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REPORT ON THE COMBINED AIRBORNE
MAGNETIC AND ELECTROMAGNETIC
SURVEY, POST LAKE AREA,
PATRICIA MINING DIVISION,
ONTARIO,
FOR
CANADIAN JAVELIN LIMITED

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### McPHAR GEOPHYSICS LIMITED

REPORT ON THE

COMBINED AIRPORNE

MAGNETIC AND ELECTROMAGNETIC SURVEY

POST LAKE AREA

PATRICIA MINING DIVISION, ONTARIO

FOR

CANADIAN JAVELIN LIMITED

### 1. INTRODUCTION

During November, 1969, a combined airborne magnetic and electromagnetic survey was carried out in the Post Lake Area, Fatricia Mining Division, Ontario for Canadian Javelin Limited.

The purpose of the survey was to map any anomalous electromagnetic and/or magnetic responses that might be indicative of the presence of base metal sulphide mineral deposits. Several conductive zones have been indicated by the survey which would warrant further investigation on the ground.

## 2. SURVEY DUTAILS

The area surveyed extends from the shore of Sturgeon Lake on the northwest to the north edge of Glitter Lake on the southeast. The flight lines are oriented approximately northeast-southwest perpendicular to the regional strike of the geology. A flight line interval of 1/8 mile was main-

tained throughout the survey and the length of the individual flight lines is approximately 4 miles with somewhat shorter lines in the northwest portion of the area. A total of 155.1 line miles of airborne surveying was carried out, of which 62.6 line miles lie within the boundary of the Canadian Javelin claim group. A standard terrain clearance of 450 feet was maintained wherever topographic conditions permitted.

The electromagnetic and magnetic system employed in carrying out the survey is described in the notes preceding this report.

#### 3. PRESENTATION OF RESULTS

The results of the combined electromagnetic and magnetic survey are shown on the accompanying map AE-6943, at a scale of one inch equals approximately 1,320 feet in the standard manner described in the notes preceding this report and indicated in the legend. Line-to-line correlation of conductor axes has been indicated and aromalies of particular interest have been indicated by a star.

Based upon information supplied by Canadian Javelin Limited the outside boundary of their contiguous claim group of 131 claims has been indicated on Figure 1, as well as on map AE-6943.

## 4. REGIONAL GEOLOGY

The geology of the area surveyed is covered by Ontario Department of Mines prelininary geology map P353. Based upon this map a band of metasedimentary rocks consisting of conglomerates, arkose, greywacke, siltstone, argillite, phyllite, slate and derived schist, cuts through the

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central portion of the survey area. It trends northwest-southeast underlying Barge Lake and Post Take. Iron formations are indicated south of Post Lake. Northwest of Barge Lake there is a narrow zone mapped as gabbro, metagabbro and metadiorite lying between the metasediments and the basic metavolcanics.

The remainder of the survey area is underlain by metavolcanic rocks. The most significant are the acid metavolcanics (rhyolitic and dacitic tuff, agglomerate and flows) underlying the southwest portion of the survey area and being the host rock of the recent discovery of Mattagami Lake Mines which lies approximately eight miles to the west of the survey area.

Regional magnetic coverage of the area is provided by the GSC Aeromagnetic Map 1117G, Bell Lake. These results indicate a distinct magnetic trend running through Barge Lake and Post Lake which would correlate with the band of matasediments mentioned above. Of interest is the elongated magnetic high of about 120 gammas lying within the acidic metavolcanics between Swamp Lake and Clay Lake.

#### 5. DISCUSSION OF RESULTS

The most distinct electromagnetic anomalies within the survey area are confined to either the metasediments or the general area of the contact between the acidic and basic metavolcanics. The former may be due to graphitic zones or iron formations within the metasediments, while the latter would appear to be a better location for sources due to sulphide mineralization. Except for the northeast, southeast and southwest portions of the

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Canadian Javelin Limited claim group, the more distinct anomalies lie outside the boundaries of the claim group.

Where possible, line-to-line correlation has been indicated between anomalies. The more interesting anomalies are as follows:

#### Zone #1

This zone may be related to Zone #2 to the north. An "A" category response of good amplitude and conductivity ratio at fiducial 2970 on Line 3 correlates with "B" category EM responses on Line 2 and Line 4. The zones lies within the basic metavolcanics and is associated with a magnetic high of 280 gammas. It would warrant further investigation on the ground.

### Zone #2

As mentioned above, this zone may be related to Zone #1 especially in the area of Line 1, Line 2, and Line 3 where they appear to converge. The best response is indicated on Line 7, fiducial 2077, where the "A" category EM anomaly is associated with a magnetic high of 280 gammas. Ground followup is warranted.

### Zone #3

A distinct zone of multiple parallel conductors with associated strong magnetic response correlates with the band of metasediments trending through the survey area. The largest amplitude responses occur in the southern portion of the area, southeast of Post Lake. Based upon the geologic information, these responses would appear to be due to iron formation and/or graphitic bands. However, some ground followup would be warranted to confirm

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the accuracy of the geology.

The "A" category EM response on Line 9, fiducial 3026, lies near the contact between the metasediments and metavolcanics and would warrant investigation on the ground. Depending upon the results of this ground investigation further work may be warranted on the "B" category anomalies within this conductive zone.

#### Zone #4

The geologic map suggests a nose to the acidic metavolcanics in the area of Line 8 and Line 9, north and east of Clay Lake. If this is the case Zone #4 and Zone 5 may be related. However, if the acidic metavolcanics instead pinch out to the southeast then Zone #1 and Zone #2 may also be related to Zone #4 and Zone #5. The "A" category EM response on Line 9, finucial 3026 is located at the contact between the acidic and basic metavolcanics near the nose of the flexure and should be investigated on the ground to confirm the geologic information, and to determine the significance of this conductive zone as a source of sulphide mineralization.

#### Zone #5

As mentioned above, this zone may be related to Zone #4 and Zone #6. Although only "C" category responses with fair conductivity ratios, the location of this zone along the contact between the basic and acidic metavolcanics, as well as the associated magnetic high, renders it worthy of furthe investigation on the ground.

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## Zone #5

As mentioned above, this zone may be related to Zone #4 and Zone #6. Although only "C" category responses with fair conductivity ratios, the location of this zone along the contact between the basic and acidic meta-volcanics, as well as the associated magnetic high, renders it worthy of further investigation on the ground.

#### Zone #6

This zone consists of the strongest EM response of a long conductive zone, associated with a magnetic high and extending from Zone #5 through to at least Line 39. Throughout its length it is associated with a magnetic high. The portion referred to as Zone #6 lies within, and to the northwest, of Clay Lake, trending north of Swamp Lake and correlating with the distinct magnetic high feature indicated on the government aeronagnetic map.

The "A" category EM responses on Line 23, fiducial 630, and Line 24, fiducial 424, as well as the correlating "B" category responses on Line 19, Line 20, Line 21, Line 22, Line 25 and Line 26 have correlating magnetic highs of from 200 gammas to 600 gammas. The strongest magnetic response occurs on Line 25 through to Line 30 which correlates with the government magnetic data. Although the length of the overall zone suggests a structural feature or possibly iron formation, the favourable location near or at the geologic contact and the associated magnetic high renders the zone worthy of further investigation of the ground.

#### Zone #7

This zone lies within the Canadian Javelin claim group along the southwest shore of Post Lake near to or at the contact between the metavolcanic and metasediments. "A" category EM responses are indicated on Line 29, fiducial 1498; Line 20, fiducial 1219; and Line 31, fiducial 972 with correlating "B" category esponses on Line 18, Line 22, Line 23 Line 24 and Line 25. Although, possibly due to graphite zones within the metasediments, and lacking

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### Zone 17

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Although, possibly due to graphite sonce within the metasediments, and lacking

correlating magnetic response, this zone would warrant further investigation on the ground.

#### Zone #8

This isolated "C" category EM response of moderate amplitude and conductivity ratio on Line 20, fiducial 1188, lies to the northeast of Post Lake within the basic metavolcanics.

## Zone #9

Lying just to the northeast and parallel to the long conductive zone associated with Zone #6, this "C" category EM response is located on Line 37, fiducial 1378. It lies within the acidic metavolcanics, and has a correlating magnetic high of 40 gammas. Ground followup would be warranted.

#### Zone #10

This isolated anomalous zone of "C" category EM response of moderate magnitude and conductivity ratio is located within the acidic metavolcanics near to the contact with the basic metavolcanics to the northeast. Although there is no correlating magnetic response, this zone would warrant some investigation of the ground.

#### Zone #11

This weak zone of "C" category EM responses on Line 36, Line 37, and Line 38 is located within the area mapped as metasediments near to the contact with the metavolcanics. The associated magnetic high of 50 gammas is actually a shoulder on a larger magnetic feature. Some ground followup is warranted.

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Lying just to the northeast and parallel to the long conductive zone associated with Zone #6, this "C" category EM response is located on Line 37, fiducial 1378. It lies within the acidic metavoleanies, and has a correlating magnetic high of 49 gammas. Ground follower would be warranted.

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#### 6. SUMMARY AND CONCLUSIONS

The resutls of the combined airborne geophysical survey have indicated several anomalous zones which would warrant further investigation on the ground. Other weaker anomalies have been outlined which may be of interest if there is supporting geologic information.

Most of the anomalies of interest lie outside of the boundaries of the Canadian Javelin claim group. Zone #3, Zone #7, Zone #11 and the possible northwest extension of Zone #4 lie within the boundaries of the claim group and should be investigated.

MCPHAR GEOPHYSICS LIMITED,

David K. Fountain, P. Eng., Geophysicist.

Dated: January 5, 1970.

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## 6. SUPPLIARY AND CONCLUSIONS

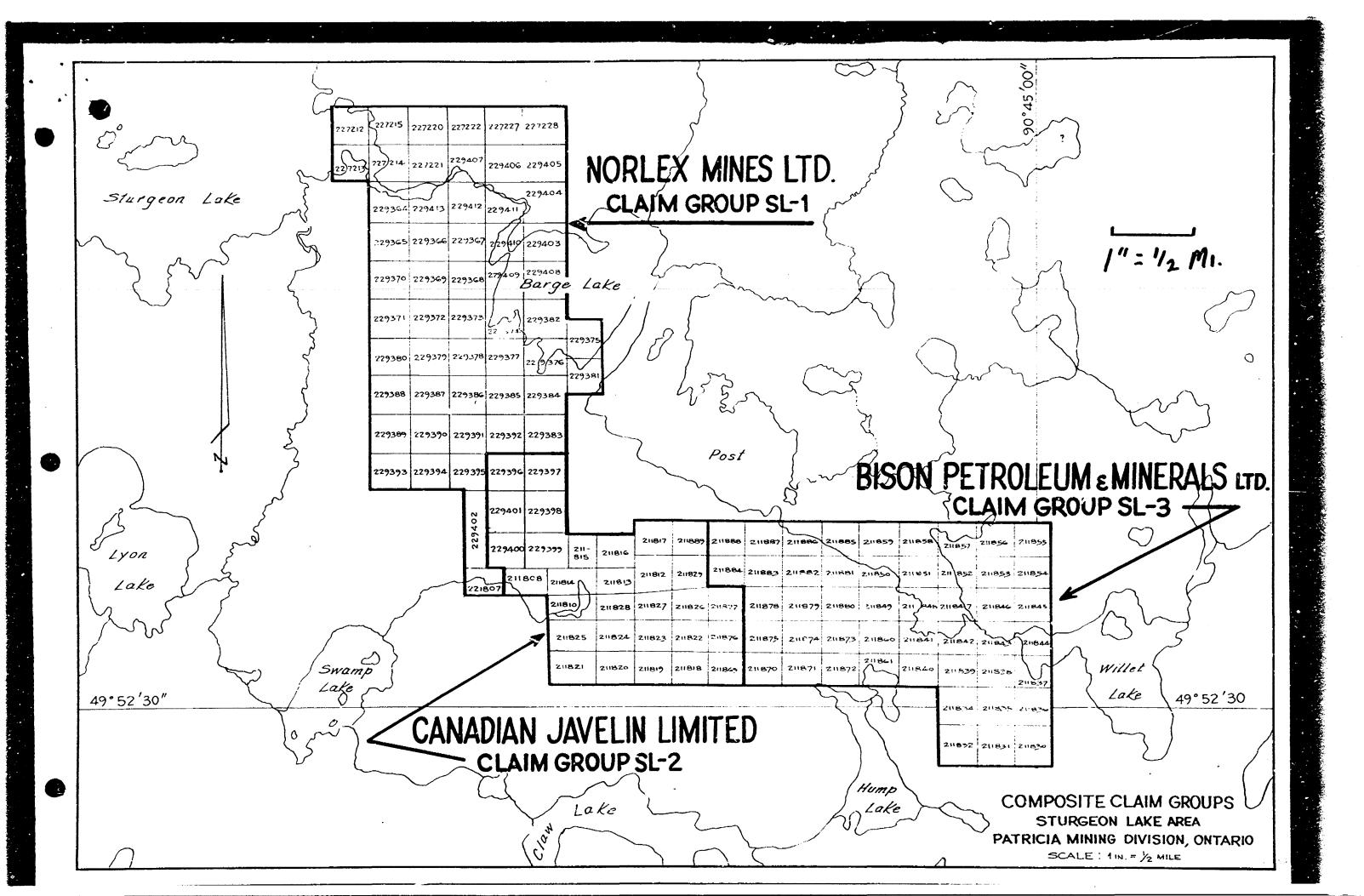
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#### McPHAR GEOPHYSICS

#### GENERAL NOTES ON

#### AIRBORNE

#### ELECTROMAGNETIC & MAGNETIC SYSTEMS

### A. EQUIPMENT

The electromagnetic and magnetic units are the primary instruments used in the McPhar combined survey system which is designed for use in a de Havilland DHC-2 Beaver aircraft. Ancillary equipment consists of a radio altimeter, a frame camera, an interval-ometer-fiducial numbering system and a light beam recorder.

## I) F-400 Electromagnetic Unit

The F-400 is a sequential dual frequency unit (340 Hz and 1070 Hz) that measures the quadrature response of a conductor. In the absence of a conductor the quadrature response is zero. Two iron cored coils mounted beneath the wings of the aircraft are used to create the primary field which is essentially a forward pointing dipole. A 450 foot cable is used to tow a receiver bird and gives a transmitter-receiver separation of approximately 400 feet. The dipole of the receiver system is vertical and flown in the proper position to be maximum coupled to the primary field. Thus the coil configuration can be designated as an X-Z

skew system which is flown ln-Line. Sequential dual-frequency EM operation is employed together with time sharing for a proton magnetometer. The cycle consists of one third second at each frequency and one third magnetic readout. The quadrature response at each frequency is recorded on two channels of the recorder.

## II) Proton Magnetometer

A Varian V-4937, airborne proton free precession magnetometer is used to record the variations in the earth's magnetic field.

The sensing head of this unit is conveniently mounted inside the port wing tip. This instrument has a sensitivity of 1 gamma when pulsed at 1 second intervals or 2 gamma when more frequent readings are required. The proton magnetometer has the advantage of reading the absolute value of the earth's magnetic field and is almost completely free of drift or variations due to temperature or environmental changes. The magnetic data is recorded on the same trace as the electromagnetic response for ease of correlation.

## III) Ancillary Equipment

A Bonzer doppler radio altimeter provides a cominuous ground clearance profile. Flight path coverage is obtained by a frame camera driven by the intervalometer-fiducial unit which synchronizes the individual frames with the time events on the recorder. At the standard flying height of 450 feet the camera is programmed to provide 20%

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overlap on each frame, which results in a continuous record of the flight path. At greater heights, there is proportionally more overlap.

## B. DATA RECORDING & COMPILATION

A light-beam recorder employing a photo-sensitive paper is used to record the data. High-sensitivity galvanometers give almost instantaneous response to the incoming signals and the recorder time log is essentially zero. The recorder normally employed is the Century 444 six channel recorder.

With the actual flight record oriented so that the fiducial numbers increase from left to right, the 3.5 inch trace width has been divided into 100 units with zero at the bottom and 100 at the top. Fifty horizontal grid lines are used to mark 2 unit intervals. The ten unit intervals are indicated by the thicker grid lines. Except where noted on individual records the traces are identified as follows:

## I) 340 & 1070 Hz Quadrature EM Response

These two primary information traces are centred at 20 and 40 units respectively. Upward excursions represent positive quadrature response, which is normally indicative of the presence of conductors.

Negative deflections usually have no interpretational significance.

The equipment may be flown at sensitivity settings of 5 ppt, 10 ppt or 20 ppt as indicated by the local geology and topography. Nor-

mally a 10 ppt setting is employed where ppt represents parts per thousand in terms of the primary field strength at the receiver.

Anomalies of 1000 ppm or 1 ppt are easily recognized in most conditions. The sensitivity settings are recorded by the operator on the Flight Report and should be noted prior to referring to the actual data strips.

The ratio of the amplitude of the response at the two frequencies is characteristic of the "apparent conductivity" (i.e. si conductivity-product) of the disturbing body; poor conductors display LO/HI ratios of 1.0 or less while good to excellent conductors have ratios greater than 1.0.

### II) Magnetometer

Positive magnetic anomalies (i. e. increase in magnetic field strength) are indicated by upward excursions. The magnetic field is sampled at intervals of approximately 1 second. The observed value of the total magnetic field is then written out on two scales; the 2000 gamma scale for 250 milliseconds followed by the 200 gamma scale for 750 milliseconds.

The absolute value of the magnetic field is a five digit number; the first three of these are set on the zero line and recorded by the operator at the beginning of each flight. The 2000 gamma scale (coarse scale) is recorded in ten steps of 200 gammas (adjusted to the 10 unit lines) covering the entire 100 units; strong anomalies can be easily

traced by the short bars that occur on the record. Full scale deflection (i.e. 0 to 100 units) is adjusted to 200 gammas for the fine scale which is recorded as a longer bar. Thus the absolute value of the magnetic field may be read from the trace to an accuracy of 2 gammas.

## III) Fiducials

Fiducials are shown in one of two ways and coincide with the shutter opening of the frame camera. Usually the fiducials appear as vertical lines on the trace. Occasionally these are supplemented by an interruped galvanometer centred near 90 units, these interruptions correspond with the vertical fiducial lines.

## IV) Altimeter

The altimeter scale is non-linear and a calibration scale is recorded periodically on the data strips.

Uncontrolled airphoto mosaics usually serve as the base maps for flying the surv and for compilation of the geophysical data. A common scale is 1/4 mile (i. e. 1320 feet) per inch.

Flight lines are oriented perpendicular to the direction of the expected strike of the target, except in special cases where detail is required in the orthogonal direction.

Copies of the photo mosaic are given to the flight crew with intended flight lines indicated and numbered. Navigation along these lines is done visually from the physical features of the area. The air-

craft is flown with a terrain clearance of 450 feet or, in rough terrain, at the lowest altitude that is judged feasible for safe operation.

Flight path is recovered from the film as compared to the photo mosaic. Identifiable points are marked on the mosaic and designated by the fiducial numbers which synchronize the camera and the recorder.

#### C. DATA PRESENTATION

#### I) F-400 Dual Frequency EM Results

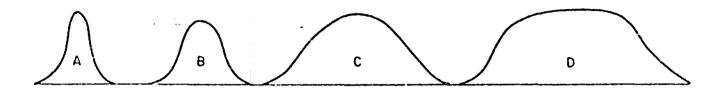
Electromagnetic anomalies result from areas on, or in, the ground which are electrical conductors. Geological sources of conductivity include sulphide mineralization, graphitic formations and fault or shear zones which often contain electrolytes. Other sources of conductivity include poorly conductive surficial materials such as saline waters, swamps and wet clays. The surficial anomalies sometimes extend over large areas and may obscure responses from underlying mineralized zones.

The presentation used on the plan maps has been developed to show the three primary characteristics of each individual response.

This is accomplished by the numerals and letters adjacent to each anomaly symbol. For most purposes these characteristics are sufficient to describe the anomaly but for detailed interpretation it is best to study the actual flight trace.

### a) Shape

The letters A, B, C and D are used to indicate the recorded shape of the EM response which approximates one of the following curve types. Often, to simplify presentation, the shape is indicated by symbols as shown in the legend of the plan map.



### b) Amplitude

The amplitude of the peak response at 340 Hz is shown in parts per thousand (ppt). Although various sensitivity settings may be used, resulting in various amounts of deflection on the trace representing one ppt, the amplitude indicated on the map is always in units of parts per thousand.

## c) Apparent Conductivity Ratio

The ratio of the response at 340 Hz compared to the response at 1070 Hz is shown as the third parameter. Generally ratios less than 1.0 indicate poor conductivity while those greater than 1.0 indicate good to excellent conductivity. However, it should be noted that this ratio is a measure of the "apparent conductivity" and varies with the product of the size and conductivity, where the size is usually a squared function. The significance of the calculated ratio is obviously dependent upon the ampli-

tude of the response, with the reliability decreasing with very small amplitudes.

### d) Evaluation

The response obtained from a conductive body is influenced by a variety of factors which include conductivity, permeability, size, depth, attitude of the body. In addition to the frequencies used, geometry and the angle of attack are also important variables. Consequently, the amplitude and shape of the response cannot be regarded as absolute interpretational gradings or classifications. However, they do have interpretational value as illustrated in the following examples.

- i) A vertical sheet of highly conductive material (such as a vein of massive sulphides), striking perpendicular to the flight line, would give rise to a strong, sharp response with a high conductivity ratio. A typical characteristic would be:- A, 15, 1.8.
- from a vertical sheet would change from A to B to C; the magnitude of response could increase while the ratio may decrease (i. e. C, 20, 1.2).
- iii) An extensive flat horizontal sheet will show a response similar to C or D. The amplitude and "apparent conductivity" will be a function of the size-conductivity product and can vary over a wide range. A typical response from poorly conductive overburden would be:- D, 20, 0.4.

Because of the large number of parameters that influence EM response, the anomalies obtained from airborne surveys should be evaluated in the light of all geological, geophysical and physiographical data before embarking on field investigations and follow-up work.

### II) Magnetic Results

In the standard presentation of the combined electromagnetic and magnetic survey results, the location and amplitude of magnetic highs which appear to be related to electromagnetic features are indicated on the plan map as illustrated in the legend. This is usually done in the form of a cross line which indicates the location of the peak (direct correlation or flank correlation) and the value of the amplitude of the response in gammas.

In some cases, it may be of value to present all the magnetic data in contour form. These contours represent lines of equal intensity of the earth's magnetic field and are termed 'isogams'.

AREA CODE - 416
TELEPHONE - 365-6918



WHITNEY BLOCK, QUEEN'S PARK, TORONIO 182, ONT.

# DEPARTMENT OF MINES AND NORTHERN AFFAIRS MINING LANDS BRANCH



April 15th. 1971.

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Mr. W.A. Buchan, Mining Recorder, Court House, Sioux Lookout, Ontario.

> Re: Mining Claims PA. 211807 et al, Sixmile Lake Area, File No. 2.118

Dear Sir:

The Airborne (Electromagnetic) assessment work credits as shown on the attached list have been approved as of the date above. Please inform the recorded holder and so indicate on your records.

Yours very truly,

Fred W. Matthews, Supervisor, Projects Section.

c.c.Mr. G.N. Milner,
c.c.Canadian Javelin Limited,
c.c.McPhar Geophysics Limited,
c.c.Day, Wilson, Campbell.,

c.c.Mr. H.L. King.

FwM/mr

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## TECHNICAL ASSESSMENT WORK CREDITS

Township or Area Sixmile Lake Are	ea.
Type of Survey and number of Assessment Days Credits per claim	Mining Claims
Magnetometer	PA. 211807  227212 to 15 Inclusive  227220 to 22 Inclusive  227227 - 28  229364 to 95 Inclusive  229402 to 13 Inclusive
• Wan days	NOTE:
NOTICE OF INTENT TO BE ISSUED  Credits have been reduced because of partial coverage of claims.  Credits have been reduced because of corrections to work dates and figures of applicant.  NO CREDITS have been allowed for the following mining claims as they were not sufficiently covered by the survey:	Reports of work forms sent to the Mining Pecorder did not specify whether these credits should be applied on Electromagnetic or Magnetometer. The reports and maps submitted for this work, however, were for an Electromagnetic survey only.

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## TECHNICAL ASSESSMENT WORK CREDITS

G. N. Milner

Recorder Holder G. N. Milner.	
Township or Area Sixmile Lake A	rea
Type of Survey and number of Assessment Days Credits per claim	Mining Claims
GEOPHYSICAL Airborne X Ground	
Magnetometerdays	PA. 211808 - 10
Electromagnetic20days	211812 to 29 Inclusive
Radiometricdays	211869
110000000000000000000000000000000000000	211876 -77
***************************************	211889
GEOLOGICALdays	229396 to 401 Inclusive
GEOCHEMICALdays	
SECTION 84 (14)days	
Special Provision Man days	
•	NOTE:
NOTICE OF INTENT TO BE ISSUED	Peports of work forms sent to the Mining
Credits have been reduced because of partial coverage of claims.	Recorder did not specify whether these credits should be applied on Electromag-
Credits have been reduced because of corrections to work dates and figures of applicant.	netic or Magnetometer. The reports and maps submitted for this work however, were
NO CREDITS have been allowed for the following mining claims as they were not sufficiently covered by the survey:	for an Electromagnetic survey only.

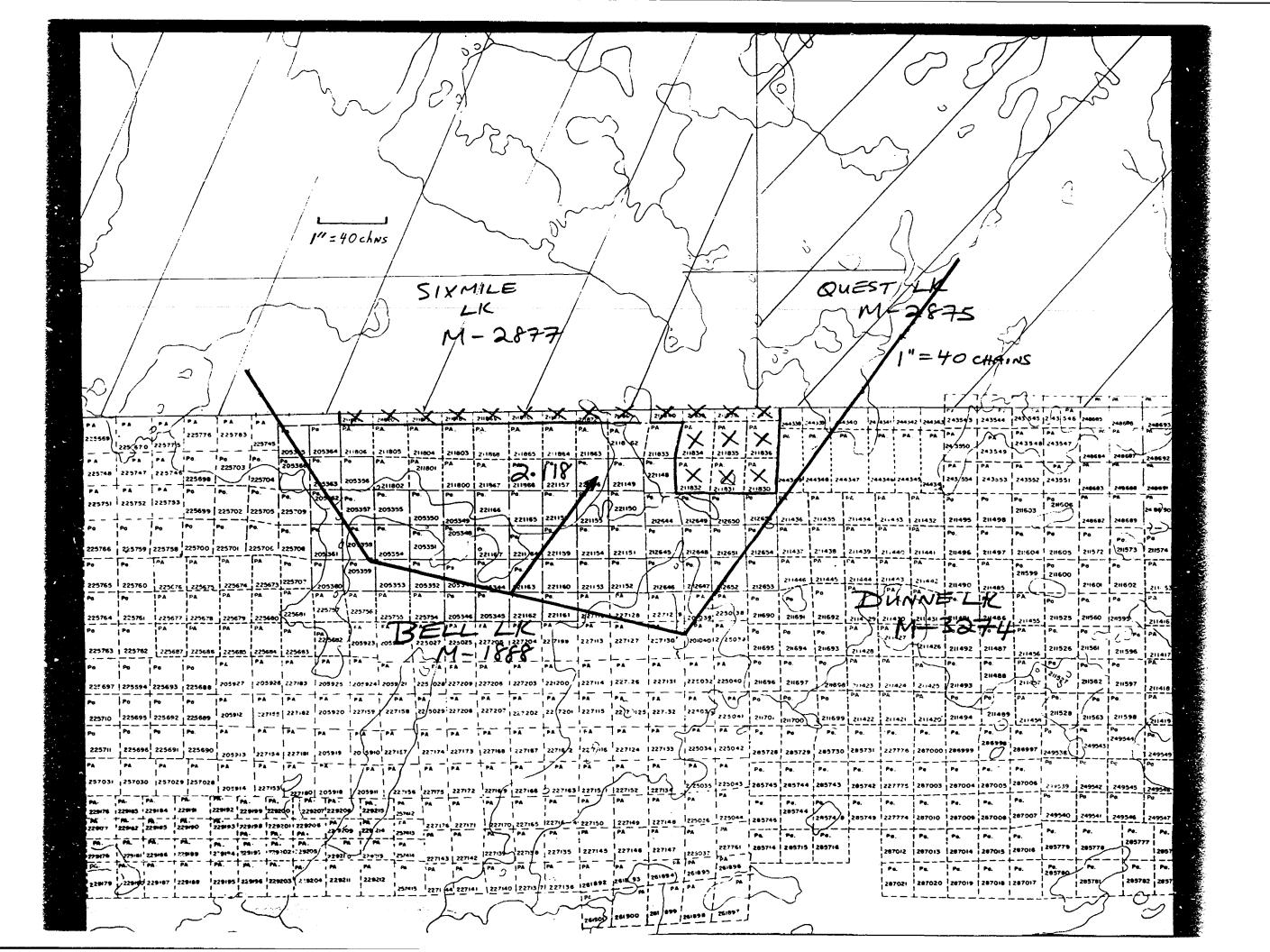
The Mining Recorder may reduce the above credits if necessary in order that the total number of approved assessment days recorded on each claim does not exceed the maximum allowed as follows: Geophysical - 80; Geological - 40; Geochemical - 40;

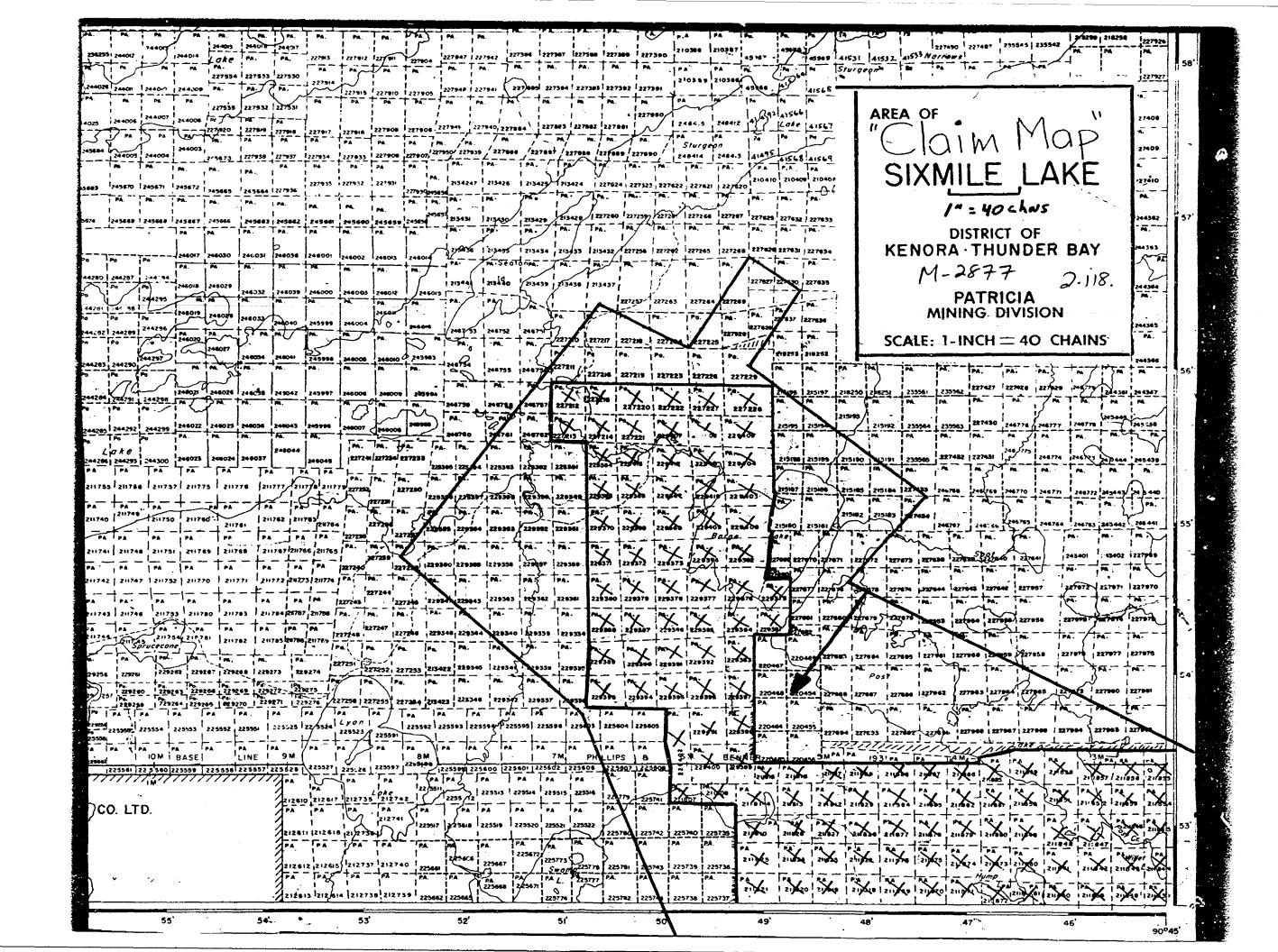
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## TECHNICAL ASSESSMENT WORK CREDITS

Recorder Holder G. N. Milner,	
Township or Area Bell, Shikag an	nd Sixmile Lakes Areas
Type of Survey and number of Assessment Days Credits per claim	Mining Claims
Magnetometer	PA. 211830 to 32 Inclusive 211834 to 61 Inclusive 211870 to 75 Inclusive 211878 to 88 Inclusive
NOTICE OF INTENT TO BE ISSUED  Credits have been reduced because of partial coverage of claims.  Credits have been reduced because of corrections to work dates and figures of applicant.  NO CREDITS have been allowed for the following mining claims as they were not sufficiently co red by the survey:	NOTE:  Reports of work forms sent to the Mining Pecorder did not specify whether these credits should be applied on Electromagnetic or Magnetometer. The reports amd maps submitted for this work, however, were for an Electromagnetic survey only.





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MAP (5)	IDENTIFIED	AS
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LOCATED IN THE MAP CHANNEL IN THE FOLLOWING SEQUENCE (X)

