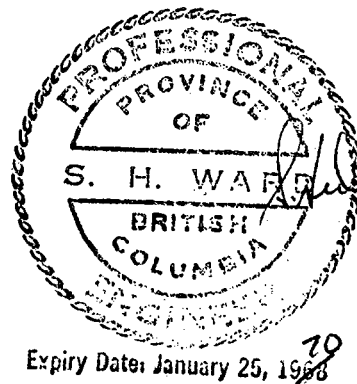
I, Stanley H. Ward, hereby certify:

1. That I am a geophysical engineer and reside at 8119 Phaeton Drive, Oakland, California, U.S.A.
2. That I am a registered Professional Engineer in the Provinces of Ontario and British Columbia.
3. That I am a graduate of the University of Toronto, 1952, with the degree Doctor of Philosophy.
4. That I have been practising my profession continuously for 19 years.
5. That the foregoing report to Churchill Copper Corporation is based on my general supervision of field and office crews.
6. That I do not have, nor do I expect to receive directly or indirectly, any interest in the property or in the securities of Churchill Copper Corporation.



Stanley H. Ward, Ph.D., P.Eng.

Oakland, California  
25 May, 1969



## SUMMARY OF COSTS

### A. GEOLOGICAL

#### Personnel Employed

E. S. Holt	Geologist	September 11-21, 1969
H. Jordan	Assistant	September 11-13, 1969
R. Powell	Draftsman	September 13-15, 1969

#### Cost

Geologist	10 days @ \$95/day	\$ 950.00
Assistant	3 days @ \$35/day	105.00
Draftsman	2 days @ \$35/day	70.00
Vehicle	3 days @ \$15/day	<u>45.00</u>
Total Geological		\$1,170.00

### B. GEOPHYSICAL

Line Miles Surveyed	2.33
Area Surveyed	2,000,000 square feet

#### Personnel Employed

S. H. Ward	Consultant
E. S. Holt	Operator
J. Cook	Helper
K. G. Kauffman	Surveyor
H. Jordan	Survey Helper

#### Cost

Consulting	2 days @ \$150/day	\$ 300.00
Operator	4 days @ \$ 95/day	380.00
Helper	4 days @ \$ 35/day	140.00
Surveyor	5 days @ \$ 60/day	300.00
Survey Helper	5 days @ \$ 35/day	175.00
Vehicle	10 days @ \$ 15/day	150.00
Instrument		
Rental	1 month	<u>40.00</u>
Total Geophysical		\$1,485.00

C. PHYSICAL

Diamond Drilling

Footage charge	383 ft. @ \$7.35	\$2,815.00
Mobilization on property		112.00
Demobilization		84.00

Access Road (4.5 miles)

D-8 Cat	48 hrs. @ \$18.50	888.00
Supervision	2 days @ \$50.00	100.00

Camp Costs	120 man days @ \$8.00	<u>960.00</u>
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Total Physical		\$4,959.00
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C. COST SUMMARY

Geological	\$1,170.00
Geophysical	1,485.00
Physical	<u>4,959.00</u>
Total Costs	\$7,614.00

Declared before me at the *City*  
of *Vancouver*, in the  
Province of British Columbia, this *9th*  
day of *June, 1969*, A.D.

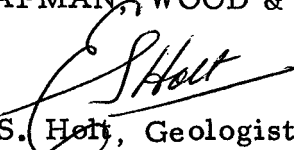
*[Signature]*

*J. Paul* Sub-mining Recorder

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

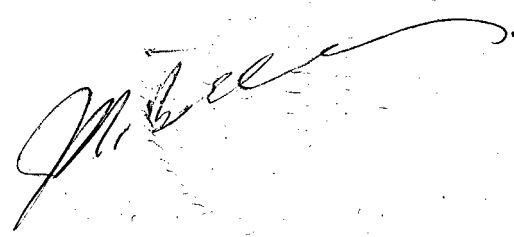
Respectfully submitted,

CHAPMAN, WOOD & GRISWOLD LTD.

  
E. S. Holt, Geologist

Approved by:

J. Billingsley, P. Eng.  
Mine Manager

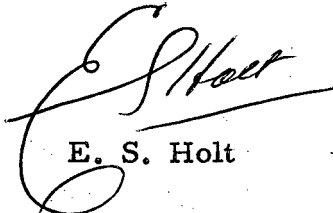


June 2, 1969

CERTIFICATE

I, E. S. Holt, of North Vancouver, British Columbia, do hereby certify:

1. That I am a geologist residing at 316-145 West Keith Road, North Vancouver, B. C.
2. That I am employed by Chapman, Wood & Griswold Ltd. Consulting Mining Engineers and Geologists, 133 East 14th Street, North Vancouver, B. C.
3. That I have practised my profession for ten years.
4. That I have no direct or indirect interest in Churchill Copper Corporation Ltd. (NPL), nor do I expect to receive any such interest excepting insofar as an interest might accrue by reason of my holding 825 shares of Thermochem Industries Ltd.
5. That I have personal knowledge of the John claims, having geologically mapped the property and supervised the diamond drilling, surveying, geophysical programs, and that I have knowledge of the regional geology, having spent the field seasons of 1967 and 1968 as project geologist at Churchill Copper and have examined the other known mineral occurrences in the area.

  
E. S. Holt

June 2, 1969

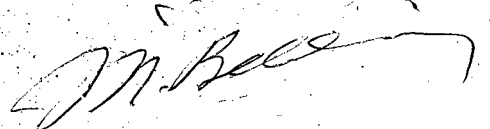
CERTIFICATE

I, J. Billingsley, of Vancouver, British Columbia, do hereby certify:

1. That I am a Mining Engineer residing at 3157 West 33rd Avenue, Vancouver 13, B.C.
2. That I am employed by Combined Capital Resources Ltd., 1111 West Hastings St., Vancouver 1, B.C.
3. That I am a registered Professional Engineer in the Province of British Columbia.
4. That I have practised my profession for more than 20 years.
5. That I have no direct or indirect interest in Churchill Copper Corporation Ltd. (NPL), nor do I expect to receive any such interest excepting insofar as an interest might accrue by reason of my holding shares of Thermochem Industries Ltd.
6. That I have knowledge of the John deposit having directed Churchill Copper's development work during the year of 1968.

J. Billingsley, P.Eng.

June 2, 1969

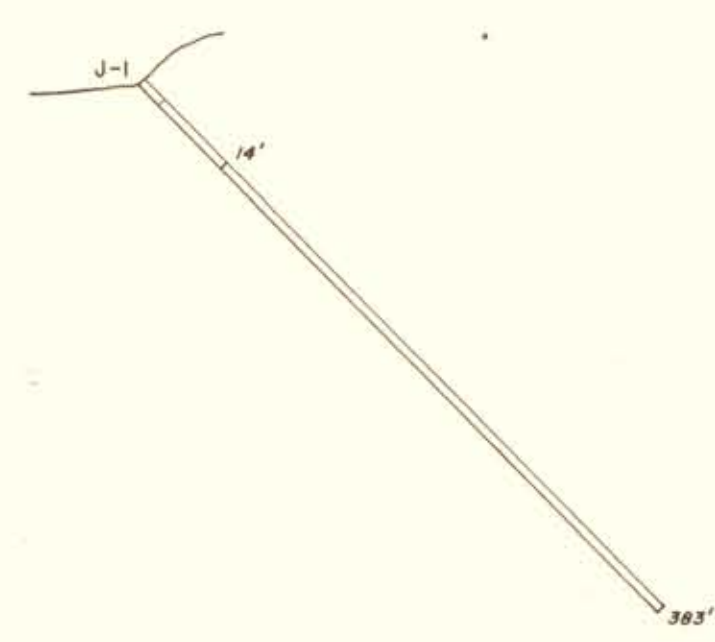
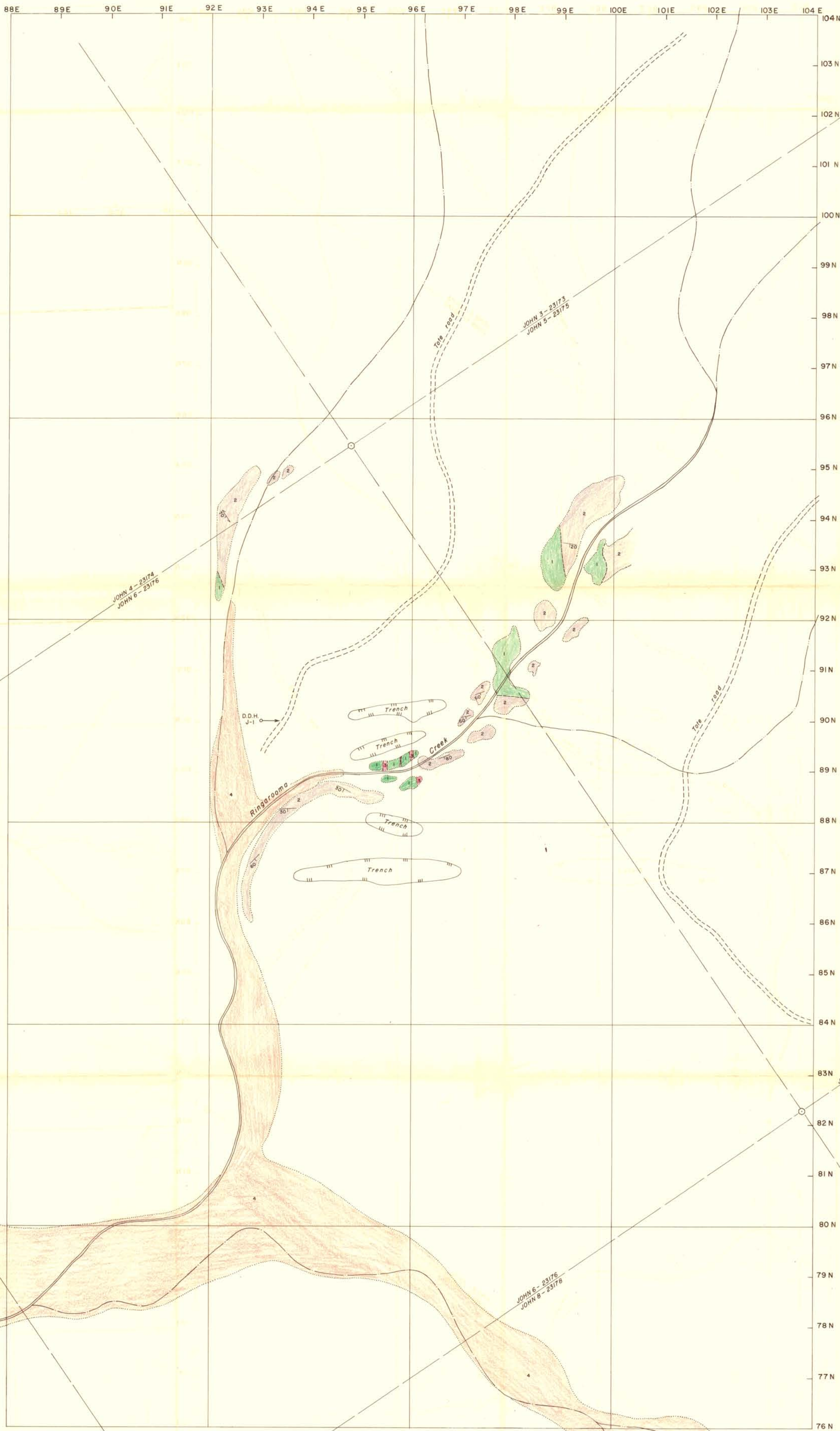


**GEOPHYSICS**

**Report**

**by**

**Stanley H. Ward**  
**Consulting Geophysicist**



**LEGEND**

- 1 BASIC DYKE
- 2 SHALE
- 3 VEIN MATERIAL
- 4 RIVER GRAVELS
- OUTCROP
- - - CONTACT
- CLAIM POST

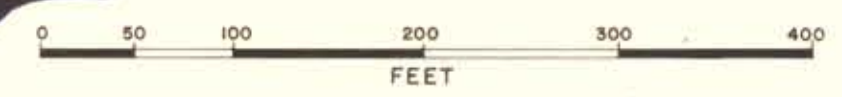
Department of  
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ASSESSMENT REPORT  
NO. 1892 MAP #3

*J. B. ...*

CHURCHILL COPPER CORPORATION LTD

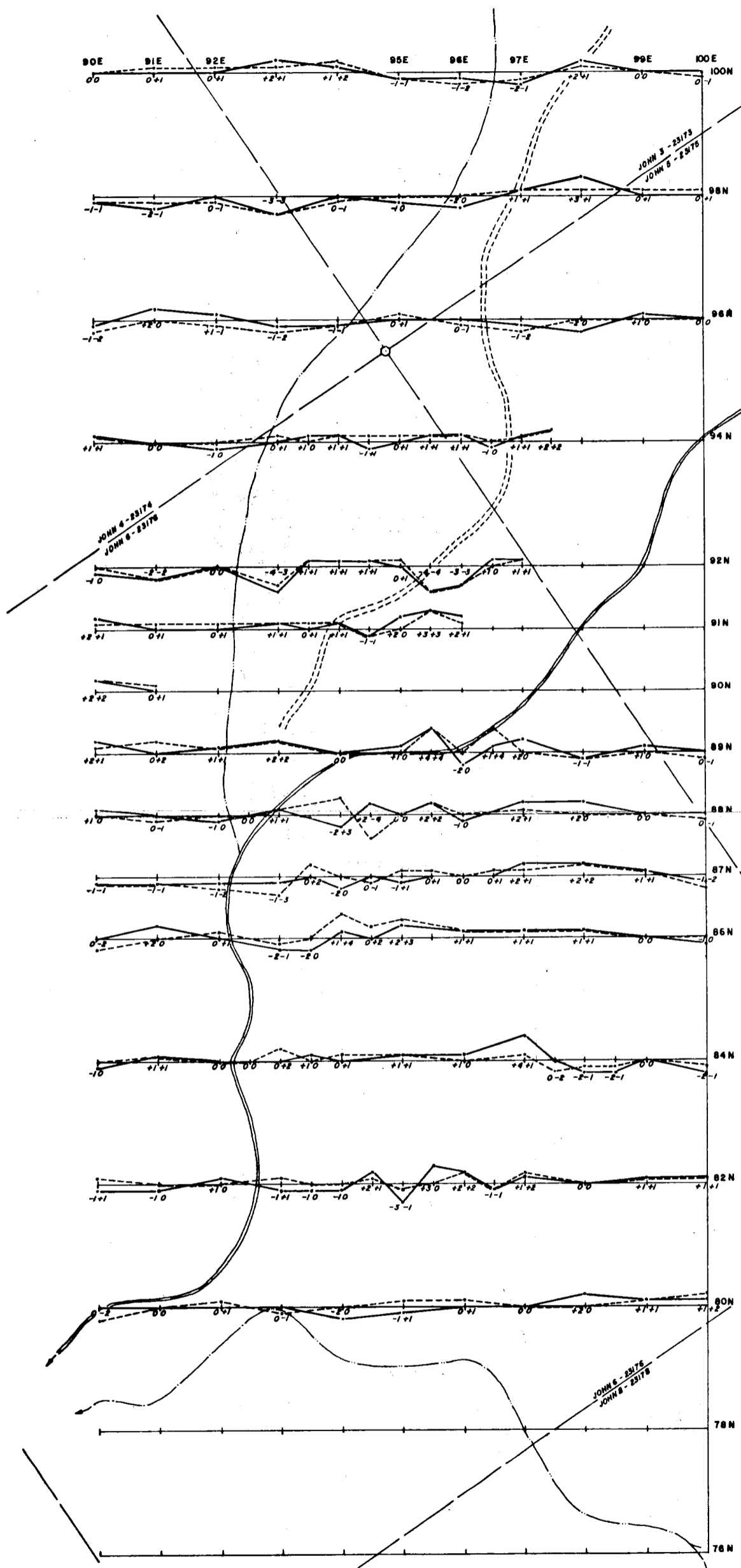
**1892**

**JOHN CLAIMS  
GEOLOGIC PLAN**



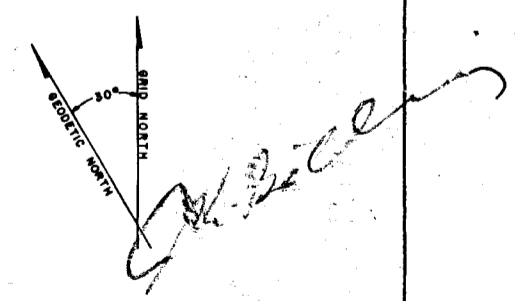
To accompany geological and geophysical report by E.S. Holt, Geologist,  
and Stanley H. Ward, Ph.D., P.Eng., on the John Claim Group, Magnum  
Deposit, Laird Mining Division, dated May, 1969.





Department of  
 Mines and Petroleum Resources  
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High, Low  
 -1+2 FIELD READING



CHURCHILL COPPER CORPORATION LTD.  
 JOHN CLAIMS  
 CRONE SHOOTBACK E.M. SURVEY



D.W.B. NO. 1  
 MAY, 1969  
 L. Gray & Co. Ltd. Surveyors

To accompany geological and geophysical report by E.S. Holt, Geologist,  
 and Stanley H. Ward, Ph.D., P. Eng., on the John Claim Group, Magnum  
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**1892**