



31M05SW0011 2.422 GILLIES LIMIT SOUTH

010

2.422

DOUGLAS BURTON, P. ENG

GEOPHYSICAL SURVEYS

COBALT, ONT

REPORT ON THE VLF AND THE MAGNETIC  
GEOPHYSICAL SURVEYS ON THE PROPERTY OF  
COPPERVILLE MINING CORPORATION LIMITED  
IN BLOCKS 59 and 60, and, 68 and 69  
GILLIES LIMIT TOWNSHIP, ONTARIO

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PROJECTS  
SECTION

TABLE OF CONTENTS

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31M05SW0011 2.422 GILLIES LIMIT SOUTH

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INTRODUCTION

Location, Area and Accessibility  
The Land Survey

THE GEOLOGY

Geophysical Correlation with the Geology  
Governmental Maps and Reports  
The Regional and the Local Geology  
Economic Geological Considerations

THE GEOPHYSICAL SURVEYS

General  
The VLF Method and Procedure for Geophysical Prospecting  
The Magnetic Method

THE RESULTS OF THE GEOPHYSICAL SURVEYS

The Maps (70-74-1 and -2, and -3)  
The Results of the VLF Surveys (Maps 70-74-1 and -2)  
The Results of the Magnetic Survey (Map 70-74 -3)

CONCLUSIONS AND RECOMMENDATIONS

MAPS

Three maps numbered 70-74-1, -2 and -3



REPORT ON THE VLF AND THE MAGNETIC  
GEOPHYSICAL SURVEYS ON THE PROPERTY OF  
COPPERVILLE MINING CORPORATION LIMITED  
IN BLOCKS 59 and 60, and, 68 and 69  
GILLIES LIMITED TOWNSHIP, ONTARIO

DIGEST

The geophysical survey on this property has located two anomalous conductive zones as determined by a VLF method.

Magnetic measurements are not helpful in indicating the type of minerals and the best location for testing these zones.

Two locations have been selected for testing by drilling, on separate zones. These drill sites are shown on the three maps accompanying this report.

The zones located are traced to the west side of the property. More claims should be staked to acquire the extension of these zones.



REPORT ON THE VLF AND THE MAGNETIC  
GEOPHYSICAL SURVEYS ON THE PROPERTY OF  
COPPERVILLE MINING CORPORATION LIMITED  
IN BLOCKS 59 and 60, and, 68 and 69  
GILLIES LIMIT TOWNSHIP, ONTARIO

INTRODUCTION

Through December 9th, 1970 to January 22nd, 1971.  
an EM6 VLF electromagnetic examination was made on taped picket  
lines on this 19-claim property.

The surveying was arranged for by Mr. Roger Careau of  
Cobalt, who acted as agent for Mr. Murray Watts, your managing  
director.

The picket lines to position the geophysical measure-  
ments were cut and taped by Mr. T. D. Brown of North Cobalt, who  
supplied a map showing the lines cut and taped.

The surface of the property is about average for this  
area; rock outcrops and swampy areas with small lakes. There  
are abrupt 20-foot cliffs. Thick brush makes line cutting slow  
and expensive.

The weather was normal for December and January; cold  
with considerable snow hanging on the trees.



### Accessibility, Location and Area

The 19-claim property with an area of approximately 760 acres is located in Blocks 59 and 60, and, 68 and 69 in Gillies Limit Township, Ontario.

The Block designation is unusual for land surveying. Gillies Limit is an original timber concession. It was divided into square blocks one mile on the side. In some cases the iron posts cannot be found now. For claim staking this township is considered to be not surveyed. Therefore the area of a claim is determined by the position of the posts when a claim is staked.

Highway 11 crosses the east side of the property four miles south of Latchford.

Twelve claims comprised the original group. Four additional claims were staked to the south and east because of a magnetic anomaly shown on the airborne magnetic map to the south and east of the original group. After the VLF survey had progressed a zone of conductivity was found to cross the property in an east-west direction. Three more claims were then staked to the east and geophysically examined in order to test the eastward extension of the zone.

### The Land Survey

The picket lines to position the geophysical measurements were laid out 400 feet apart in a north-south direction and marked at 100 foot intervals. base-lines and tie-lines were



laid out and cut east and west to locate the north-south lines.

Mr. T. D. Brown, the contractor for the line survey supplied a map showing the lines and their designation. On this map he shows the position of Highway 11, and bush roads, also lakes and creeks. The lines were well cut out and blazed, and conspicuous marking pickets were solidly grounded. These lines should be useful into 1980, although the new brush will fill in the lines in five years.

18.7 miles of line were cut and taped for the positioning  
of the geophysical survey measurements.



## THE GEOLOGY

### Geophysical Correlation with the Geology

Geophysical measurements act as a guide to indicate hidden geological and mineralogical conditions at depth in an area considered to be favorable for the deposition of ore minerals.

Geophysical results must be prepared and mapped in such a way that they may be translated into geological terms and possibilities in order to be of assistance in the exploration and testing of a mining property. Some geological knowledge must be available in order to derive the maximum benefit from a geophysical examination.

### Governmental Maps and Reports

There is one map of the area with its accompanying report. This is the one inch equals one mile map entitled "Map of the Cobalt-Nickel-Arsenic-Silver area near Lake Temiksaming, Ontario", to accompany the 4th Edition of Report by Willet G. Miller, Provincial Geologist, in Part 2 of the Nineteenth Report of the Bureau of Mines, 1910.

An aeromagnetic map, scale one inch equals one mile, shows the airborne magnetic results over the area. This map is Sheet 31-M/5, "Cobalt", Map 1492G.

It is obvious that the whole area should have been geologically mapped more thoroughly in recent years.



### The Regional and Local Geology

A recent geological map has not been made for this area. There are many rock outcrops, and the area is readily accessible by Highway 11 which crosses the property.

The property was covered with snow before the picket lines were taped so that only the larger rock outcrops could be identified during the course of the geophysical examination.

The basement Keewatin rocks are composed of a series of acid to basic lava flows interbedded with tuffs and breccia. These formations have been violently folded until now they are in a more or less vertical attitude. Their strike is generally east-west with large variations, and they may be over-folded. Masses of magnetic basic rock complicate the sequence.

Large outcrops of Algonian granite are found to the west of the area surveyed and Miller shows the central part of the claim group to be granite.

In Huronian time, Cobalt Series sediments were laid down on the erosional surface of the basement rocks. Erosion and glaciation then removed most of the sediments so that today we find large windows in these sediments exposing the basement rocks. In places the remaining sediments may be only a few feet thick.

Younger dikes cut across all of the older formations usually with a vertical attitude. In some cases they may be traced in a more or less straight line for many miles. In places these dikes are magnetic.



The Nipissing diabase sill outcrops as a wide belt with an easterly trend near the south edge of the claim group. It may intrude under the whole group at a rather flat angle.

The Montreal River fault system is about one mile east of the property.

#### Economic Geological Considerations

Well-mineralized showings on this claim group have been prospected for many years. Rock trenches have exposed some pyritized zones that in places have obvious copper minerals. During the course of line-cutting a hand specimen with attractive copper minerals was picked up by one of the line-cutters near Four Mile Lake.

To the best of our knowledge this is the first attempt to locate and trace conductive mineral zones on this area by geophysical methods.





## THE GEOPHYSICAL SURVEY

### General

Two geophysical methods are used for this examination.

The Very Low Frequency (VLF) method, made possible by the development of the Ronka EM16 receiver, is used to indicate zones of relatively higher conductivity; usually caused by shearing, faulting, fracturing and conductive sulfides in the bedrock.

The relative distribution of the magnetic minerals in the underlying bedrock will be shown by accurate recordings of the vertical component of the earth's magnetic field at the surface.

A comparison of the results of the two methods will assist in the interpretation of the geophysical data into geological and mineralogical possibilities.

### The VLF Method and Procedure for Geophysical Prospecting

Very Low Frequency (VLF) transmitters are located all over the world. These transmitters originate Morse Code and pulsed continuous wave carriers. Their particular application is for world-wide communication with submarines under conductive seawater. VLF radiation (15 to 25 kHz) has considerable penetration into the earth.

The radiation is vertically polarized and propagates radially in straight lines concentrically from the transmitter. The radiation is characterized by low path attenuation which is relatively stable with time.



Changes in the usual propagation pattern of VLF radiation are introduced by such factors as land-sea boundaries, and changes in the ground characteristics. Good conductors in the earth, such as sulfides and graphite zones, and shears and faults of some considerable dimension, will have a tendency to concentrate and locally distort VLF radiation. Artificial conductors such as pipe lines, fences, electric line and railroad tracks distort these fields.

#### The Geophysical Survey

VLF transmissions are most strongly concentrated by electrically conductive zones with a strike or longitudinal dimension along the radial path of propagation from each transmitter. Where the strike of the conductive zones is not known it is advisable to record the VLF results from two VLF transmitters whose azimuth from the area of survey is 90 degrees apart. In this case the radiation from the transmitters at Kalboa, C.Z., and Jim Creek, Washington, were used. Their azimuth direction is 180 degrees and 285 degrees.

The Ronka EM16 receiver for VLF radiation has two directional antenna at right angles. By means of earphones and null directional reception, the azimuth to the transmitting station is determined, and the dip of the field at right angles to this azimuth, and the phase difference, from point to point in the area of survey. Two transmitting stations may be used for determining these parameters. Readings are usually taken at 100 foot intervals or less along profile lines crossing the general geo-



logical strike of the area examined. Conductive zones are indicated by anomalous dips of the field in the vicinity, with a vertical orientation directly over a conductive zone. When the dips are recorded and plotted on a map, the position of conductive bodies are indicated and the dip of the conductive zone may be shown. For conductive bodies parallel to the profile lines a careful examination of the results is necessary to determine the axis.

#### The Magnetic Survey

The recordings are made by means of an accurate magnetic vertical component zero-balance adjusted to a sensitivity of ten gammas per scale division.

The magnetic component at any point on the surface will usually differ from the average value for the region. Anomalous intensities are caused by magnetic minerals below. The magnetic susceptibility of rocks is generally accounted for by the contained magnetite although other magnetic minerals such as pyrrhotite may contribute to the observed intensity.

This method is used for the direct location of magnetic minerals such as magnetite. Magnetic surveys may assist in geological mapping. The plotted results, when compared with known geological conditions, frequently yield information for the solution of geological problems, especially where the rock surface is hidden by overburden. Magnetic anomalies are often found associated with formational contacts and structural features. Dikes and faults may



be located and traced. The depth to the upper magnetic pole may be estimated under favorable conditions where large tabular magnetic deposits occur.

Zones of stronger magnetic intensity indicate concentrations of magnetite and pyrrhotite. These often accompany valuable non-magnetic mineral concentrations. On the other hand a lower magnetic intensity may signify important zones of alteration where magnetite is changed to non-magnetic minerals.



THE RESULTS OF THE GEOPHYSICAL SURVEYS

The Maps (numbered 70-74-1, -2 and -3)

Accompanying this report are three maps drawn on a scale of one inch equals 200 feet. On these maps the taped and picketed north-south lines are shown with their related east-west base- and tie-lines. These are traced from a map made by T. D. Brown who was in charge of the line-cutting. Lakes, <sup>o</sup>craks and marked topographic relief are shown, together with Highway No. 11, access roads and the gas pipe line. Mining claim numbers are shown on a location map drawn in a box in the corner of the larger map.

The geophysical anomalies are shown on all of these maps, and also the locations recommended for further examination by drilling.

Maps numbered 70-74-1, and -2 show the results of the VLF examinations using the radiation from the Jim Creek transmitter in the State of Washington, and the radiation from the transmitter in Balboa in the Panama Canal Zone, respectively.

The dip of the VLF field together with a quadrature phase difference is plotted as a profile using the picketed survey lines as a zero base. These are distinctively colored in red and blue for identification and correlation.

Map No. 70-74-3 shows the results of the magnetic examination. The relative magnetic vertical component intensity is shown in gammas on the profile lines examined. In order to avoid continuous repetition in the plotting of the magnetic results, 50,000 gammas are



deducted from the observed magnetic intensity. Lines of equal intensity are drawn. Areas with an intensity less than 8000 gammas are tinted red, and the intensity contours above 9000 gammas are colored blue.

#### The Results of the VLF Surveys

Two zones of VLF anomalies are traced to the west edge of the property. They are in low ground and swamp areas. Two sites for testing by drilling are selected from these results.

The two zones found on this property are believed to be due to mineralized shearing in the underlying bedrock.

An electric power line along Highway 11 and a gas pipe line cross the east part of the property. These conductive conditions disturb the VLF field very strongly so that anomalies from bedrock conductors are masked by these disturbances.

18.7 miles of VLF observations were completed with readings at 100 foot intervals on lines 400 feet apart. At each observation point VLF readings from the transmitter in the State of Washington were recorded. In addition ten miles of VLF readings were recorded from the transmitter to the south in the Panama Canal Zone.

#### The Results of the Magnetic Survey

The vertical component of the earth's magnetic field was measured at 50 foot intervals on line 400 feet apart in the vicinity of the VLF anomalies.



No specific magnetic anomalies could be related to the VLF indications of conductive zones. The magnetic survey is disappointing. Usually in this region large continuous magnetic anomalies would be found on a property of this size. These would have geological significance at least.

The magnetic intensity varies from a low of 57,070 gammas to a high of 65,200 gammas, with the usual reading being between 58,000 gammas and 59,000 gammas.

4.6 miles of magnetic observations were made at 50 foot intervals on lines 400 feet apart.



CONCLUSIONS AND RECOMMENDATIONS

The VLF anomalies located may be traced from line to line. They warrant a further examination by drilling to test the value of the minerals in these zones. Two drill sites are marked on the accompanying maps. The targets are at S2200 on line W800 and at N800 on line W2000.

The magnetic results around the VLF give no indication of the type of mineralization in these zones.

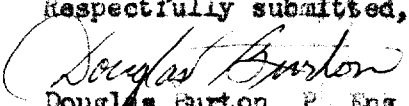
Only two VLF zones are found. An east-west zone in the central portion of the property extends from Highway 11 to the west boundary of the property; a distance of over 4000 feet. A north-west-southeast striking zone is located on four lines in the north-west corner of the property. The strike length on the property is about 1500 feet.

It is recommended that the westward continuation of these two VLF zones be acquired by staking. Four claims as a square block would add a half mile along strike for the central east-west zone. Three claims at the northwest corner of the property would add a quarter mile along the strike of the VLF anomaly in the northwest corner. More claims along this strike may be justified.

Further locations for the examination of these zones by drilling may be readily selected from the results shown on Map 70-74-1 which shows the VLF anomalies along the strike.

In the meantime, this report is,

Respectfully submitted,

  
Douglas Burton, P. Eng.  
Geophysicist

Cobalt, Ontario,  
January 23rd, 1971



422



31M05SW0011 2.422 GILLIES LIMIT SOUTH

900

Copperville Mining Corporation Limited, 420 - 159 Bay St., Toronto Magnetometer

ASSESSMENT WORK DETAILS

Type of Survey Magnetometer Geophysical

A separate form is required for each type of survey

Township or Area Gillies Limit Township

Chief Line Cutter T. D. Brown  
Name

North Cobalt, Ont.  
Address

Party Chief Douglas Burton,  
Name

Box 293, Cobalt, Ont.  
Address

Consultant Douglas Burton,  
Name

Box 293, Cobalt, Ont.  
Address

Geological field mapping by \_\_\_\_\_  
Name

\_\_\_\_\_  
Address

COVERING DATES

Line Cutting \_\_\_\_\_

Field Dec. 9th, Jan. 21st, 1971  
Instrument work, geological mapping, sampling etc.

Office Jan. 14th - Jan. 23rd, 1971

INSTRUMENT DATA

AE Elektrisk Malmletning

Make, Model and Type ABEM Type 1261 No 4537

Scale Constant or Sensitivity 10 gammas per scale division  
Or provide copy of instrument data from Manufacturer's brochure.

Radiometric Background Count \_\_\_\_\_

Number of Stations Within Claim Group \_\_\_\_\_

Number of Readings Within Claim Group 4.6 mls 485

Number of Miles of Line cut Within Claim Group \_\_\_\_\_

Number of Samples Collected Within Claim Group \_\_\_\_\_

CREDITS REQUESTED

20 DAYS per claim

40 DAYS per claim

----- Includes (Line cutting)

Geological Survey

Geophysical Survey  Show Check /

Geochemical Survey

DATE May 18 1971 SIGNED Douglas Burton

SPECIAL PROVISION CREDITS for PERFORMANCE & COVERAGE

MINING CLAIMS TRAVERSED List numerically

267098 1/2  
699 2/3

268221 1/3  
224 1/4  
226 2/3  
227 1/2  
229 2/3

*Area not covered - 3 claims  
(224 & 226) - 14 days  
per d.  
7/1*

TOTAL CLAIMS 7

Send in Duplicate to:  
FRED W. MATTHEWS  
SUPERVISOR-PROJECTS SECTION  
DEPARTMENT OF MINES &  
NORTHERN AFFAIRS  
WHITNEY BLOCK  
QUEEN'S PARK  
TORONTO, ONTARIO

If space insufficient, attach list

Performance and coverage credits do not apply to airborne surveys

Copporville Mining Corporation Limited, 420 - 159 Bay St., Toronto

Line cutting & EM16

ASSESSMENT WORK DETAILS

Type of Survey VLF Ronka EM16 receiver  
A separate form is required for each type of survey

Township or Area Gillies Limit Township

Chief Line Cutter T. D. Brown,  
Name  
North Cobalt, Ont.  
Address

Party Chief Douglas Burton,  
Name  
Box 293, Cobalt, Ont.  
Address

Consultant Douglas Burton,  
Name  
Box 293, Cobalt, Ont  
Address

Geological field mapping by \_\_\_\_\_  
Name  
 \_\_\_\_\_  
Address

SPECIAL PROVISION CREDITS  
 for  
 PERFORMANCE & COVERAGE

MINING CLAIMS TRAVERSED  
 List numerically

|        |
|--------|
| 266640 |
| 41     |
| 42     |
| 43     |
| 267098 |
| 099    |
| 100    |
| 268221 |
| 22     |
| 23     |
| 24     |
| 25     |
| 26     |
| 27     |
| 28     |
| 29     |
| 30     |
| 268458 |
| 59     |

COVERING DATES

Line Cutting Nov. 19th - Jan. 6th, 1971

Field Nov. 19th - Jan. 6th, 1971  
Instrument work, geological mapping, sampling etc.

Office Jan. 14th, to Jan. 24th, 1971

INSTRUMENT DATA

Make, Model and Type VLF RONKA EM16 No. 10

Scale Constant or Sensitivity Degrees dip and % quadrature  
Or provide copy of instrument data from Manufacturer's brochure.

Radiometric Background Count \_\_\_\_\_

Number of Stations Within Claim Group 987

Number of Readings Within Claim Group 18.7 mls 1515  
10. mls

Number of Miles of Line cut Within Claim Group 18.7 miles

Number of Samples Collected Within Claim Group \_\_\_\_\_

TOTAL CLAIMS 19

CREDITS REQUESTED

|                    |                             |                                     |                            |
|--------------------|-----------------------------|-------------------------------------|----------------------------|
|                    | <u>20 DAYS</u><br>per claim | <u>40 DAYS</u><br>per claim         | Includes<br>(Line cutting) |
| Geological Survey  | <input type="checkbox"/>    | <input type="checkbox"/>            |                            |
| Geophysical Survey | <input type="checkbox"/>    | <input checked="" type="checkbox"/> | Show<br>Check ✓            |
| Geochemical Survey | <input type="checkbox"/>    | <input type="checkbox"/>            |                            |

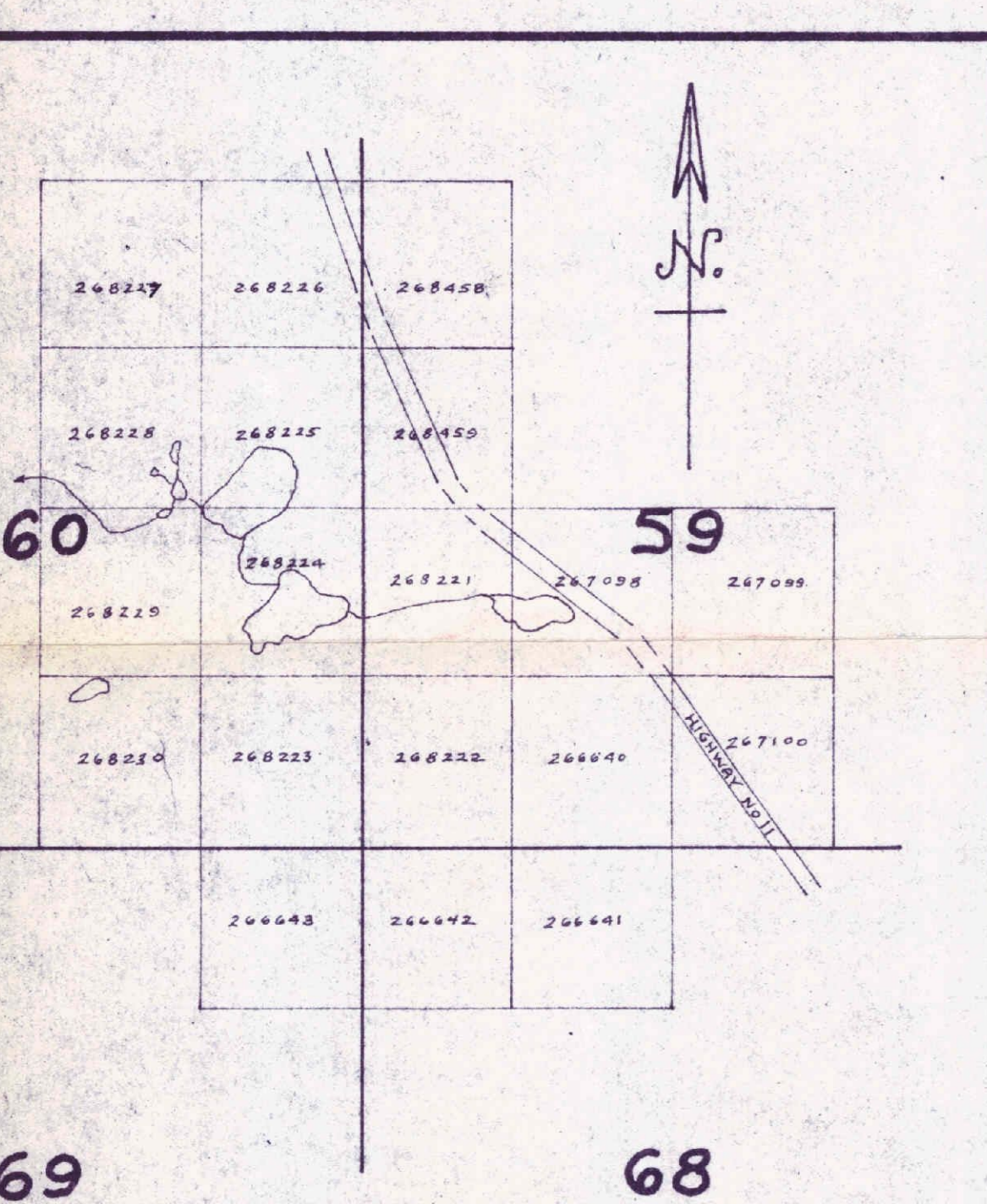
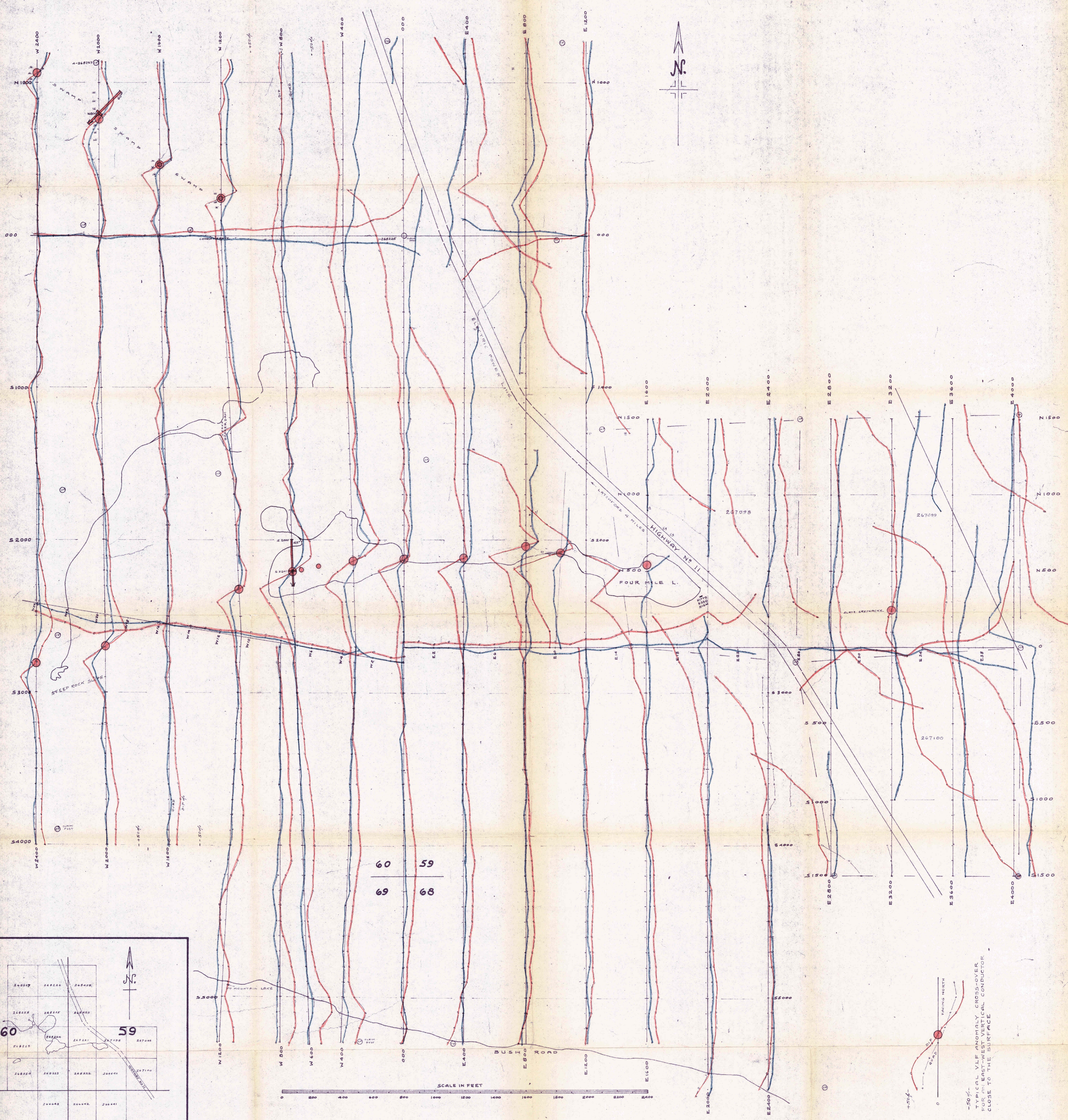
DATE May 18, 1971 SIGNED Douglas Burton

Send in Duplicate to:  
 FRED W. MATTHEWS  
 SUPERVISOR-PROJECTS SECTION  
 DEPARTMENT OF MINES &  
 NORTHERN AFFAIRS  
 WHITNEY BLOCK  
 QUEEN'S PARK  
 TORONTO, ONTARIO

If space insufficient, attach list

Performance and coverage credits do not apply to airborne surveys





- TARGET AND SECTION TO BE TESTED BY DRILLING
- VLF ANOMALY FROM JIM CREEK RADIATION
- VLF ANOMALY FROM BALBOA RADIATION

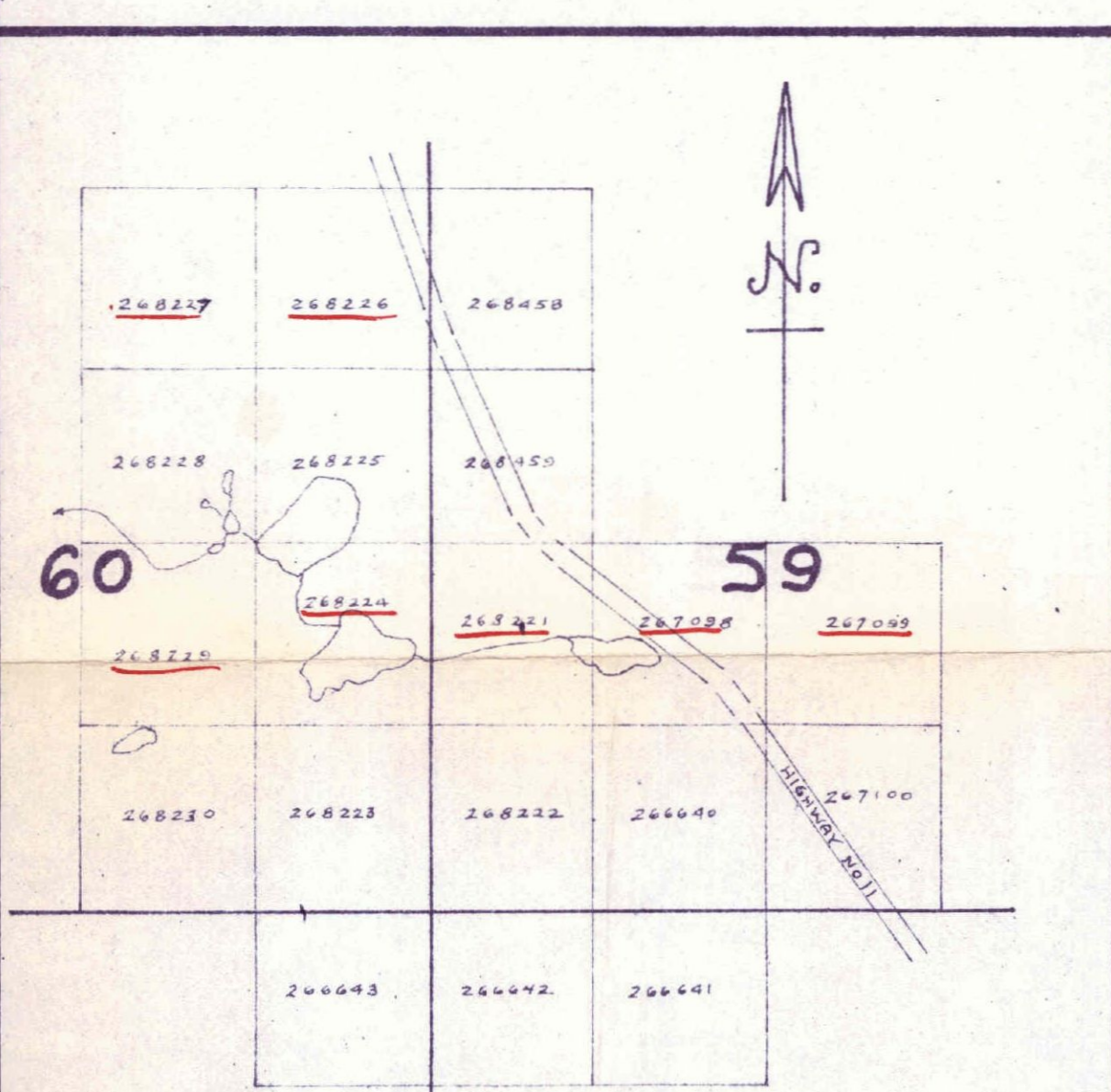
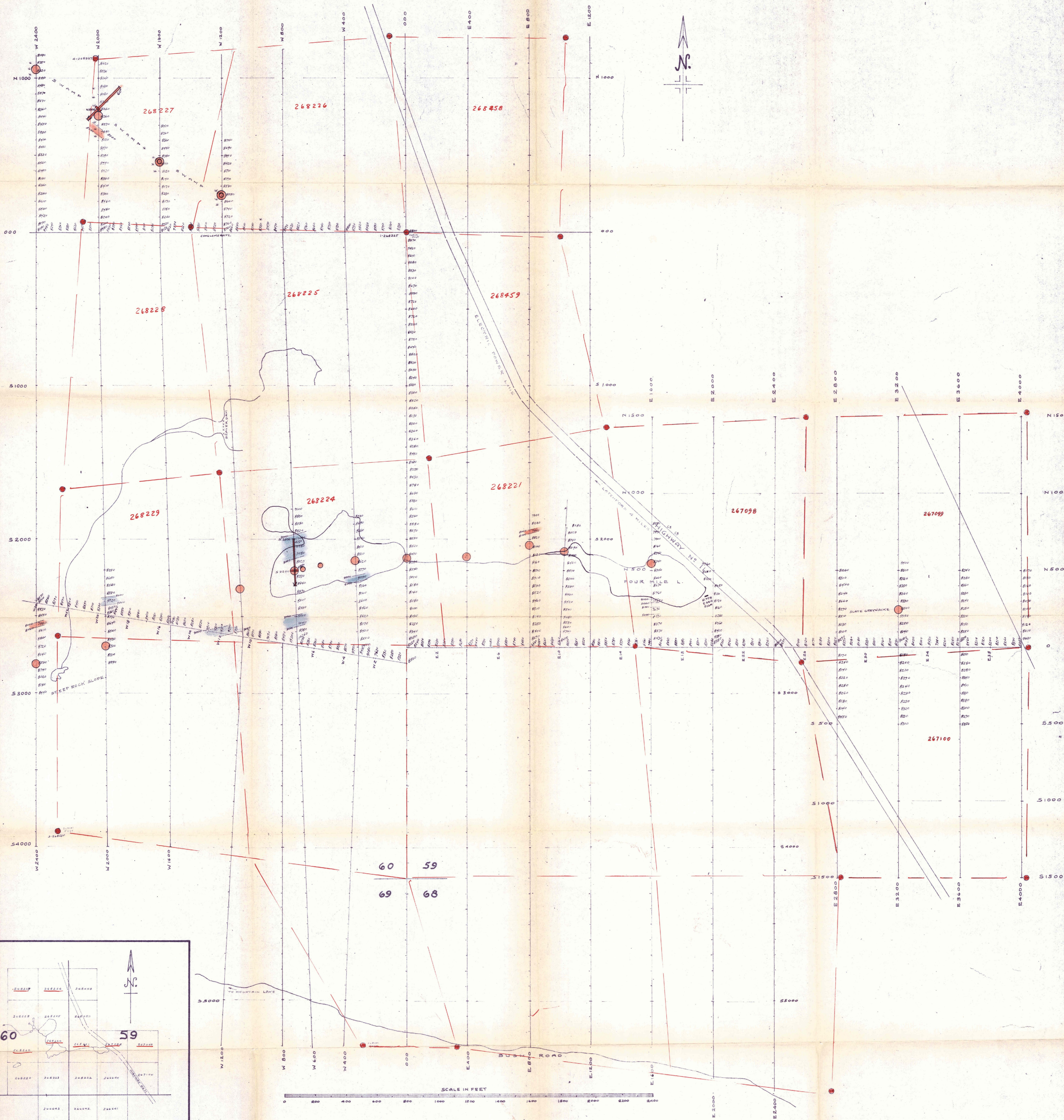
VLF TRANSMITTER NLK/NPG 13.6 KHZ  
 JIM CREEK, WASHINGTON, USA  
 AZIMUTH ABOUT 285°

MAP SHOWING  
 THE VLF RONKA EM16 RECEIVER RESULTS  
 OF THE GEOPHYSICAL SURVEYS  
 ON THE PROPERTY OF  
 COPPERVILLE MINING CORPORATION LIMITED  
 GILLIES LIMIT TOWNSHIP, ONTARIO

TO ACCOMPANY REPORT BY  
 DOUGLAS BURTON  
 COBALT, ONTARIO  
 JANUARY, 1971

*Douglas Burton*

70-74-1



—●— TARGET AND SECTION TO BE TESTED BY DRILLING

- VLF ANOMALY FROM JIM CREEK RADIATION
- VLF ANOMALY FROM BALDOR RADIATION

MAGNETIC VERTICAL COMPONENT IN GAMMAS  
 EQUAL INTENSITY CONTOURS COLORED  
 RED FOR LOWER INTENSITY AND  
 BLUE FOR HIGHER INTENSITY

PICKET LINES TRACED FROM MAP BY T.D. BROWN NOVEMBER, AND JANUARY, 1971

*Douglas Burton*  
 DOUGLAS BURTON  
 CONSULTANT

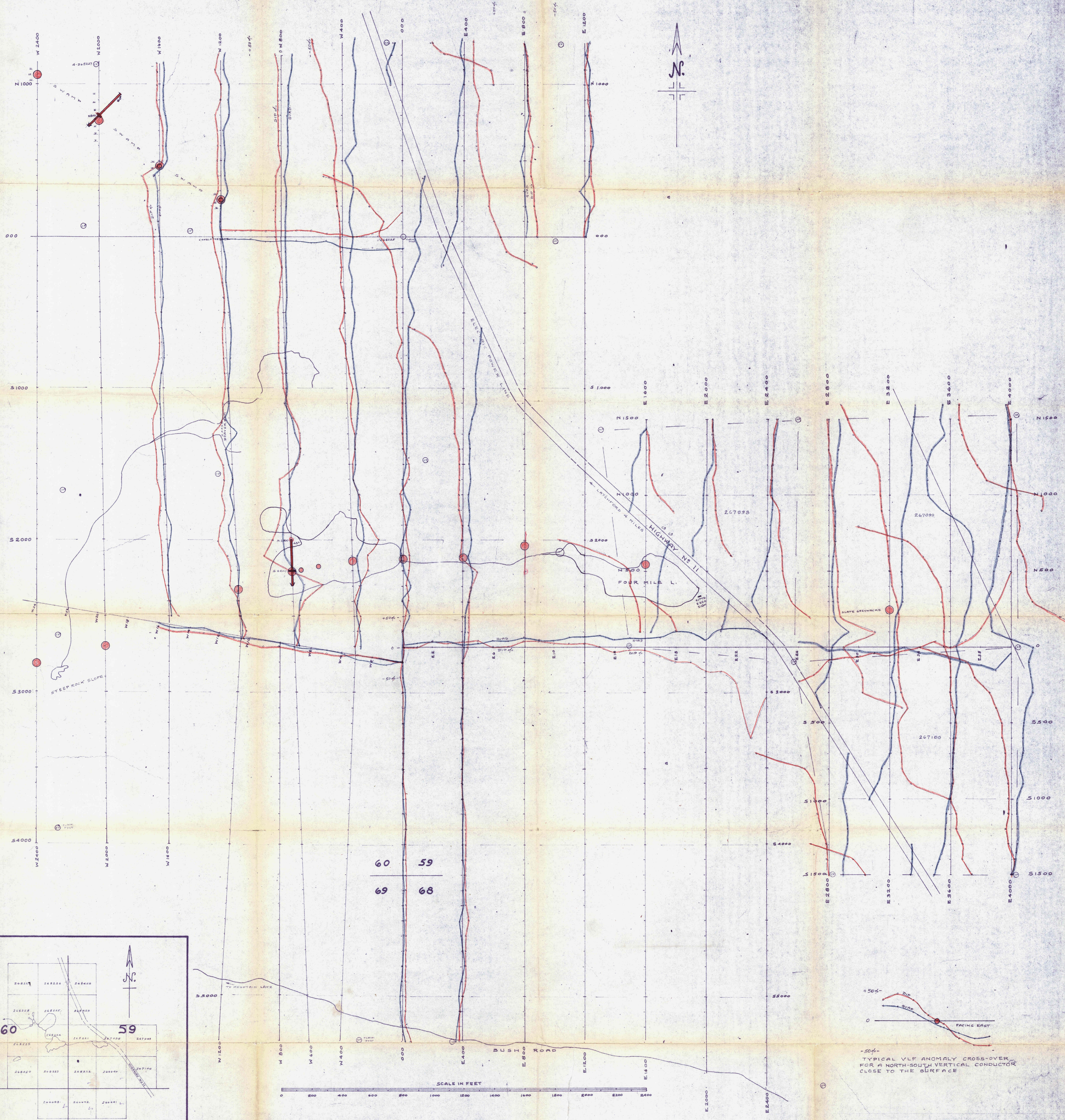
**MAP SHOWING  
 THE MAGNETIC RESULTS  
 OF THE GEOPHYSICAL SURVEYS  
 ON THE PROPERTY OF  
 COPPERVILLE MINING CORPORATION LIMITED  
 GILLIES LIMIT TOWNSHIP, ONTARIO**

TO ACCOMPANY REPORT BY  
 DOUGLAS BURTON  
 COBALT, ONTARIO  
 JANUARY, 1971

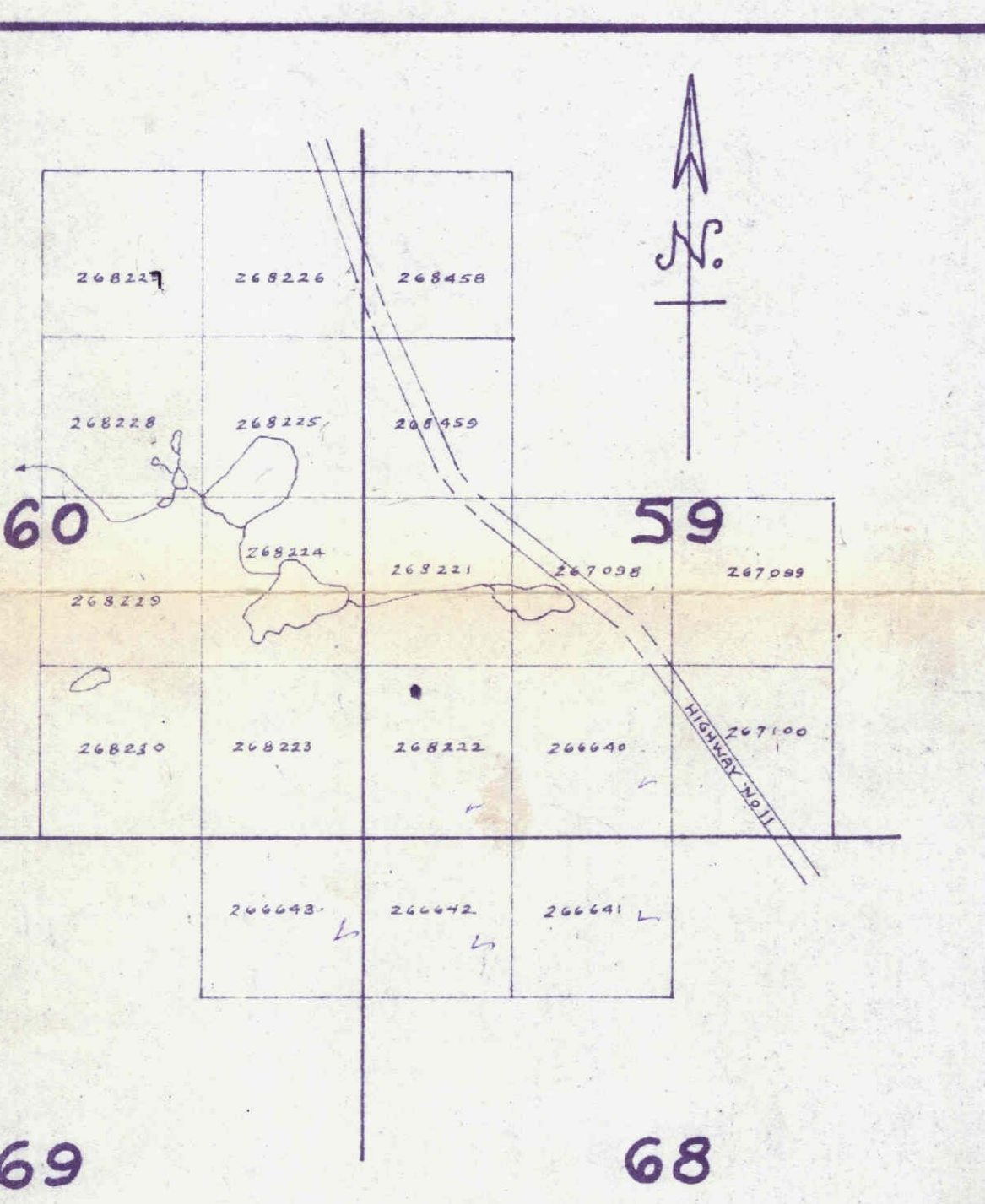
**70-74-3**

TRACED FROM CLAIM MAP M-483 DECEMBER, 1970  
 SCALE IN MILES





|    |    |
|----|----|
| 60 | 59 |
| 69 | 68 |

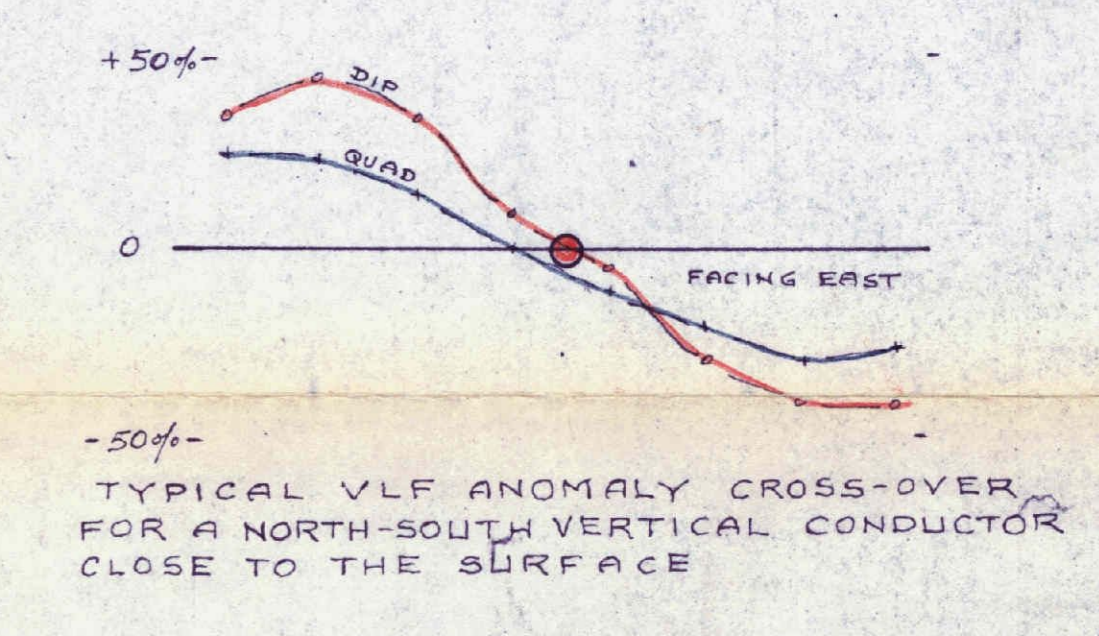


—●— TARGET AND SECTION TO BE TESTED BY DRILLING

● VLF ANOMALY FROM JIM CREEK RADIATION  
 ● VLF ANOMALY FROM BALBOA RADIATION

VLF TRANSMITTER NBA 24 KHZ  
 BALBOA, PANAMA C.Z.  
 AZIMUTH ABOUT 180°

PICKET LINES TRACED FROM MAP BY T.D. BROWN NOVEMBER AND JANUARY, 1971



MAP SHOWING  
 THE VLF RONKA EM16 RECEIVER RESULTS  
 OF THE GEOPHYSICAL SURVEYS  
 ON THE PROPERTY OF  
 COPPERVILLE MINING CORPORATION LIMITED  
 GILLIES LIMIT TOWNSHIP, ONTARIO

TO ACCOMPANY REPORT BY  
 DOUGLAS BURTON  
 COBALT, ONTARIO  
 JANUARY, 1971

70-74-2

TRACED FROM CLAIM MAP M-483 DECEMBER, 1970  
 SCALE IN MILES

