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DOUGLAS BURTON, P. ENG

GEOPHYSICAL SURVEYS

COBALT, ONT

REPORT ON THE VLF AND THE MAGNETIC
GEOPHYSICAL SURVEYS ON THE PROPERTY OF
LOBO MINES & EXPLORATIONS LIMITED
IN BLOCKS 58 AND 59, AND, 67 AND 68
GILLIES LIMIT TOWNSHIP, ONTARIO

DIGEST

The electromagnetic geophysical survey on this property has located an anomalous conductive zone running northwest-southeast through Johnson Lake.

This is believed to be caused by the fracturing of the geologically important Montreal River fault system which is projected to pass through this lake.

In addition three smaller anomalous zones are shown on the maps accompanying this report. These are apparently caused by east-west fracturing. Because of their proximity to the Montreal River fault zone it is recommended that they be examined by drilling.

Four exploratory drill holes are recommended to test these zones. Information about the cause of the conductive conditions will be obtained, and also the sequence of geological formations. Further drilling may then be recommended.



REPORT ON THE VLF AND THE MAGNETIC
GEOPHYSICAL SURVEYS ON THE PROPERTY OF
LOBO MINES & EXPLORATIONS LIMITED
IN BLOCKS 58 AND 59, AND, 67 AND 68
GILLIES LIMIT TOWNSHIP, ONTARIO

INTRODUCTION

Through March 21st to April 8, 1971, VLF EM16
electromagnetic surveys, and a magnetometer survey, were
completed on taped picket lines on this fourteen claim property.
Two claims were staked during the course of the geophysical sur-
vey on March 24, 1971.

The geophysical surveying was arranged for by Mr. Mark
Rash, the President, of M. Rash & Co Limited, who has made pay-
ments for this survey and report to this date.

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

The property is rather rough with many large and steep
outcrops: almost inaccessible with snow on the ground. Second-
growth timber covers most of the property. There is much low-
growing brush.



The weather was excellent for this work. Cool nights and bright warm days kept the snow in good condition for snowshoeing. The ice on Johnson Lake was quite safe during the term of the survey.

Location, Area, Accessibility and Topography

The fourteen claim group is located in Blocks 58 and 59, and 67 and 68 in Gillies Limit Township, Ontario. The area is somewhat less than 560 acres because of the small size of some of the claims. All of Johnson Lake is included in this group; it extends almost one mile across the property in a northwest-southeast direction just west of the railroad.

Part of the claims straddle Highway No. 11, about five miles south of the Latchford Bridge. A gas pipe line crosses the property and also the Ontario Northland Railway.

The Block designation in Gillies Limit Township is unusual in Ontario land surveying practice. Gillies Limit is an original timber concession. It was divided into square blocks one mile on the side. In some cases the iron corner 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 corner posts when the claim is staked.

Twelve claims comprised the original group. A geophysical anomaly was found in the early part of the survey on Johnson Lake near the south boundary of the property. Two more



claims were staked and included in the group in order to control an extension of the anomaly. The additional two claims were geophysically examined.

The topography is rough with some very steep rock cliffs 50 and 60 feet high. Between the rock outcrops there are large areas of thick second-growth balsam, pine, polar and birch. The ever-present low-growing brush makes travel difficult.

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 with marked pickets at 100 foot intervals were laid out east-west and cut across the north-south lines in order to determine the spacing between the lines.

On Johnson Lake the lines were laid out 200 feet apart because an important geological condition crosses this lake.

Mr. T. D. Brown, the contractor for the line survey, supplied a map on a scale of one inch equals 200 feet, showing the lines and their designation. On this map he also shows the position of the railroad, gas pipe line, roads, trails and lakes. This map was used as the base for the maps accompanying this report showing the geophysical results.

The lines were well cut out and blazed, and conspicuous



marking pickets were solidly grounded in the snow. These pickets should be driven into the ground after the snow melts away.

17.47 miles of line were cut and taped for the positioning of the geophysical survey measurements. The cost of this work at \$80.00 per mile is \$1,397.60, plus \$100.00 for staking two claims, 266522 and 266523, during the course of the line cutting.



THE GEOLOGY

Geophysical Correlation with the Geology

Geophysical measurements act as a guide to indicate favorable mineralogical and geological conditions at depth in an area considered to be suitable 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 only one geological 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 Temiskaming, 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, available from the Ontario Department of Mines.



It is obvious that this whole area should have been geologically mapped in the last half century. Highway No. 11 and many bush roads render this area quite accessible for a visual inspection of all of the outcrops.

The Regional and the Local Geology

The property was covered with snow during the course of the geophysical examination so that only the larger outcrops could be identified during the course of the field work. These corresponded to the geology as mapped by Miller.

The basement Keewatin rocks are composed of a series of acid to basic lava flows interbedded with tuffs and breccias. These formations have been violently folded so that now they are in a more or less vertical attitude. Their strike is generally east-west with large variations, and they may be overfolded. Masses of magnetic basic rock complicate the sequence. Large outcrops of Algonian granite are mapped one mile to the west of the area surveyed. The above formations are completely covered by flat-lying Huronian sediments, and diabase, of unknown thickness on the property.

In Huronian time, Cobalt series sediments were laid down on the erosional surface of the basement rocks. Erosion and glaciation then removed much of these sediments so that today they may be only a few feet thick in places. Nearby but off the property, windows in the sediments expose the basement rocks.



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 flat-lying Nipissing diabase sill outcrops as a wide belt with an easterly-westerly trend near the south and the east sides of the property. It is expected to intrude under the sediments at a rather flat angle to the north.

The Montreal River fault system is projected to pass in the vicinity of Johnson Lake with a northwest-southeast strike. This fault system is traced for more than 100 miles, from Rib Lake to the south, and to the north it is in the vicinity of Texas Gulf Kidd Township discovery near Timmins. A number of mines are located near this fault. It is believed to be an important factor in the deposition of mineralized bodies.

Economic Geological Considerations

Well-mineralized showings at the surface have been known for many years in this area. In the Huronian sediments black chloritic spotted alteration is found. This is believed to be a favorable indication of nearby silver deposits. In the Cobalt area proper wherever silver veins are found, this spotted alteration is also found nearby. However this chloritic alteration is also found where silver deposits have not been located as yet.

Only a few diamond drill holes have been drilled on this property in the vicinity of N1900-E3200 in 1962.



THE GEOPHYSICAL SURVEYS

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 sulphides 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 (15 to 25 kHz) 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 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 sulphides 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 lines and railroad tracks distort these fields.

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 about 90° degrees apart. In this case the radiation from the transmitters at Balboa, C.Z., and Jim Creek, Washington were used. Their azimuth direction is about 180 degrees and 285 degrees, respectively.

The Ronka EM6 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 may be recorded. Two transmitting stations may be used for determining these parameters. Readings are usually taken at 100 foot intervals along profile lines crossing the general geological 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 conductive zones may be traced and the dip of the conductive zone may be indicated also. 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 bedrock 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 minerals 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 71-75-1, -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 base- and tie-lines. These are traced from a map made by T. D. Brown who carried out the line-cutting contract. Johnson Lake is shown, together with Highway No. 11, the gas pipe line and the Ontario Northland Railroad line. Mining claim numbers are shown on a location map, scale four inches equals one mile, in a corner of the larger map. Wherever found, the claim posts are also shown.

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

Maps numbered 71-75-1 and -2 show the results of the VLF examinations using the radiation from the Jim Creek transmitter to the west in the State of Washington, and the radiation from the transmitter at Balboa to the south in the Panama Canal Zone, respectively.

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

Map No. 71-75-3 shows the results of the magnetic



examination. The relative magnetic vertical component 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 intensities more than 8400 gammas are colored blue, and the intensity contours below 8000 gammas are colored red.

The Results of the VLF Surveys (Maps 71-75-1 and -2)

One major zone of VLF anomalies is traced across Johnson Lake in a general northwest-southeast direction. These are believed to indicate the fracturing of the Montreal River fault system.

In addition, several short isolated anomalies are found to the west with a general east-west trend.

Four sections are recommended to be tested by drilling.

Artificial conductors distort the VLF field. These are the electric line along Highway No. 11, the 36-inch gas pipe line, and the telegraph lines and the metal tracks of the railroad. These disturbances are quite violent, but the interpretation of the anomalies to be tested is quite valid.

17.26 miles of VLF observations were completed with readings at 100 foot intervals on lines 200 and 400 feet apart. At each observation point the VLF parameters from the radiation of the Jim Creek transmitter to the west in the State of Washington



were recorded. In addition, 10.17 miles of VLF readings were made with the radiation from the Balboa transmitter to the south in the Panama Canal Zone. This latter station is not very satisfactory in its operation as it is shut off for days at a time.

The charge for the VLF geophysical survey with the report and maps is \$1,300.00.

The Results of the Magnetic Survey (Map No. 71-75-3)

The vertical component of the earth's magnetic field was measured at 50 foot intervals on lines 400 feet and 200 feet apart in the vicinity of the VLF anomalies.

The magnetic anomalies found show lower magnetic intensity at the VLF indications of conductive zones. The results of the magnetic survey are disappointing. Usually on a property of this size in this area, magnetic anomalies are found that may have more geological significance.

The magnetic intensity varies from a low of 57,970 gammas to a high of 58,650 gammas, with the average reading about 58,400 gammas. These are minor magnetic variations for this area.

3.36 miles of magnetic observations were made at 50 foot intervals on lines 200 and 400 feet apart. The charge for the magnetic survey with the report and maps is \$260.00.



Drilling Recommendations

Four drill sites are selected for testing the VLF anomalies. These are listed below more or less in the sequence of priority for drilling.

	<u>Coordinates of drill site</u>		<u>Dip of Hole</u>	<u>Length of hole in feet</u>	<u>Asimuth of hole</u>
1/	N1200	E0200	-45°	570	185°
2/	S0030	E0400	-45°	570	180°
3/	S1100	E1200	-45°	570	150°
4/	S1400	E2600	-45°	570	40°

This totals 2280 feet of drilling more or less.

At \$5.00 per foot at this time, the cost will be about \$11,000.00. Supervision, logging and assaying may add another \$3.00 per foot so that the cost of the drilling will be about \$19,000.00.

After the core is logged, the minerals located may justify drilling at some other horizon or along strike. These other locations may be readily selected from the geophysical results plotted on Map No. 71-75-1.

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CONCLUSIONS AND RECOMMENDATIONS

Electromagnetic VLF evidence of the fracturing of the Montreal River fault system is found on the property under Johnson Lake. This zone has the expected strike of about northwest-southeast.

Nearby several isolated east-west conductive zones are also found.

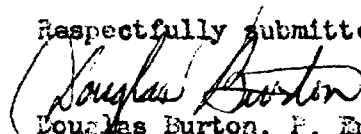
Magnetic measurements surrounding the VLF anomalies indicate lower magnetic intensity for the conductive zones, so that concentrations of magnetic minerals should not be expected in these zones.

In the Cobalt camp silver veins are found in or near diabase. In exploring for silver it is important to know the sequence of the formations so that a test hole may be directed to the more favorable formation where they are fractured and electrically conductive.

Four sections have been selected to be tested by drilling, in the sequence as numbered on the previous page and on the accompanying maps. With the information gained by this drilling further exploratory holes may be laid out.

In the meantime, this report is,

Respectfully submitted,


Douglas Burton, P. Eng.
Geophysicist

Cobalt, Ontario
April 22nd, 1971

North Part Gillies Limit (M.484)

THE TOWNSHIP OF GILLIES (SOUTH PART) DISTRICT OF TIMISKAMING LARDER LAKE MINING DIVISION SCALE: 1 INCH = 20 CHAINS

LEGEND

- PATENTED LAND
- CROWN LAND SALE
- LEASES
- LOCATED LAND
- LICENSE OF OCCUPATION
- MINING RIGHTS ONLY
- SURFACE RIGHTS ONLY
- ROADS
- IMPROVED ROADS
- KINGS HIGHWAYS
- RAILWAYS
- POWER LINES
- MARSH OR MUSKEG
- MINES

NOTES

This Twp. Lies Within The TIMAGAMI PROVINCIAL FOREST.

400' Surface Rights Reservation Around All Lakes And Rivers

Mining Claims Accepted Subject To Sec. 53 Of The Mining Act.

L.O. 7558 Covers Flooding Rights On Montreal River Upstream From The Upper Notch Power Site To Contour Elevation 785.5' H.E.P.C. File: 20934 Vol. 3.

RESERVE FLOODING RIGHTS TO H.E.P.C. (PROPOSED) TO CONTOUR 800' E. 56'

DATE OF ISSUE FEB 2 1972 ONT. DEPT. OF MINES AND NORTHERN AFFAIRS

PLAN NO. M.483 ONTARIO DEPARTMENT OF MINES AND NORTHERN AFFAIRS

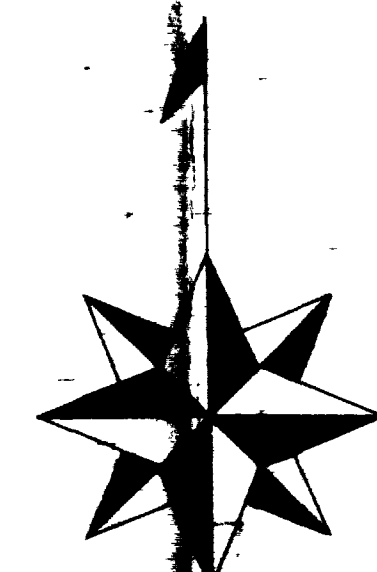
Brigstocke Twp. (M.429)

Best Twp. (M.417)

Best Twp. (M.417)

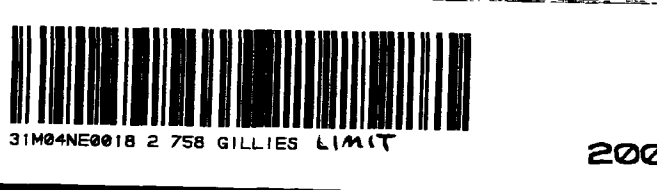
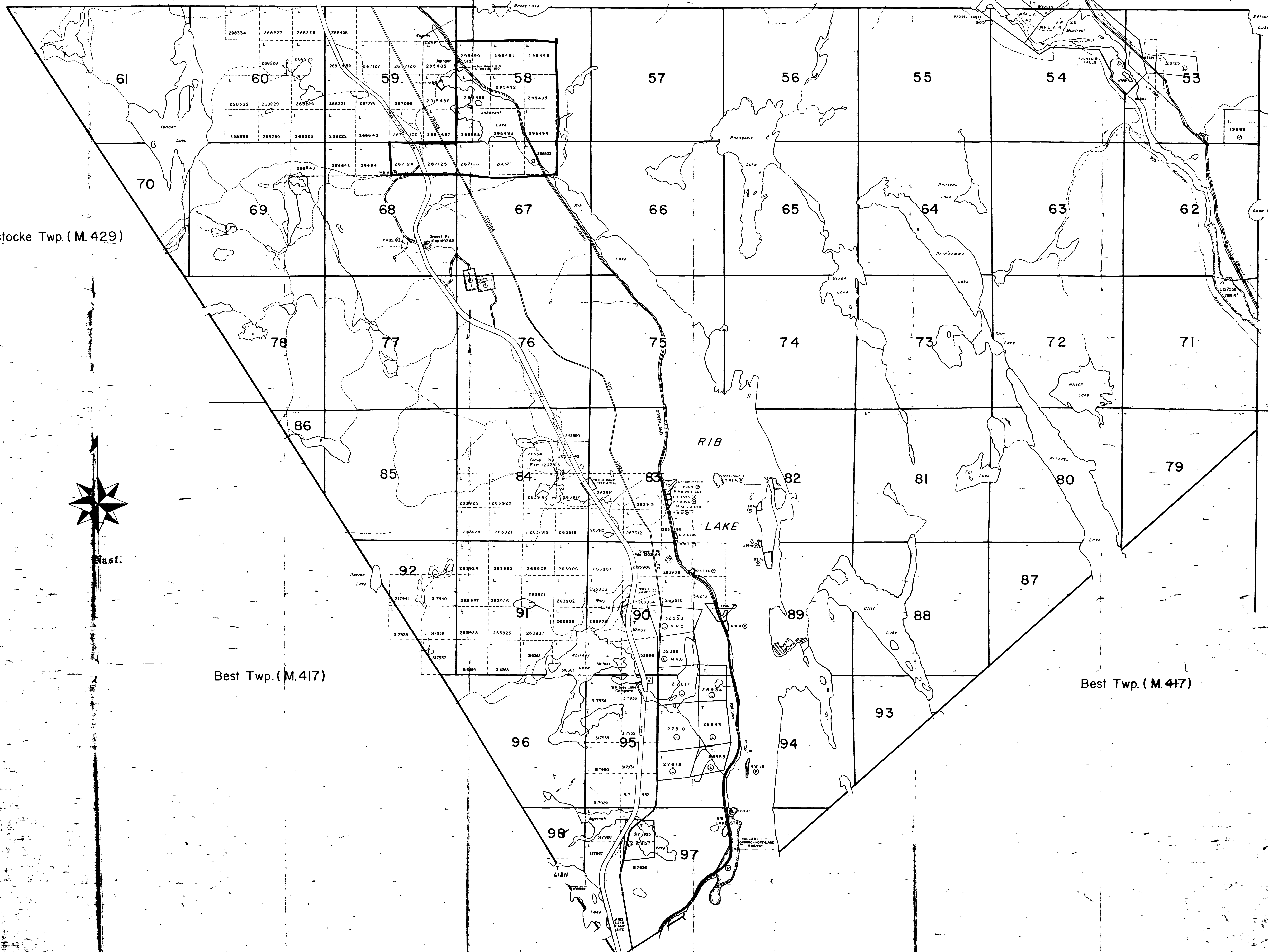
Lorrain Twp. (M.536)

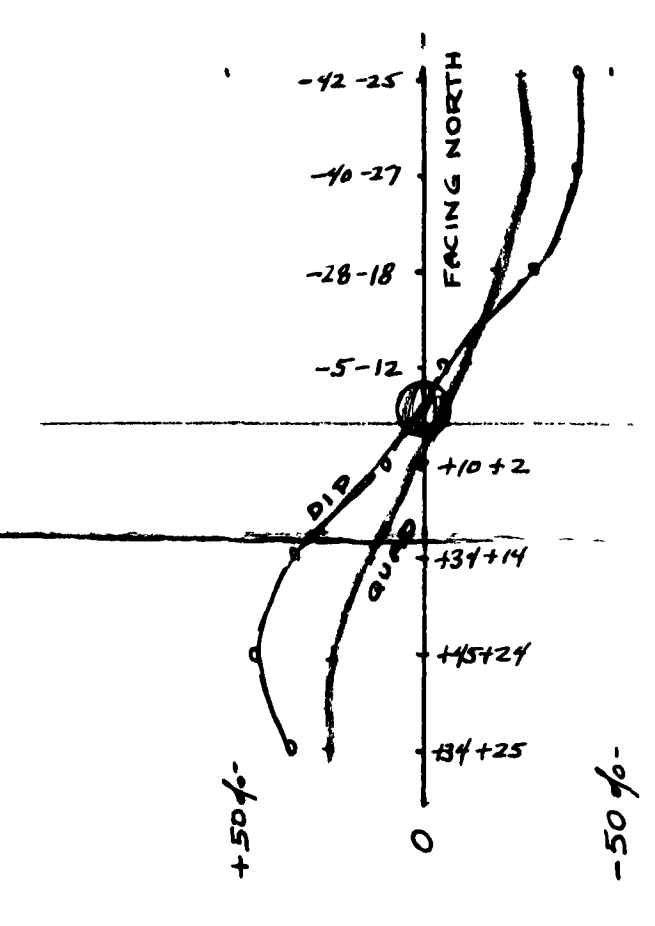
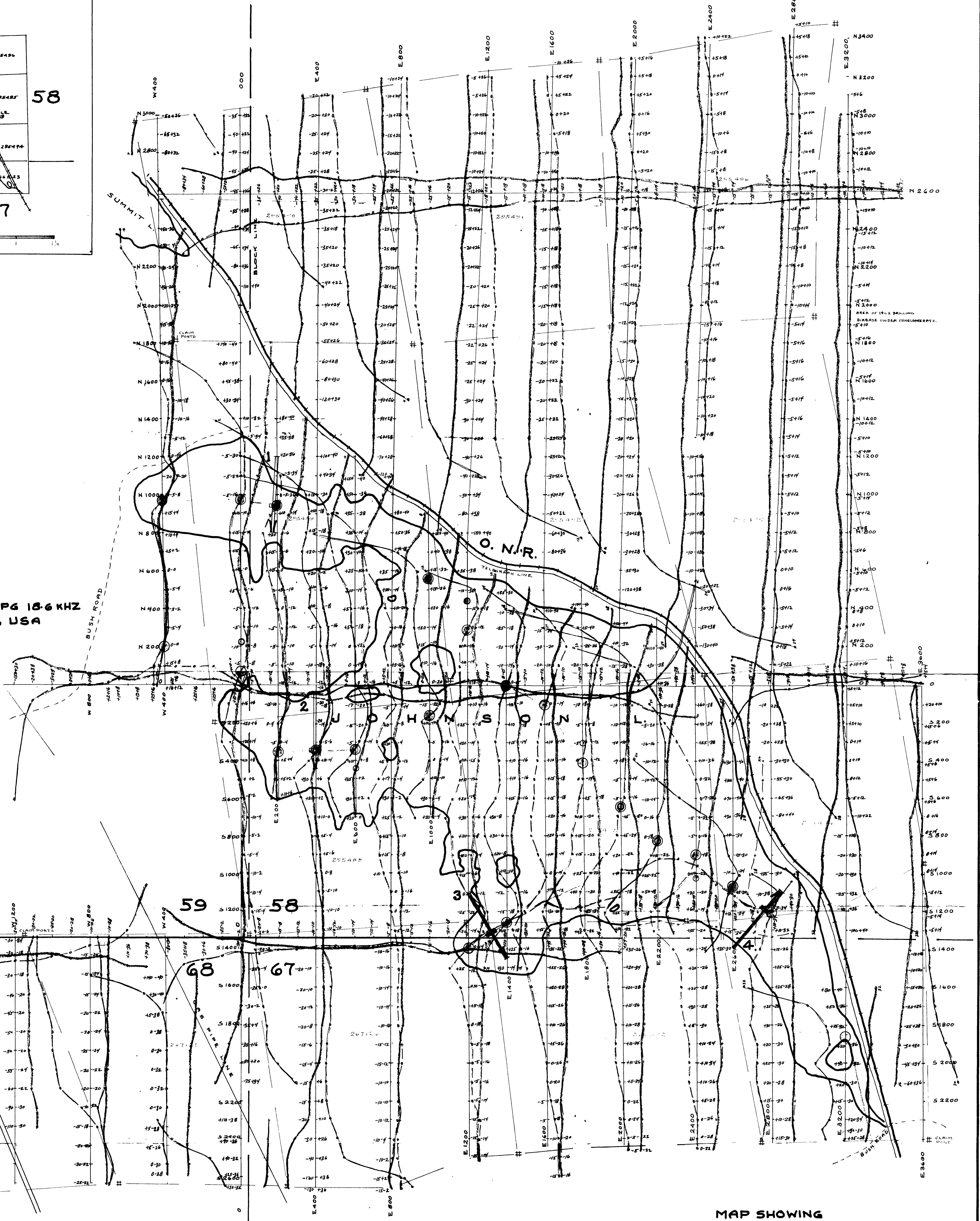
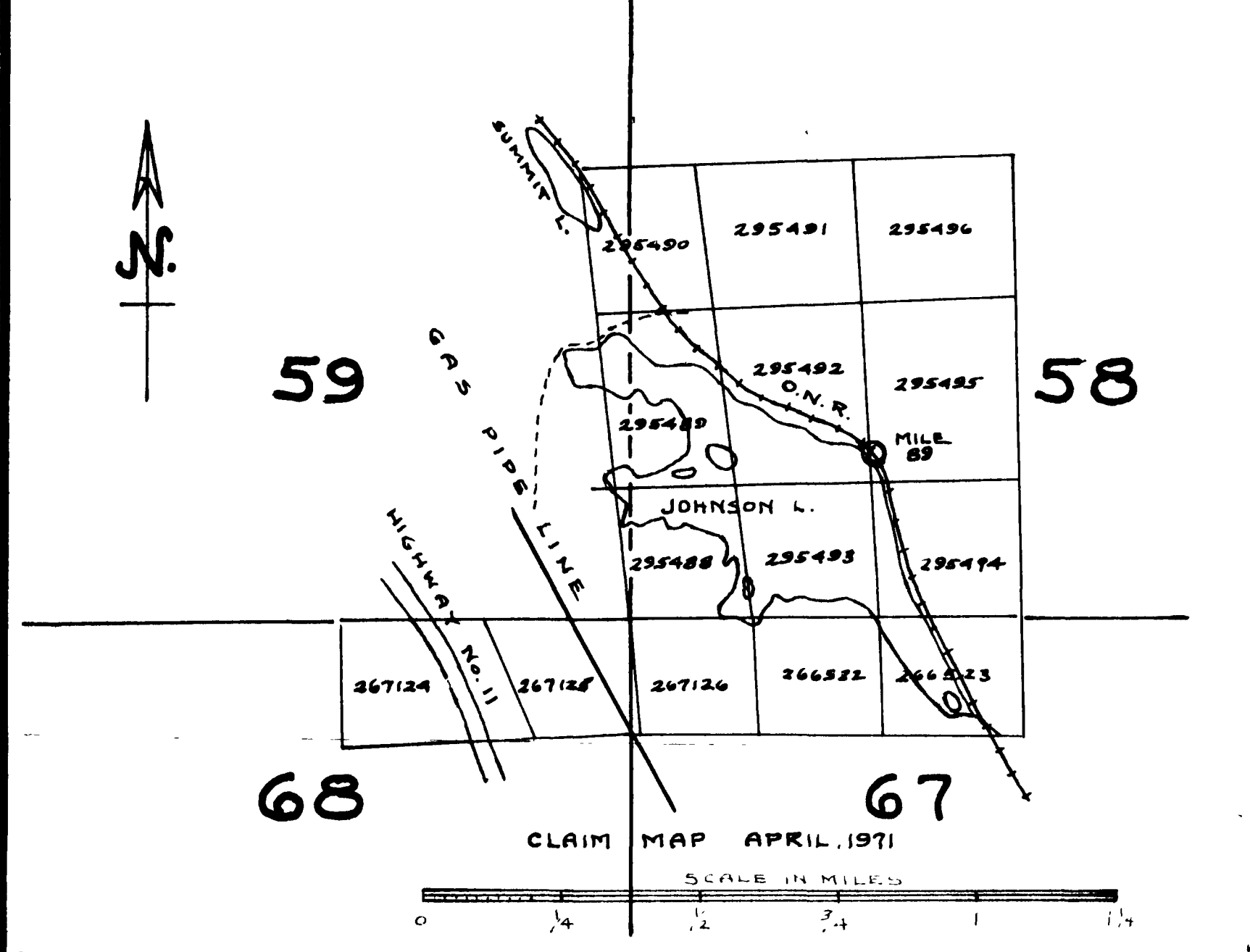
South Lorrain Twp. (M.591)



East.

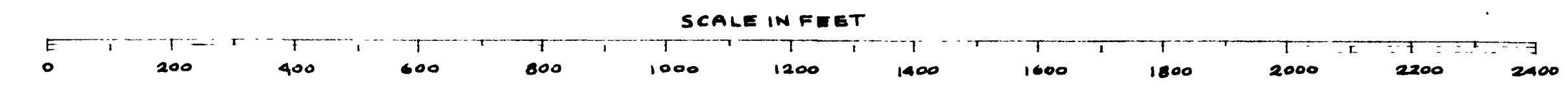
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TYPICAL VLF ANOMALY CROSS-OVER FOR AN EAST-WEST VERTICAL CONDUCTOR CLOSE TO THE SURFACE

VLF TRANSMITTER NLK/NP6 18.6 KHZ
 JIM CREEK, WASHINGTON, USA
 AZIMUTH ABOUT 285°



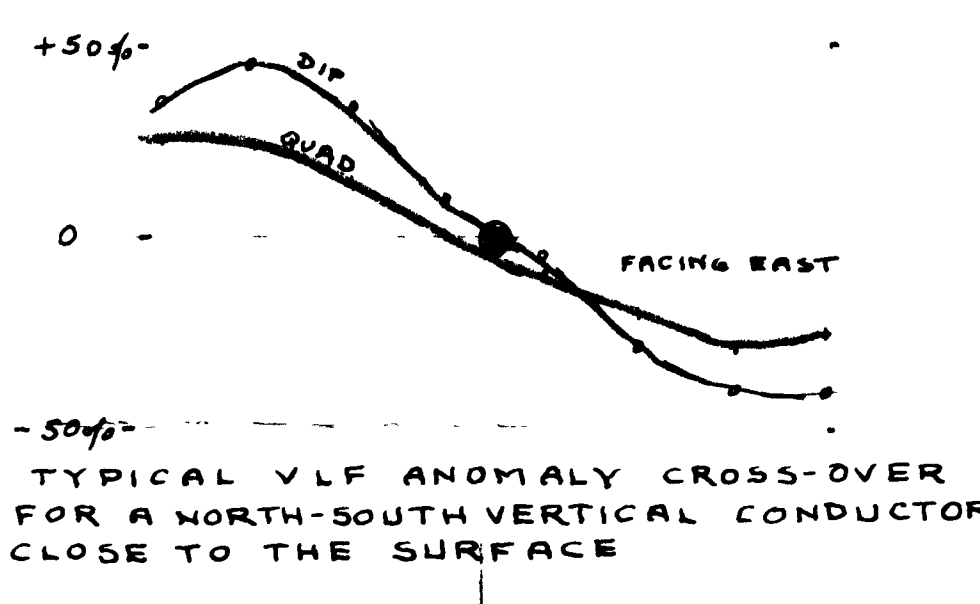
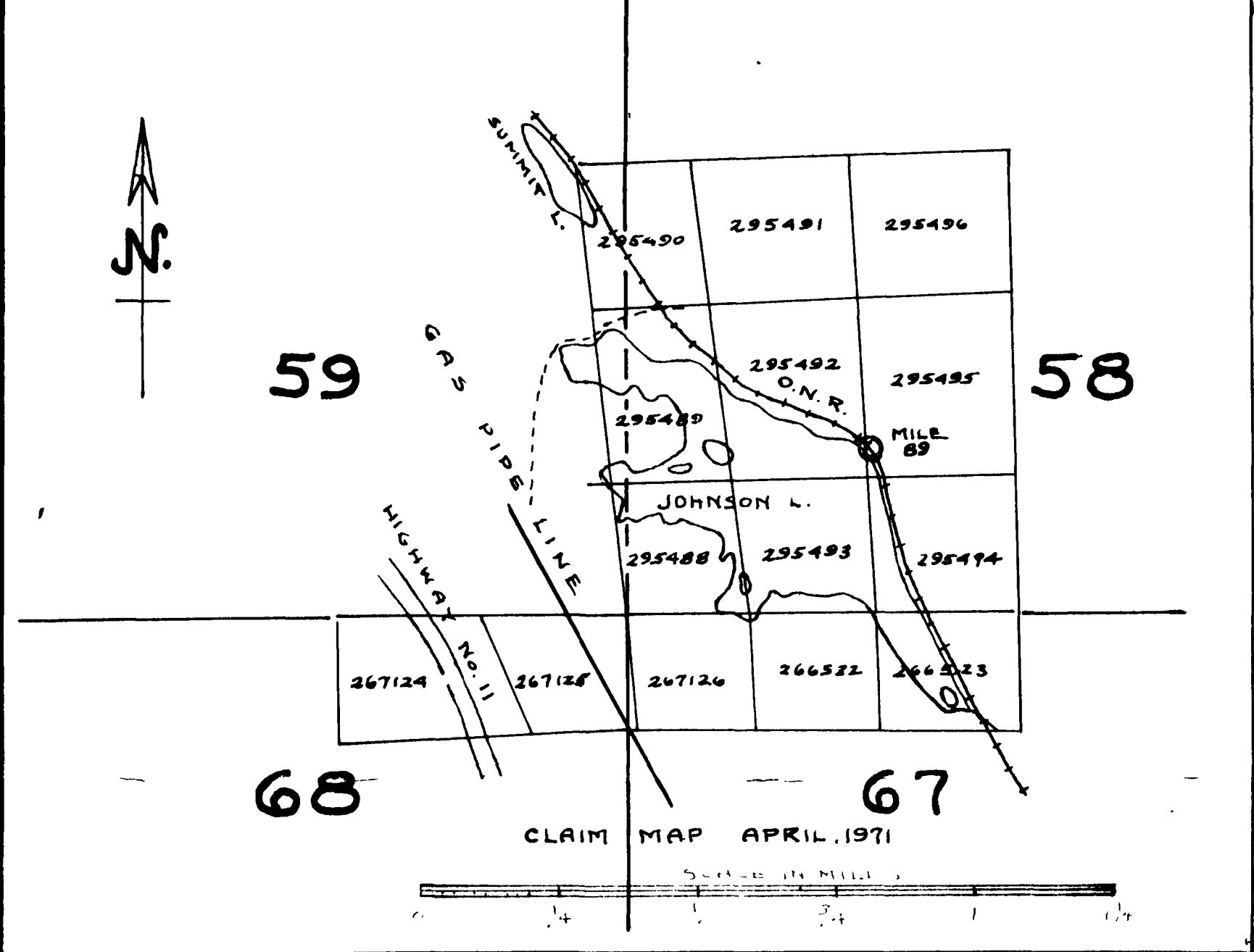
- ← TARGET AND SECTION TO BE TESTED BY DRILLING
- VLF ANOMALY FROM JIM CREEK RADIATION
- VLF ANOMALY FROM SALBOA RADIATION

MAP SHOWING
 THE VLF RONKA EMIG RECEIVER RESULTS
 OF THE GEOPHYSICAL SURVEYS
 ON THE PROPERTY OF
 LOBO MINES & EXPLORATIONS LIMITED
 GILLIES LIMIT TOWNSHIP, ONTARIO

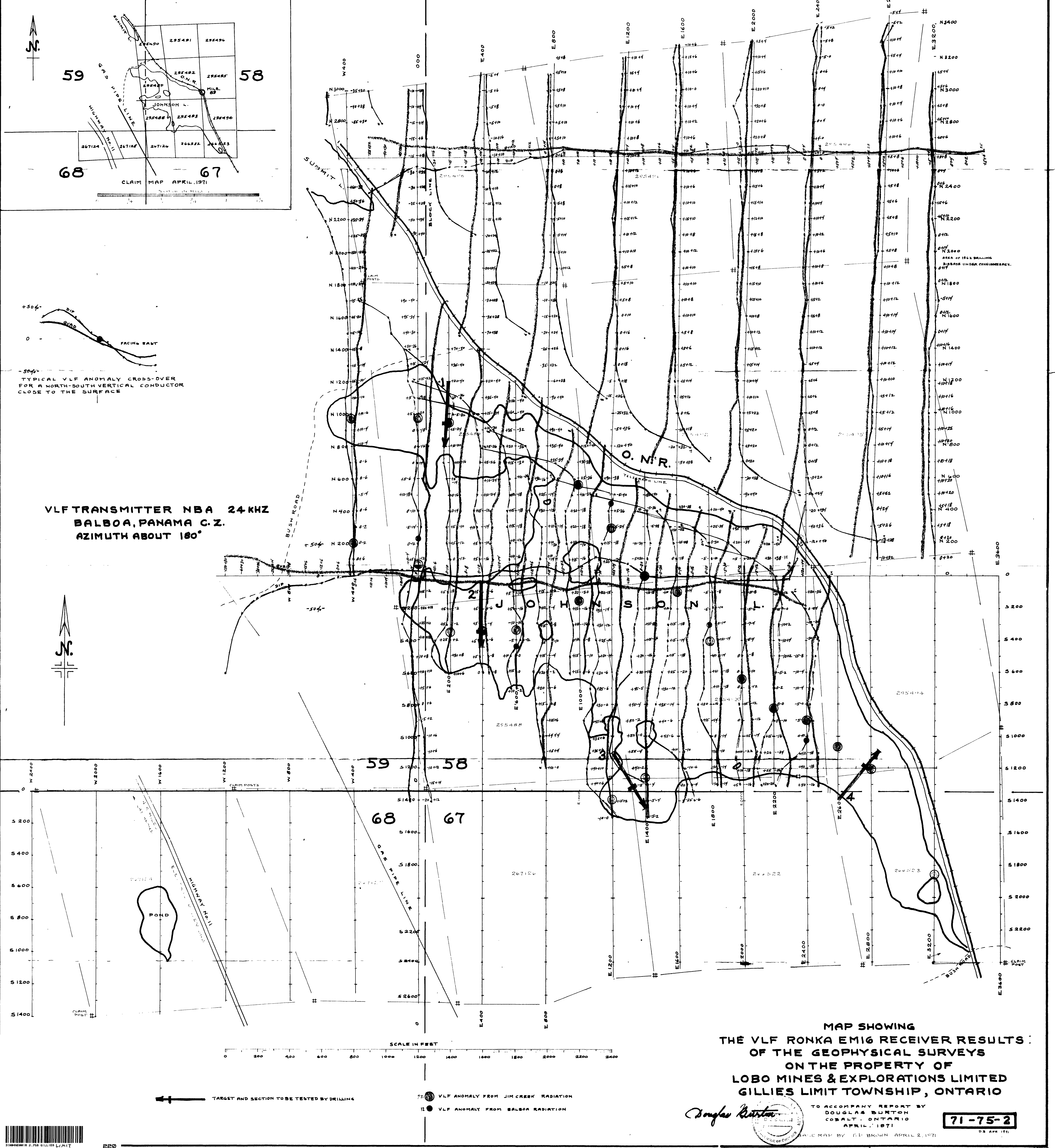
Douglas Burton

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

71-75-1



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



MAP SHOWING
THE VLF RONKA EMIG RECEIVER RESULTS
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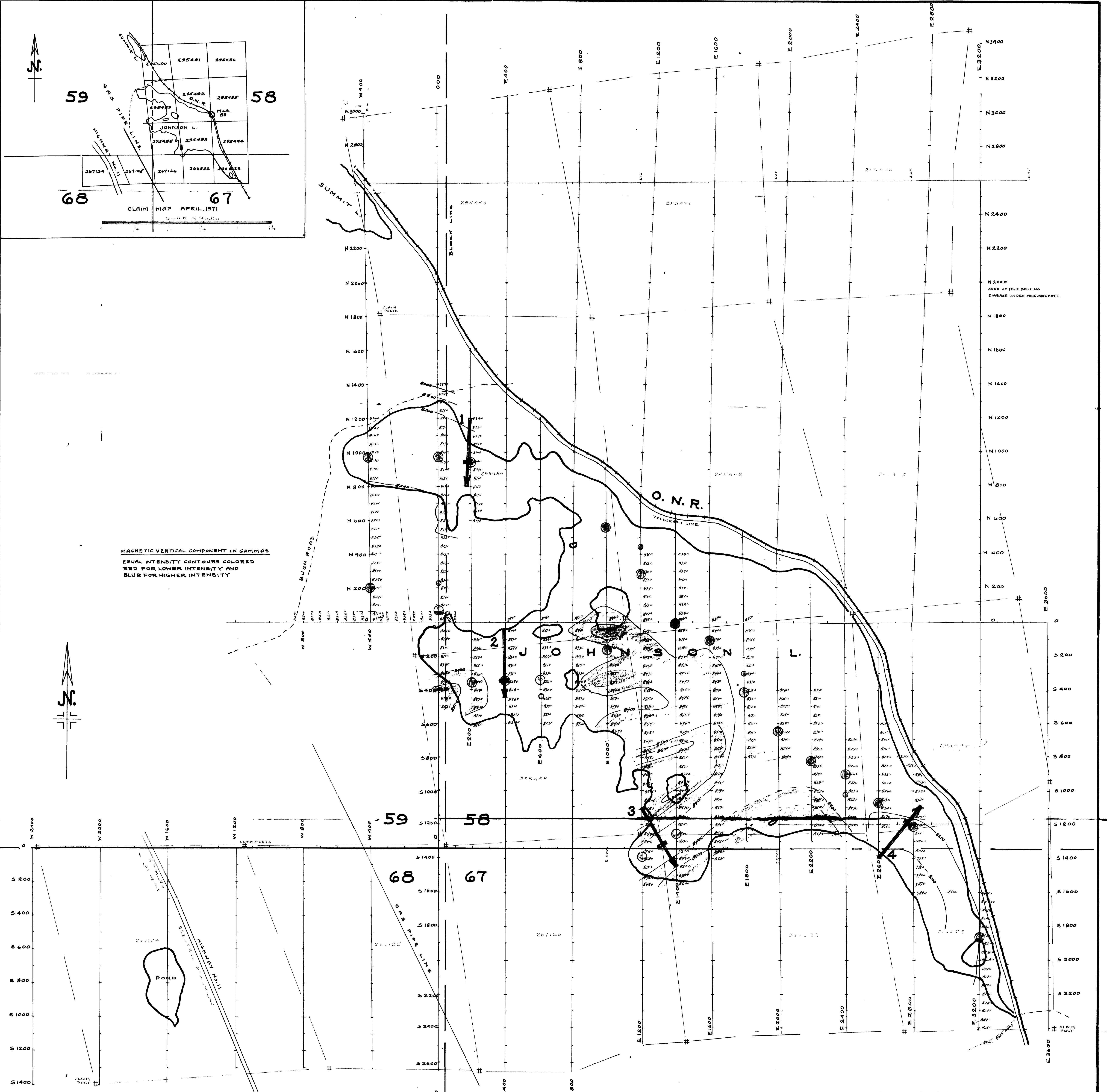
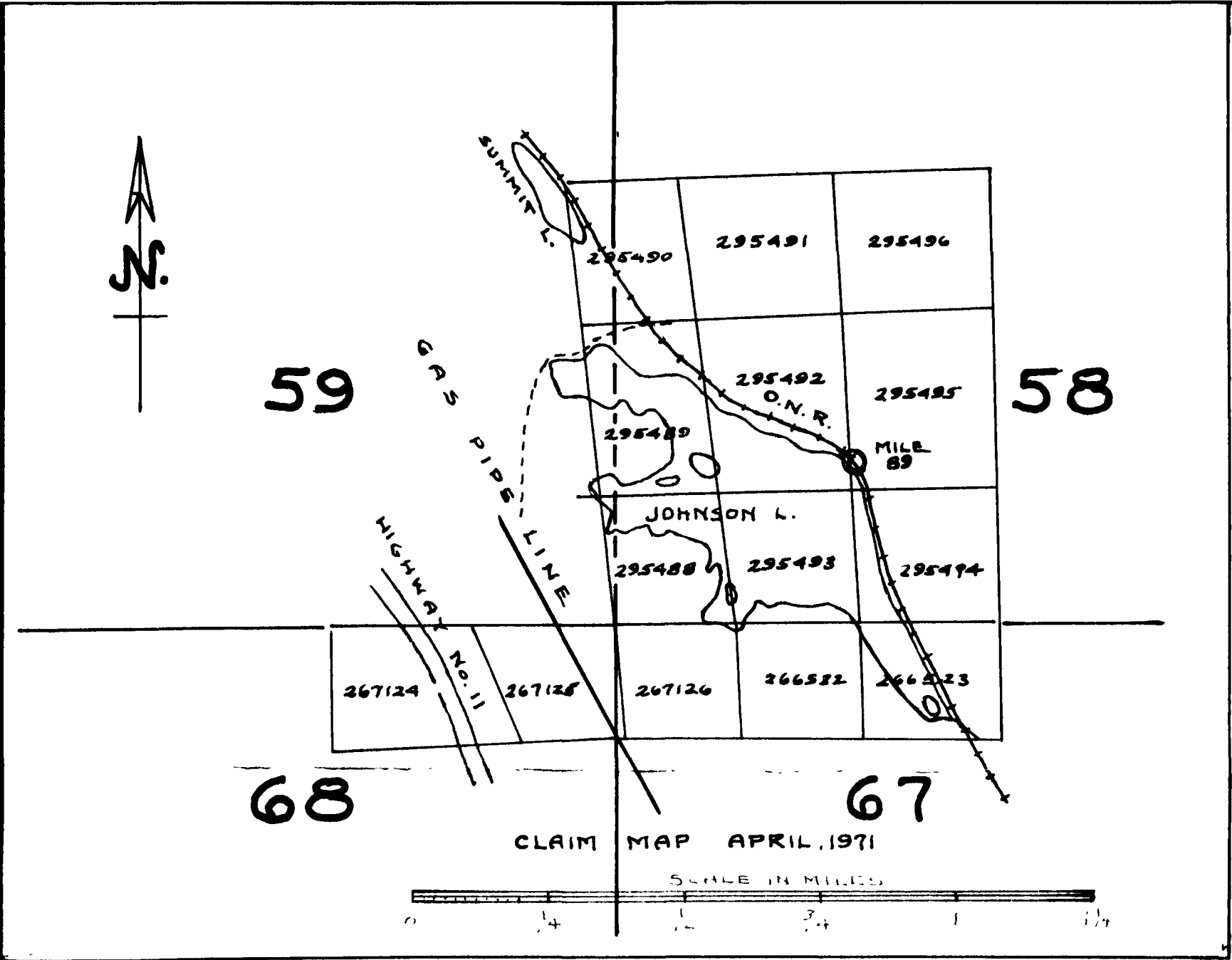
TO ACCOMPANY REPORT BY
DOUGLAS BURTON
COBALT, ONTARIO
APRIL, 1971

71-75-2

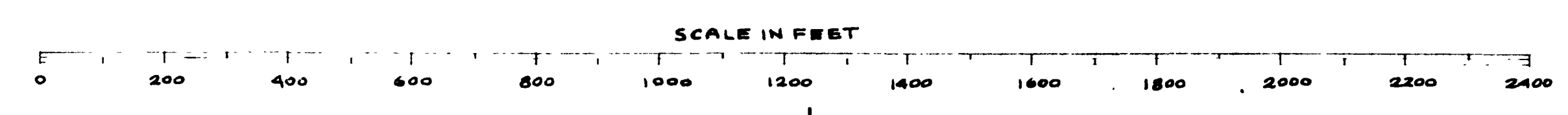
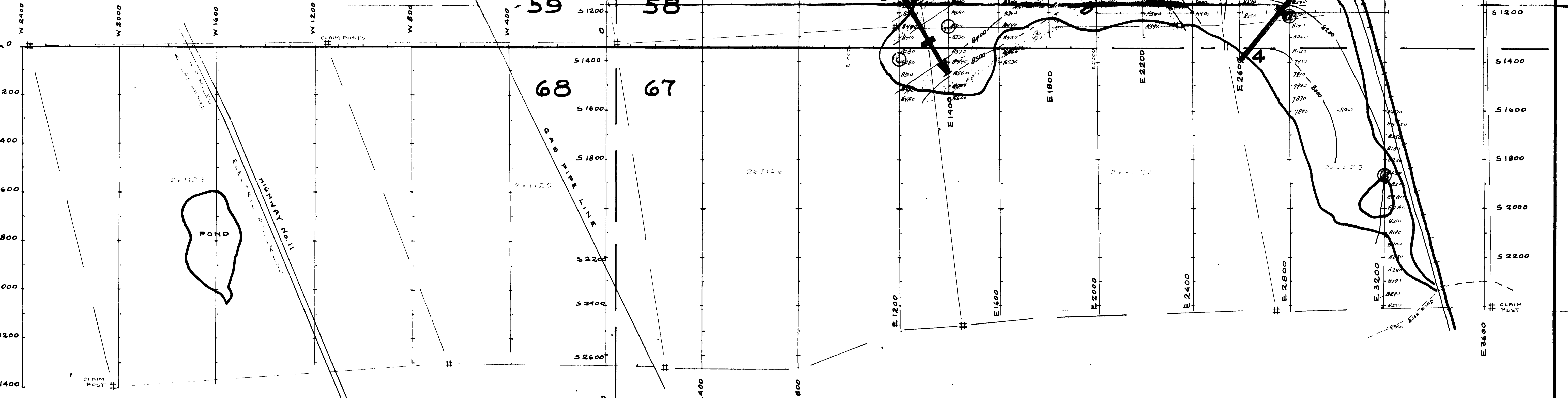
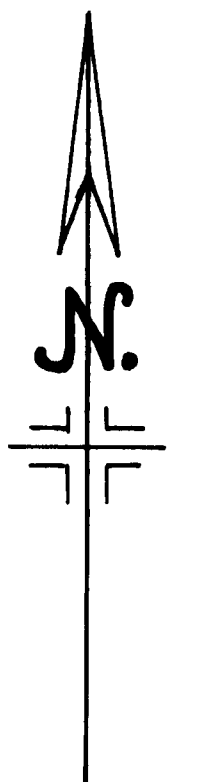
← TARGET AND SECTION TO BE TESTED BY DRILLING

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





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



← TARGET AND SECTION TO BE TESTED BY DRILLING

- VLF ANOMALY FROM JIM CREEK RADIATION
- VLF ANOMALY FROM BALBOA RADIATION

**MAP SHOWING
 THE MAGNETIC RESULTS
 OF THE GEOPHYSICAL SURVEYS
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71-75-3

BASE MAP BY T. D. BROWN APRIL 2, 1971