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52K01SW0015 52K01SW0020 WHIPPER LAKE

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GEOPHYSICAL SURVEYS

SIOUX LOOKOUT AREA

PROJECT 3352

NTS 52G/13, 52F/16, 52K/1

1981

RECEIVED
JUL 31 1981
MINING LANDS SECTION

July, 1981
Toronto, Canada

L.D.

~~N.W.Rayner~~
J.L.Wright 2.2330

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INTRODUCTION

Ground horizontal loop electromagnetic and ground magnetometer surveys were run on 193 claims in the Sioux Lookout Area to delineate airborne E.M. anomalies. This work was done by Sulpetro geophysical staff.

PROPERTY, DESCRIPTION and LOCATION

The Sioux Lookout Area properties fall into three airborne E.M. blocks. Block A consists of six (6) claim groups totalling forty-nine (49) claims. These claims are located west of the town of Hudson in Vermilion Additional Township, McIlraith Township, Lomond Township and the Whipper Lake area. Block B claims consist of six (6) claim groups totalling sixty-eight (68) claims. These claims are located in Echo Township, McAree Township and the Kabik Lake-Pickerel Township area south-west of the town of Sioux Lookout. Block C claims consist of three (3) groups totalling seventy-six (76) claims. All these claims are in the Parnes Lake Area which is approximately 10 miles south of Sioux Lookout.

The summary of properties on the following page gives a complete list of property names, claim numbers and township or area. Also, the location map in the pocket of this report shows the location of the geophysical grids relative to the towns of Sioux Lookout and Hudson.

ACCESS

Block A claim groups are accessible by Highway 116 from Highway 72 to Hudson, then west of Hudson by logging roads. Block B claim groups are located astride Highway 72, a distance of 20 miles south-west of Sioux Lookout. All claim groups are accessible by road except for the Currier Lake property which is on the south side of Pickerel Arm of Minnitaki Lake and the Pickerel Bay claims which lie in Pickerel Arm of Minnitaki Lake. These two claim groups are accessible by snowmobile in winter and boat in the summer. Block C claims are only accessible by either snowmobile in winter or boat in summer, a distance of 12 miles across Abram Lake and Minnitaki Lake to the Southeast Bay-Twin Bay area.

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HISTORY OF PREVIOUS WORK

The earliest reference to the geology of the Sioux Lookout area is contained in a report by R. Bell, in "Report on the Country between Lake Superior and Lake Winnipeg", Geol. Surv. Can. Sum. Rept. 1872, p.101,102. The number of exploration companies who have worked in the area are far too numerous to outline in this report. For details of the previous work conducted in the Sioux Lookout area see O.G.S. data series maps P.2327, P.2328, P.2329, P.2330, P.2331, P.2332, P.2333 and P.2334. All data present on these maps are contained in the assessment files in the Resident Geologist's office in Sioux Lookout.

SIOUX LOOKOUT AREA

Summary of Properties 1981

Block A Claims

Olga Lake - 4 claims - McIlraith Township M-1852
Claim numbers: 566662 - 566665 incl.

Fire Creek - 10 claims - McIlraith Township M-1852
Lomond Township M-1852
Claim numbers: 566762 - 566771 incl.

Bass Island - 6 claims - Lomond Township M-2251
Claim numbers: 566666 - 566671 incl.

Tab Lake - 11 claims - Whipper Lake Area M-2574
Claim numbers: 566862 - 566872 incl.

Mud Lake - 16 claims - Vermilion Additional Township M-2273
Claim numbers: 566722 - 566733 incl.
589078 - 589081 incl.

Botham Bay - 2 claims - Vermilion Additional Township M-2273
Claim numbers: 565759 - 565760 incl.

Block B Claims

Hooch Lake - 4 claims - Echo Township M-2236
Claim numbers: 565755 - 565758 incl.

Tom Chief Lake - 20 claims - McAree Township M-2254
Claim numbers: 566842 - 566861 incl.

Maskinonge Lake - 16 claims - Pickerel Township M-2258
Claim numbers: 566808, 566810 - 566824 incl.

Currier Lake - 6 claims - Pickerel Township M-2258
Claim numbers: 566876 - 566881 incl.

Minnitaki Peninsula - 2 claims - Pickerel Township -
Kabik Lake Area M-2258
Claim numbers: 566752 - 566753 incl.

Pickerel Bay - 20 claims - Pickerel Township M-2258
Claim numbers: 566680 - 566699 incl.

Block C Claims

Southeast Bay - 38 claims - Parnes Lake Area M-2150
Claim numbers: 566672 - 566679 incl.
566772 - 566801 incl.

Twinpine Bay - 20 claims - Parnes Lake Area M-2150
Claim numbers: 566825 - 566841 incl.
566873 - 566875 incl.

Twin Bay - 18 claims - Parnes Lake Area M-2150
Claim numbers: 566734 - 566751 incl.

WORK DONE BY SULPETRO MINERALS LIMITED

1979 - Reconnaissance geological mapping

1980 - A.E.M. survey - Blocks A, B, C.

1981 - Ground geophysical surveys H.L.E.M. and Magnetometer (this report)

GENERAL GEOLOGY

Block A is underlain mainly by mafic metavolcanics which occur as massive and pillowed flows. The mafic metavolcanics along the north side of the block have been metamorphosed to amphiboles which occur north of the C.N. railway. The south boundary of the airborne area is underlain by metasediments of the Vermilion Lake group, consisting of greywackes, slates and minor conglomerates.

Block B is underlain by a sequence of mafic to felsic metavolcanics intruded by granodiorite stocks and quartz feldspar porphyry sills. The felsic volcanics are mainly tuffaceous in nature with some areas of agglomerate and tuff breccia. The area is isoclinally folded with a series of anticline-syncline axes trending through Minnitaki Lake in a northeasterly direction.

Block C is underlain in the north by metasediments. The metasediments lie on a sequence of interlayered flows and volcanoclastic sediments which host the banded iron formations known as the Minnitaki Iron Range. These rocks are in contact with a primarily mafic metavolcanic sequence to the south.

SURVEY PROCEDURE

Magnetometer Survey

Logistical details keyed to each of the fifteen (15) grids follow. These include instrumentation, base station value and location, line and station spacing, personnel and survey dates.

Olga Lake

Instrumentation:	Barringer GM 122 Magnetometer Scintrex MBS-2 Base Station
Base Station Location:	Southeast Bay Camp (91°49'30"W; 49°58'20"N)
Base Station Value:	63700 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	D. Windsor
Survey Dates:	January 31 - February 1, 1981

Fire Creek

Instrumentation:	Barringer GM 122 Magnetometer Scintrex MBS-2 Base Station
Base Station Location:	41 Lakeshore Dr., Sioux Lookout, Ontario
Base Station Value:	60500 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	P.Churcher, T.Hamilton
Survey Dates:	January 28 - 29, 1981

Bass Island

Instrumentation:	Barringer GM 122 Magnetometer Scintrex MBS-2 Base Station
Base Station Location:	41 Lakeshore Dr., Sioux Lookout, Ontario
Base Station Value:	60500 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	J. Newall
Survey Dates:	February 14 - 15, 1981

Tab Lake

Instrumentation:	Barringer GM 122 Magnetometer Scintrex MBS-2 Base Station
Base Station Location:	41 Lakeshore Dr., Sioux Lookout, Ontario
Base Station Value:	60500 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	P.Churcher, I.Macdonald, A.Drost
Survey Dates:	February 16, 1981

Mud Lake

Instrumentation:	Barringer GM 122 Magnetometer Scintrex MBS-2 Base Station
Base Station Location:	41 Lakeshore Dr., Sioux Lookout, Ontario
Base Station Value:	60500 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	P.Churcher, A.Drost, T.Hamilton
Survey Dates:	February 15, 1981

Botham Bay

Instrumentation:	Barringer GM 122 Magnetometer
Base Station Location:	LO, O.B.L.
Base Station Value:	60277 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	D.Windsor, P.Churcher
Survey Dates:	February 3 & 18, 1981

Hooch Lake

Instrumentation:	Barringer GM 122 Magnetometer Scintrex MBS-2 Base Station
Base Station Location:	41 Lakeshore Dr., Sioux Lookout, Ontario
Base Station Value:	60500 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	P.Churcher, T.Grantis
Survey Dates:	February 18, 1981

Tom Chief Lake

Instrumentation:	Barringer GM 122 Magnetometer Scintrex MBS-2 Base Station
Base Station Location:	41 Lakeshore Dr., Sioux Lookout, Ontario
Base Station Value:	60500 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	T.Grantis, T.Hamilton, P.Churcher
Survey Dates:	February 13 - 15, 1981

Maskinonge Lake

Instrumentation:	Barringer GM 122 Magnetometer Scintrex MBS-2 Base Station
Base Station Location:	41 Lakeshore Dr., Sioux Lookout, Ontario
Base Station Value:	60500 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	J.Newall, T.Hamilton, P.Churcher, T.Grantis
Survey Dates:	February 16 - 17, 1981

Currier Lake

Instrumentation:	Barringer GM 122 Magnetometer Scintrex MBS-2 Base Station
Base Station Location:	41 Lakeshore Dr., Sioux Lookout, Ontario
Base Station Value:	60500 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	J.Newall, D.Windsor
Survey Dates:	February 18, 1981

Minnitaki Peninsula

Instrumentation:	Barringer GM 122 Magnetometer Scintrex MBS-2 Base Station
Base Station Location:	41 Lakeshore Dr., Sioux Lookout, Ontario
Base Station Value:	60500 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	P.Churcher, T.Hamilton
Survey Dates:	February 13, 1981

Pickerel Bay

Instrumentation:	Barringer GM 122 Magnetometer Scintrex MBS-2 Base Station
Base Station Location:	41 Lakeshore Dr., Sioux Lookout, Ontario
Base Station Value:	60500 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	T.Grantis, P.Churcher
Survey Dates:	February 11 - 13 & 19, 1981

Southeast Bay

Instrumentation:	Barringer GM 122 Magnetometer Scintrex MBS-2 Base Station
Base Station Location:	Southeast Bay Camp (91°49'30"W; 49°58'20"N)
Base Station Value:	63700 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	T.Grantis, J.Wright
Survey Dates:	February 5 - 6, 1981

Twinpine Bay

Instrumentation:	Barringer GM 122 Magnetometer Scintrex MBS-2 Base Station
Base Station Location:	Southeast Bay Camp (91°49'30"W; 49°58'20"N)
Base Station Value:	63700 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	J.Wright, T.Grantis
Survey Dates:	January 30 - February 1, 1981

Twin Bay

Instrumentation:	Barringer GM 122 Magnetometer Scintrex MBS-2 Base Station
Base Station Location:	Southeast Bay Camp (91°49'30"W; 49°58'20"N)
Base Station Value:	63700 gammas
Line Spacing:	100m
Station Spacing:	25m
Personnel:	J.Wright, T.Grantis
Survey Dates:	February 1 - 3, 1981

Diurnal control on all grids except Botham Bay was provided by a Scintrex MBS-2 continuously recording base station. Readings of the earth's total magnetic field were recorded each minute to a resolution of ±5 gammas. Output is via a paper strip chart from which additive constants can be scaled and applied to the raw field data to produce the diurnal correction. In the case of Botham Bay a standard looping procedure was employed with tie backs once an hour to the base station. Any diurnal drift was then linearly distributed around the reading loop. These diurnally corrected data were then plotted upon grid maps at a scale of 1:5000 for all grids. However, before plotting a datum was subtracted to better present the data. This varies from grid to grid but is generally in the 60000 gamma range. Values for each particular grid can be found upon the prints at the rear of the report. After plotting the data were contoured with intervals adjusted to best present the data. Again, particular intervals can be found upon the individual prints.

The parameter read was the amplitude of the total magnetic field. This resulting from the fact that the Barringer GM 122 magnetometers are proton precession devices. Details concerning instrument specifications can be found in Appendix A.

Horizontal Loop Electromagnetic (H.L.E.M.) Survey

Logistical details keyed to each of the fifteen (15) grids follow. These include instrumentation, frequencies, coil separation, line and station spacing, personnel, and survey dates.

Olga Lake

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	P.Churcher, T.Hamilton
Survey Dates:	January 31 - February 2, 1981

Fire Creek

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	I.Lowe-Wylde, A.Drost
Survey Dates:	January 26 & 28 - 29, 1981

Bass Island

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	D.Windsor, J.Newall, I.Macdonald
Survey Dates:	February 14 - 15, 1981

Tab Lake

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	I.Lowe-Wylde, A.Drost
Survey Dates:	January 20 - 23, 1981

Mud Lake

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	I.Lowe-Wylde, A.Drost
Survey Dates:	January 11 - 19 & February 19, 1981

Botham Bay

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	D.Windsor, T.Hamilton
Survey Dates:	February 3, 1981

Hooch Lake

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	A.Drost, I.Lowe-Wylde
Survey Dates:	February 5, 1981

Tom Chief Lake

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	J.Wright, T.Grantis, J.Newall, I.Macdonald
Survey Dates:	January 26 - 29, 1981

Maskinonge Lake

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	A.Drost, I.Lowe-Wylde
Survey Dates:	January 31 - February 4, 1981

Currier Lake

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	A.Drost, I.Lowe-Wylde, D.Windsor, J.Newall
Survey Dates:	February 9, 11 & 19, 1981

Minnitaki Peninsula

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	I.Lowe-Wylde, A.Drost
Survey Dates:	February 14, 1981

Pickerel Bay

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	I.Lowe-Wylde, A.Drost
Survey Dates:	February 11 - 13, 1981

Southeast Bay

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	J.Wright, T.Grantis, J.Newall, I.Macdonald
Survey Dates:	January 21 - 23, 31 & February 1 - 3, 1981

Twinpine Bay

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	J.Wright, T.Grantis, J.Newall, I.Macdonald
Survey Dates:	January 17 - 19, 1981

Twin Bay

Instrumentation:	Apex Parametrics Max-Min II
Frequencies:	444 & 1777 Hz
Coil Separation:	100m
Line Spacing:	100m
Station Spacing:	25m
Personnel:	J.Wright, T.Grantis, J.Newall, I.Macdonald
Survey Dates:	January 19 - 20 & February 5 - 8, 1981

Parameters read were in-phase and out-of-phase percentages of the secondary electromagnetic field expressed relative to the primary field. These values were then plotted in profile form upon grid maps at a scale of 1:5000 and profile scale of 1cm = 20%. Details concerning any plot conventions can be found upon prints of these maps at the rear of the report. In addition, particulars regarding equipment specifications can be found in Appendix B.

INTERPRETATION

Each grid is reviewed separately in the following. Both the magnetic and H.L.E.M. results are analyzed together. An overall summary will be set forth under the 'Conclusions' section.

Olga Lake

Magnetic background appears to be in the 60300 gamma range with a total relief over the grid of about 3000 gammas. A regional trend rising westerly at a rate of 130 gammas/km is noted. A linear trend of high frequency responses trends northeast to southwest across the grid. End points are L16E, 25N to L3E, 300S. Highest values occur on L14E and L11E. However the extremely high frequency of the anomalies almost certainly would indicate higher values could be obtained between stations on other lines. Very little overburden is indicated.

Two H.L.E.M. conductors are noted and designated 01 and 02. Conductor 01 lies directly along the abovementioned magnetic trend and shows good correlation along its entire strike length. Lines 7E, 11E, and 15E show weakened responses with strongest responses in L12E and L13E. Tabulated below are several parameters characterizing the conductor.

Anomaly	Line Locations	Strike Length	Depth	Dip	Conductivity-width σt
01	L16E, 25N; L15E, 25S; L14E, 35S; *L13E, 65S; L12E, 65S; L11E, 100S; L10E, 110S; L9E, 110S; L8E, 130S; L6E, 200S; L5E, 225S (* Above data from L13E)	1200m (Open easterly)	~8m	Vertical	40 mhos
02	*L5E, 70S; L3E, 100S (approx.); L2E, 110S (*above data from L5E)	300m	~40m	Vertical	9 mhos

Conductor 02 shows no magnetic correlation.

Another conductor is hinted to lie south of the grid off the ends of L12E to L16E.

Fire Creek

Magnetic background appears to be in the 60200 gamma range with a total relief over the grid in excess of 10000 gammas. A regional trend rising westerly at a rate of roughly 250 gamma/km is noted. At least three high frequency linear trends are present. The first, characterized by substantial negative anomalism, trends across the northern ends of L1E - L8E at the 300 - 350N level. These negatives are undoubtedly reflecting remnant magnetization. The second feature runs essentially down the baseline from L0-16E. The third and most persistent traverses the entire width of the grid at the 350 - 500S level. Both the second and third zones show what appears to be purely induced magnetization. The generally symmetric shape of these responses suggests vertical or very steeply dipping dike-like features. The rock unit situated between the first and second linear trends shows a response consistently 400-500 gammas lower than that which lies between the second and third trends. The extreme amplitudes and persistent nature of the anomalies strongly suggest iron formations to be the causative bodies.

No less than seven (7) H.L.E.M. anomalies are noted on the grid and are designated anomalies F1 - F7. Tabulated below are several parameters characterizing each.

Anomaly	Line Locations	Strike Length	Depth	Dip	Conductivity-width σt
F1	L2E, 475N	Open to east and west	5m	Indeterminate	25 mhos
F2	L13E, 185N; L12E, 175N; L11E, 165N; *L10E, 165N; L9E, 150N (* Above data from L10E)	500m	25m	Vertical	35 mhos
F3	L4E, 65N; L3E, 50N; *L2E, 50N; L1E, 50N (* Above data from L2E)	400m Open to west	20m	Steep northerly	~100 mhos
F4	L12E, 35N; L11E, 35N; *L10E, 35N (* Above data from L10E)	300m	50m	Indeterminate	36 mhos
F5	L16E, 50S; *L15E, 65S; L14E, 65S (* Above data from L15E)	300m	30m	Vertical	25 mhos
F6	L18E, 200S; *L17E, 200S; L16E, 235S; L15E, 225S (* Above data from L17E)	400m Open to east	25m	Vertical	10 mhos
F7	L5E - L15E, ~400S (* Above data from L7E)	1000m Open to east and west	15m	Indeterminate	~100 mhos

Conductors F1, F6 and F7 show good magnetic anomaly correlation. In the case of F7 iron formation is very strongly indicated. Conductor F1 shows a flanking magnetic correlation with a large magnetic linear felt to be iron formation. Conductors F1, F2 and F7 all show signs of internal lamination. This is particularly well developed on F7 near L10E and L11E. Another conductor is hinted to traverse the northern extremes of L12E - L6E.

Bass Island

Magnetic background over the grid ranges about 60100 gammas with a total relief over the grid of roughly 500 gammas. A faint regional trend rising to the southeast could possibly be present. It would be on the order of 200 gammas/km. Magnetic relief appears to be much subdued due, in part, to the water cover over much of the grid. No strong linear features exist. A lithologic contact may extend from L12E, 100S westerly to L0, 300S. A region with values approximately 200 gammas above background lies south of this contact.

Only one moderately good conductor is noted and designated BA1. Much out-of-phase role exists which is quite typical of lake bottom sediments. This is well demonstrated in the vicinity of L10E, 225N. Tabulated below are several parameters characterizing the conductor.

Anomaly	Line Locations	Strike Length	Depth	Dip	Conductivity-width σt
BA1	L7E, 100S; *L6E, 75S; L5E, 50S; L4E, 50S; L3E, 45S	500m	35m	30°-40° Northerly	~15 mhos

(* Above data from L6E)

This is an extremely shallow dipping conductor with no magnetic correlation. It could well be conductive lake bottom sediments. However the conductivity-width product is high enough to be a bedrock conductor. It is difficult to say with certainty which is the case.

Tab Lake

Magnetic background ranges about 59900 gammas with a total relief over the grid on the order of 13000 gammas. No regional trend is discernible. Texturally the plot is dominated by one strong linear trend extending from L20E, 500N southwesterly to L5E, 100S. Contouring bias has not effectively connected the highs but the connection does exist. It seems to split near L11E, 150N into a northern and southern band. The southern band may turn northerly at its western extreme. At least the magnetics suggest some structural complexity in this area. A high amplitude anomaly is noted to cut the corner of the grid near L18E, 200S and may extend southwesterly to again touch the corner of the grid near L5E, 600S. This response is of quite extreme amplitude and quite possibly represents an iron formation.

Two (2) conductors are noted and designated TA1 and TA2. Tabulated below are several parameters characterizing each.

Anomaly	Line Locations	Strike Length	Depth	Dip	Conductivity-width σt
TA1	*L17E, 435N; L16E, 375N; (* Above data from L17E)	200m	17m	Steep Southerly	6 mhos
TA2	L9E, 135N; L8E, 115N; L7E, 75N (approx.); L6E, 35N; L5E, 40N; *L4E, 15N; L3E, O.B.L.; L2E, O.B.L. (* Above data from L4E)	800m	28m	Vertical	~80 mhos

Both conductors TA1 and TA2 show sporadic magnetic correlation with the major linear feature noted above. Indeed, the conductors may be strike correlative. Orientation errors such as short cables can be noted in the in-phase responses near L2E, 300S; L5E, 100S; L6E, 525S and L14E, 500N.

Mud Lake

Magnetic background over the grid ranges about 60800 gammas with a total relief in excess of 14000 gammas. A possible regional trend rising at a rate of roughly 100 gammas/km to the northwest is noted. Texturally the magnetic data reveals at least six (6) well developed linear features cutting the grid bearing generally N80°E. End points for the six anomalies are tabulated below.

#1 - L8E, 750N - L0, 550N
#2 - L8E, O.B.L. - L4E, 100S
#3 - L22E, O.B.L. - L4E, 425S
#4 - L28E, 125S - L8E, 525S
#5 - L19E, 425S - L5E, 750S
#6 - L28E, 325S - L12E, 650S

Trends #1 and #6 are the strongest and most persistent as well as #2. The others are fairly persistent but do show discontinuity along strike in certain locations. A set of negative responses trending from L11E, 75S to L4E, 575S is marking a powerline cutting the grid.

Three (3) conductors traverse the grid and are designated MU1, MU2 and MU3. Tabulated below are several parameters characterizing each.

Anomaly	Line Locations	Strike Length	Depth	Dip	Conductivity-width σt
MU1	L7E, 800N (approx.); L6E, 710N; L5E, 675N; *L4E, 665N; L3E, 640N; L2E, 590N; L1E, 560N; L0, 540N (* Above data from L4E)	800m Open east and west	10m	Steep Northerly	50 mhos
MU2	L24E, 140S; L22E, 165S; L21E, 200S; *L20E, 225S; L19E, 250S; L18E, 285S (* Above data from L20E)	700m	30m	Vertical	25 mhos
MU3	L28E - L12E, 330S - 800S (* Above data from L21E)	1700m Open east and west	5m	30° Northerly	~140 mhos

Anomalies MU1 and MU3 are very strong and show excellent correlation with magnetic trends #1 and #6. These are quite surely iron formations. Anomaly MU2 is much more subdued and shows good correlation with magnetic trend #4. This possibly is iron formation as well. It should be noted that widths as large as 25m are indicated for portions of MU3. Indeed, it appears to be topographically expressed by a bay in Vermilion Lake.

Botham Bay

Magnetic background over the grid ranges about 60350 gammas with a total relief over the grid on the order of 800 gammas. No regional trend is noted. Texturally the grid is fairly uniformly covered by low amplitude high frequency magnetic responses which produce a 'bubble' appearance. No really obvious linear features exist. An isolated relatively strong response occurs near L7E, 50N. These anomalies are likely arising from isolated concentrations of magnetite and/or pyrrhotite.

Two (2) H.L.E.M. conductors are noted to lie at both the northern and southern extremes of the grid. The first seems to be approximately located near LO, 250N while the second appears on both L4E and L5E near 150S. Nothing of an analytic nature can be said of the anomalies. No letter designations were assigned.

Hooch Lake

Magnetic background over the grid ranges about 60150 gammas with a total relief on the order of 800 gammas. No regional trend is noted. A fairly obvious linear trend crosses the grid from L1E - L7E at roughly the 100N level. The largest response occurs at L1E, 165N. However, amplitudes are generally only 100 gammas over background and of longer wavelengths. This would suggest a somewhat deeper origin.

Only one conductor of any merit is found on the grid and is designated H1. Following is a tabulation of several parameters characterizing the response.

Anomaly	Line Location	Strike Length	Depth	Dip	Conductivity-width σt
H1	L1E, 125N	100m Open to west	~5m	Indeterminate	5 mhos

The anomaly is quite broad and shows what appears to be a dual source with two dike-like bodies being involved. One at 100N and the second at 150N. The conductor shows good correlation with the abovementioned linear magnetic trend, at least on the one line upon which it occurs. A faint, very poorly conductive response might be conjectured to track easterly along this magnetic trend. Fairly pronounced out-of-phase roll occurs over much of the grid indicating conductive overburden to be present.

Tom Chief Lake

Magnetic background in the area appears to fall around 60400 gammas with a total relief over the grid in excess of 5000 gammas. However the bulk of this is accountable to an isolated response at L9E, 650S. Generally relief does not exceed 1500 gammas. A possible regional trend rising westerly at a rate of 150 gammas/km is suggested. The grid is interesting texturally in that a fairly broad linear trend runs from LO, 150S easterly to L23E, 300S bending more southerly at its eastern extremes. Amplitude is around 500-1000 gammas and of a half-width from 100-150m. This likely represents a distinct rock unit, perhaps a dike.

Southerly to this trend is an area of short strike length, high frequency anomalies giving a 'bubble' appearance to the map. Background in this area is 60600 gammas. Northerly to the trend is an area of more subdued relief giving a much 'smoother' appearance to the map. Background here is on the order of 60250 gammas. Around L24E this sequence of units appears to have been right laterally faulted with the major linear trend and southern 'bubble' unit being moved to the south off the grid. Thus the area from L24E easterly is occupied by the more subdued northerly unit.

Two (2) conductors are noted and designated T01 and T02. Tabulated below are parameters characterizing each.

Anomaly	Line Locations	Strike Length	Depth	Dip	Conductivity-width σt
T01	L11E, 675S; *L10E, 675S; L9E, 650S; L8E, 635S; L7E, 600S (* Above data from L10E)	500m	10m	60° South	9 mhos
T02	L24E, 250S; L23E, 235S; *L22E, 150S; L21E, 125S; L20E, 100S; L19E, 75S; L18E, 65S (* Above data from L22E)	700m	40m	Vertical	3 mhos

Conductor T01 is quite poor along most of its length. The response on L10E shows a dual source. Magnetic correlation exists with a quite high amplitude anomaly on L9E. T02 is a fairly poor conductor and may well be related to a shear zone rather than sulfides and/or graphite. In addition, much out-of-phase roll is noted on the grids northern and eastern extremes. This seems to coincide with the subdued magnetic unit noted earlier.

Maskinonge Lake

Magnetic background ranges about 59850 gammas with a total relief over the grid on the order of 3000 gammas. This is confined to a relatively small area with the bulk of the grid showing a relief of 200-300 gammas. A contact appears to run from L20E, 625S to L12E, 625S.

Southerly of this is an area of extremely high frequency anomalies showing amplitudes in excess of 2000 gammas. Northerly is an area of quite low amplitude broad responses generally less than 200 gammas in amplitude. No persistent linear features exist anywhere on the grid. A possible regional trend rising to the northeast at a rate of 35 gammas/km is suggested.

Three (3) conductors are noted and designated MA1, MA2, and MA3. Tabulated below are several parameters characterizing each.

Anomaly	Line Locations	Strike Length	Depth	Dip	Conductivity-width σt
MA1	L30E - L15E, 0 - 50S	1600m Open to east	20m	Steep Southerly	50 mhos
	(* Above data from L28E)				
MA2	L15E - L6E, 400 - 450S	1000m Open to west	35m	Steep Southerly	28 mhos
	(* Above data from L11E)				
MA3	L21E - L7E, 525 - 550S	1500m Open to east and west	38m	Vertical	~150 mhos
	(* Above data from L18E)				

All three conductors would be considered formational. Strike extents indicated are fairly arbitrary in that very poor responses continue beyond the above defined limits. Conductor MA1 shows fairly good magnetic correlation along portions of its length. Particularly from L30E - L22E. However the response is of quite low amplitude and of broad wavelength. It would appear the magnetics are tracking a particular rock unit as opposed to the conductor. Conductor MA3 appears to lie along the contact inferred by the magnetics discussed earlier. Another conductor is suggested to begin beyond the southern extremes of L29E and L28E.

Currier Lake

Magnetic background falls around 60150 gammas with a total relief over the grid of 1000 gammas. However the bulk of this arises from a small area at the grid's extreme northwest corner. The remainder of the grid shows a quite modest relief of only about 250 gammas. A fairly well developed regional trend rising to the northwest at a rate of 300 gammas/km is noted. No linear features of note are present. Except for an area of elevated relief at the northern ends of L3E and L4E the magnetics are unusually subdued.

Three (3) H.L.E.M. conductors are noted and designated C1, C2, and C3. Tabulated below are several parameters characterizing each.

Anomaly	Line Locations	Strike Length	Depth	Dip	Conductivity-width σt
C1	*L4E, 430N; L3E, 425N (* Above data from L4E)	150m Open to east & west	5m	Steep Southerly	12 mhos
C2	L8E, 50N; *L7E, 50N (* Above data from L7E)	150m Open to east	30m	Steep Southerly	~1 mhos
C3	L7E, 120S; *L6E, 95S; L5E, 115S; L4E, 165S; L3E, 175S (* Above data from L6E)	500m	25m	60° South	9 mhos

Conductor C1 correlates quite well with the high amplitude magnetic responses noted earlier. This suggests iron formation may be involved. The very poor conductivity-width of conductor C2 could mean a shear zone origin. Conductor C3 is definitely bedrock in origin but shows no magnetic association.

Minnitaki Peninsula

Magnetic relief over the grid falls in the 60400 gamma range with a total relief exceeding 1500 gammas. A regional trend rising from south to north at a rate of 800 gammas/km is noted. Texturally the grid can be divided into two regions. The demarcation being a line running southwest from L5E, 250N to LO, O.B.L. Northerly of this line is a region of relatively extreme magnetic relief, typically 1000 gammas, short strike length responses of high frequency. Southerly lies a region of low magnetic relief on the order of 200 gammas and only the slightest anomalism. Iron formation is surmised to be the causative body for the northerly responses.

Only one conductor designated MI1 is noted and following is tabulation of characteristic parameters.

Anomaly	Line Locations	Strike Length	Depth	Dip	Conductivity-width σt
MI1	*L4E, 20N; L3E, O.B.L.; L2E 50S; L1E, 50S; L0, 75S (* Above data from L4E)	500m Open to west	40m	Vertical	128 mhos

This conductor appears quite good but this, in reality, is not the case. Observation of the 1777 Hz data shows that phase rotation has occurred in the overburden. This is particularly apparent in the L3E response. The result is that the conductivity-widths are slanted to the high side and the depth estimates tend to be too deep. The conductor is definitely of bedrock origin but probably only a marginal conductor, perhaps a shear zone. A faint magnetic correlation may exist.

Pickerel Bay

Magnetic background in the vicinity of the grid falls in the 60150 gamma range with a total relief over the grid on the order of 3000 gammas. No regional trend is observable in the data. The majority of the grid shows quite low magnetic relief on the order of 300 gammas. This is best demonstrated by the area north of the baseline. At least two (2) linear features can be noted. The first is somewhat discontinuous along strike and extends from L28E, 300S west southwest to L16E, 25N. The second stronger trend extends from L17E, 150S to L3E, 50S being parallel to the other trend. Amplitudes in this case are quite large exceeding 2000 gammas with several large negative responses. Southerely of this second trend is an area of elevated background and at least two pseudo-linear features. This is likely reflecting a lithologic change. This area of larger readings is tentatively extended to connect to higher values noted on the southern extremes of L27E - L25E.

A total of nine (9) H.L.E.M. conductors are found on the grid. These are designated P1 - P9 and following is a tabulation listing several parameters characterizing each.

Anomaly	Line Locations	Strike Length	Depth	Dip	Conductivity-width σt
P1	L10E, 500N	100m	20m	Steep Southerly	3 mhos
P2	*L6E, 380N; L5E, 380N (* Above data from L6E)	200m	12m	Vertical	2 mhos
P3	L5E, 235N; *L4E, 260N; L3E, 240N (* Above data from L4E)	300m Open to west	10m	Vertical	1 mho
P4	L8E, 150N; *L7E, 150N (* Above data from L7E)	200m	40m	Vertical	13 mhos
P5	L4E, 90N; *L3E, 60N; L2E, 95N; L1E, 100N (approx.) (* Above data from L3E)	400m Open to west	30m	Vertical	5 mhos
P6	*L21E, 25N; L20E, 40N; L19E, 25N (* Above data from L21E)	300m	15m	60° North	4 mhos
P7	L11E - L1E, 50S - 325S (* Above data from L2E)	1100m Open to west	15m	Vertical	35 mhos
P8	L14E, 435S; L13E, 420S; *L12E, 420S; L11E, 475S; L10E, 460S; L9E, 465S (* Above data from L12E)	600m	28m	Vertical	43 mhos
P9	L14E, 765S; L13E, 750S; L12E, 705S; *L11E, 670S; L10E, 660S; L9E, 640S (approx.) (* Above data from L11E)	600m Open east & west	25m	Steep	75 mhos

Only conductor P6 shows any convincing magnetic correlation. This being on the order of only 50 gammas. Conductor P2 may have direct magnetic correlation or a closely associated northerly flanking response. Responses P7, P8 and P9 would have to be considered formational in nature. Conductive overburden appears to increase on the southern extremes of the grid. Indeed, conductor P9 hints at phase rotation on the 1777 Hz data.

Southeast Bay

Magnetic background over the grid falls in the 60000 gamma range with a total relief in excess of 14000 gammas. No large scale, that is, grid wide regional, is noted. Texturally the area is quite interesting. Crossing the grid's northern boundary are quite high values associated with a large iron formation of possible economic potential. This protrudes into the grid proper in an area centred at L32E, 200N. South of this is a relatively featureless magnetic 'plain' showing only a local regional falling off the aforementioned iron formation. The magnetic relief is particularly subdued in the grid's extreme southeast corner. Water cover has undoubtedly added to this effect. Somewhat localized, short strike, high frequency responses are noted in the area of L3E, 350S to L14E, 500S (southern block). One linear feature is of note striking northwest from L8E, 500S terminating at L3E, 350S. Amplitudes involved fall in the 500 gamma range. This may well represent a dike-like feature, perhaps of mafic lithology. Other anomalous readings in the area likely represent localized concentrations of magnetic and/or pyrrhotite.

Only two (2) conductors are identified and designated S1 and S2. Following is a tabulation of parameters characterizing each.

Anomaly	Line Locations	Strike Length	Depth	Dip	Conductivity-width σ-t
S1	L20E, 400S - L9E, 50S	1200m	28m	Vertical	14 mhos
	(* Above data from L16E)				
S2	L33E, 960S; *L32E, 880S; L31E, 815S; L30E, 730S	400m	~75m	Indeterminate	Indeterminate
	(* Above data from L32E)				

Neither conductor shows any magnetic correlation with both striking roughly east-west. Conductor S2 is very deep relative to the coil separation and thus the inability to delineate several of the characteristic parameters. Depending upon the geologic strike these may represent crosscutting features and may be shears. The extreme magnetic anomalies in the vicinity of L32E, 200N produced several positive in-phase magnetostatic anomalies in this area.

Twinpine Bay

Magnetic background in the area of the grid ranges about 59500 gammas with a total relief of approximately 3000 gammas being shown. No regional trend is evident. Generally responses are of quite long wavelength with only a few isolated high frequency amplitude anomalies. A south flanking iron formation elevates readings on the southern ends of L10E - LO. No really obvious persistent linear features exist. The magnetics as a whole essentially reflects more deeply seated longer wavelength anomalism.

Three (3) H.L.E.M. conductors are identified and assigned designations of TP1, TP2 and TP3. Tabulated below are several parameters characterizing each.

Anomaly	Line Locations	Strike Length	Depth	Dip	Conductivity-width σt
TP1	L26E, 300N; *L25E, 315N; L24E, 345N; L23E, 375N; L22E, 385N; L21E, 385N; L20E, 395N; L19E, 385N (* Above data from L25E)	800m	18m	Steep south	80 mhos
TP2	L8E, 105S; *L7E, 100S; L6E, 120S; L5E, 100S (* Above data from L7E)	400m	43m	Vertical	18 mhos
TP3	L5E, 480S; *L4E, 485S; L3E, 485S; L2E, 470S; L1E, 470S (* Above data from L4E)	500m	25m	Vertical	26 mhos

None of the three conductors show any obvious magnetic correlation. However TP3 does have a closely flanking magnetic response in excess of 2000 gammas over background. In addition, TP3 appears to become more conductive with depth.

Twin Bay

Magnetic background in the area ranges about 59250 gammas with a total relief over the grid exceeding 12000 gammas. No regional trend can be identified. Texturally the grid is extremely robust magnetically. The predominant feature being a band of very high readings running from L26E, 275S southwesterly to L2E, 700S. The continuity of this zone is not uniform indicating a poddy nature to the causative body which is in fact iron formation. Immediately to the east this particular iron formation is patented for possible future mining. At several points along its length extreme negative anomalism suggests remnant magnetization to predominate. Southerly to this is an area of relatively subdued values averaging about 60400 gammas. Northerly is an area of lower background being in the 59250 gamma neighborhood dotted with many high frequency responses. This indicates different lithologies to be flanking the iron formation. No persistent linear features are noted in this northern area.

Three (3) H.L.E.M. conductors are identified and designated TW1, TW2, and TW3. Tabulated below are several parameters characterizing each.

Anomaly	Line Locations	Strike Length	Depth	Dip	Conductivity-width σt
TW1	L11E, 175N; L10E, 155N; L9E, 130N; *L8E, 135N; L7E, 100N; L6E, 110N; L5E, 60N; L4E, 40N (* Above data from L8E)	800m	10m	Steep north	35 mhos
TW2	L19E, 90S - L6E, 560S (* Above data from L12E)	1400m	35m	Vertical	~80 mhos
TW3	L21E, 470S; *L20E, 465S; L19E, 475S (* Above data from L20E)	300m	8m	Indeterminate	1 mhos

Conductors TW2 and TW3 show no magnetic correlation. However, TW1 does show excellent correlation on the L8E section. A magnetic response on the order of 800 gammas above background is indicated. Conductor TW2 is quite formational in nature and was difficult to assign a conductivity-width product to. Conductor TW3 is very marginal and likely represents an overburden effect. As would be expected the substantial magnetic anomalism associated with the iron formation produced classic magnetostatic responses. In addition, conductive lake sediments added considerable out-of-phase roll to the 1777 Hz data.

RECOMMENDATIONS AND CONCLUSIONS

In an attempt to codify the bulk of information discussed, a rating system has been assigned to the aforementioned anomalies. That is, a priority being either A, B or C. Determining factors are magnitude of the conductivity-width product, magnetic correlation not felt to be iron formation originated, relatively short strike length and lack of a cultural origin. All of the above would be considered favourable. Tabulated below are the priority ratings for the anomalies, an 'A' being best.

Priority A:

F5 - good σ-t, flanking mag
F3 - good σ-t
TA2 - good σ-t
TP3 -
TW1 - good σ-t, mag. corr.

Priority B:

O2 - low σ-t
F4 -
F2 -
F1 -
BA1 - possible overburden
TA1 - low σ-t
H1 - low σ-t
TO1 - low σ-t
MA1 - formational
MA2 - formational
MA3 - formational
C3 -
MI1 -
P1 -
P4 -
P5 -
P6 - low σ-t
S1 - formational
S2 -
TP1 -
TP2 -

Priority C:

O1 - possible I.F.
F1 - possible I.F.
F6 - possible I.F.
F7 - possible I.F.
MU1 - possible I.F.
MU2 - possible I.F.
MU3 - possible I.F.
TO2 - low σt, no magnetic corr.
C1 - possible I.F.
C2 - very low σt
P2 - low σt
P3 - very low σt
P7 - formational
TW3 - very low σt, possible overburden
TW2 - formational, possible shear

Drill testing of all priority 'A' anomalies is recommended provided no condemning geologic and/or geochemical data is setforth. Further geophysical work is recommended on priority 'B' targets. This should include induced polarization (I.P.) surveys to determine if chargeable material exists, thus eliminating any possible overburden sources. Additional H.L.E.M. coverage between lines could possibly locate more favourable portions of the conductors. In addition, geochemical soil sampling is strongly suggested as a screening tool. Priority 'C' anomalies should probably receive no further geophysical work but geologic and geochemical surveys should be contemplated.

N.W. Rayner
Geologist

NWR/JLW*ms

James L. Wright
J.L. Wright
Geophysicist

APPENDIX A

(ii) Magnetometer Instrument Data

General Description, Principle of Operation

If a proton rich fluid such as Kerosene, jet fuel, heptane, etc. is placed into a magnetic field the protons will align along the magnetic field vector. The magnetic field is induced in the sensor upon depressing the push-button. Then this field is suddenly removed. Protons which behave as elementary gyroscopes will start pre-cessing around the remaining magnetic field that of the earth. The precession frequency is directly proportional to the magnetic field of the earth. The magnetometer counts this frequency, divides it by the appropriate constant to obtain a reading in gammas and displays the reading in the form of a 5 digit number.

MODEL GM-122

SPECIFICATIONS

Range:	20,000 to 99,999 in 12 ranges
Accuracy:	± 1 γ through operating temperature range
Sensitivity:	1 γ
Gradient Tolerance:	600 γ/ft.
Power:	12 "D" cells
Power Consumption:	< 50 Joules (Wsec) per reading
Polarizing Power:	0.8 A @ 13.5 V for 1.5 sec. (3 second cycle) 0.8 A @ 13.5 V for 3 sec. (6 second cycle)
Number of Readings with 1 Battery Set:	2,000 - 10,000 depending on type of batteries
Frequency of Readings:	1 every 3 seconds 1 every 6 seconds
Controls:	Pushbutton switch Range Selection switch - Slide switch for 3 and 6 sec. located on P/C Board
Output:	5 digit incandescent filament readout
Indicators:	LED point Lock Indicator - last three digits of the display blanked off when phaselock not achieved Segment Function Indicator - all segments light up to permit visual inspection of the display function

Mechanical:

Instrument:	Dimensions	- 7" X 3.5" X 11" (18 cm X 9 cm X 28 cm)
	Weight	- 8 lbs (3.6 kg) including batteries
Sensor:		Omnidirectional noise cancelling toroidal sensing head
	Dimensions	- 4 7/8" (12 cm) diameter - 4 3/8" (11 cm) height
	Weight	- 3 lbs (1.4 kg)
Ambient Conditions:		Operating Temperature Range - -40°F to 131°F (-40°C to 55°C) Relative Humidity - 0 to 100%
Environmental:		Instrument and sensor case made of high impact plastic

SCINTREX

TOTAL FIELD MAGNETIC BASE STATION

MODEL MBS-2

SPECIFICATIONS:

Resolution	1 gamma
Total Field Accuracy	± 1 gamma over full operating range
Operating Range	20,000 to 100,000 gammas in 25 overlapping switch selectable steps
Gradient Tolerance	Up to 5000 gammas/metre
Sensor	Omnidirectional, shielded, noise-cancelling, dual coil
Sampling Rate	Internal control: switch selectable every 2, 4, 10, 30 seconds or 1,2,10 minutes External control: manual command or by external clock at any rate longer than 2 seconds. For external trigger, a positive transition from 0 to +4V or greater initiates one reading
Clock Accuracy and Stability	± 10 ppm over full temperature range
Visual Outputs	5 digit light emitting diode numerical display lasting 0.1 seconds in automatic recycle mode and 1.7 seconds in manual mode. Internal strip chart recorder with 65 mm chart width and 100 or 600 mm/hr chart speed. Inkless recording. Switch selectabl at 10, 100 or 1000 gammas full scale
External Outputs	5 digit, 1-2-4-8 BCD DTL, TTL compatible (2 loads) with 0.5 msec, 5V pulse for synchronization of MBS-2 and external recorder. Analogue recorder output of 1V at 1 mA max. Switch selectable for 10, 100 or 1000 gammas full scale.
Time Marker	A 1.5 second pulse every 10 minutes generates a time mark on the internal or on external analogue recorders. For an external analogue recorder, a switc to ground is provided (NPN transistor, 40V max., 250 mA max). No side pen is required for continuously writing recorders as the pen returns to zero at every event mark. Intervals of less than 10 minutes are optional.

Sensor Cable	50 m length is standard
Power Requirement	The internal batteries of the MP-2, (8 "D" cells) are used to power all functions of the MBS-2. This power source lasts approximately 80 hours, at 25°C and a once per minute sampling interval. An external 10 to 32V DC supply may alternatively be used. Current drain is approximately 0.9A during polarize time and 35 mA during standby, depending upon supply voltage.
Battery Test	Digital readout of normalized internal battery voltage activated by touching switch.
Operating Temperature Range	Console: 0 to 50°C Sensor: -35 to 50°C
Dimensions	Console: 140 mm x 310 mm x 390 mm Sensor: 80 mm diameter x 150 mm length Tripod: 130 mm extended length
Weights	Console: 7.7 kg Sensor with cable: 5.5 kg Tripod: 1.5 kg.
Shipping Weight	Approximately 18 kg
Optional Accessories	Sensor monopod, harness, sensor backpack and 2 m sensor cable allow field portable survey use of MP-2 magnetometer. See MP-2 specification sheet.

APPENDIX B

The Maxmin II is a two-man continuously portable EM system. It is designed to measure both the vertical and horizontal in-phase (IP) and quadrature (QP) components of the anomalous field from electrically conductive zones.

The plane of the transmitter (Tx) is kept parallel to the mean slope between the transmitter and receiver (Rx) at all times. The Maxmin II is a horizontal loop (HL) system when the receiver measures anomalous components perpendicular to the mean slope between the coils. It is a minimum coupled (Min C) system when the receiver measures anomalous components parallel to the mean slope between the coils.

APEX MAXMIN II EM SYSTEM SPECIFICATIONS

OPERATING FREQUENCIES:	222, 444, 888, 1777 and 3555Hz.
MODES OF OPERATION:	a) Transmitter coil plane and receiver coil plane horizontal (Max-coupled; Horizontal loop mode). Used with reference cable.
	b) Transmitter coil plane horizontal and receiver coil plane vertical (Min-coupled mode). Used with reference cable.
	c) Transmitter coil plane vertical and receiver coil plane horizontal, tilted for null in the receiver output. (Vertical loop mode). Used without reference cable, in parallel lines.
COIL SEPARATIONS: (modes a and b)	25, 50, 100, 150, 200 and 250mm (MM II) or 100, 200, 300, 400, 600 and 800 ft. (MM II F). Coil separations in mode c) not restricted to fixed values.
PARAMETERS MEASURED:	a) In-Phase and Quadrature components of the secondary field in modes a) and b).
	b) Tilt-angle of the total field in mode c).

2/.....

READOUTS:

a) Automatic, direct readout on 90mm (3½
edgewise meters in modes a) and b).
nulling or compensation necessary.

b) Tilt-angle and null on 90mm (3½")
edgewise meters in mode c).

SCALE RANGES:

In-phase: ± 20% normal, ± 100% by switch
Quadrature: ± 20% normal, ± 100% by swit
Tilt: ± 75% slope
Null: Null sensitivity adjustable by separation switch.

READING REPEATABILITY:

± ½% to ± % normally, depending on conditions, frequency and coil separation used.

TRANSMITTER DIPOLE MOMENT:

150 Atm^2 @ 222Hz, 150 Atm^2 @ 444Hz, 90 At
@ 888Hz, 40 Atm^2 @ 1777 Hz and 30 Atm^2 @ 3555 Hz.

RECEIVER BATTERIES:

9V transistor radio type, 4 batteries
Life: approx. 35 hrs. continuous duty (alkaline; .5Ah), less in cold weather.

TRANSMITTER BATTERIES:

a) 12V7.5Ah Gel-Cell rechargeable batteries (2 x 6V in series)
b) 18V21Ah alkaline lantern batteries (3 x 6V in series). Transmitter current drain 0.5A to 2.2A depending on operating frequency.

REFERENCE CABLE:

Light weight, special teflon cable for minimum friction. Unshielded. All reference cables option at extra cost. Please specify.

Built-in intercom system for voice communication between receiver and transmitter operators.

INDICATOR LIGHTS:

Built-in signal and reference warning lights to indicate erroneous readings.

OPERATING TEMPERATURE:

$-40^{\circ}C$ to $+60^{\circ}C$ ($-40^{\circ}F$ to $+140^{\circ}F$)

WEIGHT OF RECEIVER UNIT:

6kg (13 lbs.)

WEIGHT OF TRANSMITTER UNIT:

Typically 65 kg (143 lbs.), depending on quantities of reference cable and batter included. Shipped in two shipping/field cases.

VOICE LINK:

Built-in intercom system for voice communication between receiver and transmitter operators.

APPENDIX C

52K01SW0015 52K01SW0020 WHIPPER LAKE

900

File ____________

Ministry of Natural Resources

Ontario

GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL
TECHNICAL DATA STATEMENT

TAB LAKE

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey(s) Geophysical - H.L.E.M. and Magnetic

Township or Area Whipper Lake Area

Claim Holder(s) Sulpetro Minerals Limited
Suite 301, 2161 Yonge Street
Toronto, Ontario M4S 3A6

Survey Company as above

Author of Report J.L. Wright and N.W. Rayner

Address of Author as above

Covering Dates of Survey January 3-April 30, 1981
(linecutting to office)

Total Miles of Line Cut 15.6 line km

SPECIAL PROVISIONS CREDITS REQUESTED

ENTER 40 days (includes line cutting) for first survey.

ENTER 20 days for each additional survey using same grid.

	DAYS per claim
Geophysical	
–Electromagnetic	40
–Magnetometer	20
–Radiometric	
–Other	
Geological	
Geochemical	

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys).

Magnetometer ______ Electromagnetic ______ Radiometric ______
(enter days per claim)

DATE: ____________ SIGNATURE: ____________
Author of Report or Agent

Res. Geol. ____________ Qualifications ____________

Previous Surveys

File No.	Type	Date	Claim Holder

DUPLICATE COPY
POOR QUALITY ORIGINAL
TO FOLLOW

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
PA	566862
PA	566863
PA	566864
PA	566865
PA	566866
PA	566867
PA	566868
PA	566869
PA	566870
PA	566871
PA	566872

If space insufficient, attach list

TOTAL CLAIMS 11

Ministry of Natural Resources

Ontario

File______

TAB LAKE

GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL TECHNICAL DATA STATEMENT

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey(s) Geophysical – H.L.E.M. and Magnetic

Township or Area Whipper Lake Area

Claim Holder(s) Sulpetro Minerals Limited
Suite 301, 2161 Yonge Street,
Toronto, Ontario. M4S 3A6

Survey Company as above

Author of Report J.L.Wright and N.W.Rayner

Address of Author as above

Covering Dates of Survey January 3 – April 30, 1981
(linecutting to office)

Total Miles of Line Cut 15.6 line-km

SPECIAL PROVISIONS CREDITS REQUESTED

ENTER 40 days (includes line cutting) for first survey.

ENTER 20 days for each additional survey using same grid.

	DAYS per claim
Geophysical	
–Electromagnetic	40
–Magnetometer	20
–Radiometric	
–Other	
Geological	
Geochemical	

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys).

Magnetometer______ Electromagnetic______ Radiometric______
(enter days per claim)

DATE:______ SIGNATURE:______
Author of Report or Agent

Res. Geol.______ Qualifications______

Previous Surveys

File No.	Type	Date	Claim Holder
			LO

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
PA	566862
PA	566863
PA	566864
PA	566865
PA	566866
PA	566867
PA	566868
PA	566869
PA	566870
PA	566871
PA	566872

If space insufficient, attach list

TOTAL CLAIMS 11

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS – If more than one survey, specify data for each type of survey

Number of Stations 645 | Number of Readings H.L.E.M. - 582, Magnetic - 645

Station interval 25m both surveys | Line spacing 100m both surveys

Profile scale H.L.E.M. - 1cm = 20% | Magnetic - N/A

Contour interval H.L.E.M. - N/A | Magnetic - 500 gammas

MAGNETIC

Instrument Barringer GM 122 Magnetometer/Scintrax MBS-2 Base Station

Accuracy – Scale constant ± 1 gamma

Diurnal correction method Continuously Recording Base Station

Base Station check-in interval (hours) Reading each minute

Base Station location and value 41 Lakeshore Dr., Sioux Lookout, Ontario. Value - 60500 gammas

ELECTROMAGNETIC

Instrument Apex Parametrics Max-Min II

Coil configuration Horizontal Loop

Coil separation 100m

Accuracy ± 0.5%

Method: ☐ Fixed transmitter ☐ Shoot back ☒ In line ☐ Parallel line

Frequency 444 Hz and 1777 Hz (specify V.L.F. station)

Parameters measured Percentages of in-phase and out-of-phase components of the secondary electromagnetic field

GRAVITY

Instrument

Scale constant

Corrections made

Base station value and location

Elevation accuracy

INDUCED POLARIZATION RESISTIVITY

Instrument

Method ☐ Time Domain ☐ Frequency Domain

Parameters – On time | Frequency

– Off time | Range

– Delay time

– Integration time

Power

Electrode array

Electrode spacing

Type of electrode

Ontario

Ministry of Natural Resources

Notification of recording of assessment work credits

YOUR FILE NO. 2.4042-Claims Pa.	566842
2.4043-	565755
2.4044-	566752
2.4045-	566672
2.4046-	565759
2.4047-	566734
2.4048-	566825
2.4049-	566722
2.4050	566876
2.4051-	566808
2.4052	566862
2.4053-	566666
2.4054-	566762
2.4055-	566662 et al
2.4056-	566680

RECEIVED

OCT 1 - 1981

MINING LANDS SECTION

Supervisor, Projects Unit
Mining Lands Section
Ministry of Natural Resources
Room 1617, Whitney Block
Queen's Park, Toronto
M7A 1W3

Date of recording of work: July 6/81

Recorded holder: SULPETRO MINERALS LTD.

Address: Ste. 301, 2161 Yonge St., Toronto, Ont. M4S 3A6

Township or Area: Vermilion Add'l.M-2273; Lomond Twp. M-2251; Whipper Lk. M-2274 McIlraith Twp.M-1852; Parnes Lk.M-2150; Kabik M-2258, Echo .. M-2236 McAree Twp. M-2254

Type of survey and number of Assessment days credit per claim	Mining claims
Geophysical	SEE ATTACHED SCHEDULES
Electromagnetic 40 days	
Magnetometer 20 days	
Radiometric ____ days	
Induced polarization ____ days	
Section 86 (18) ____ days	
Geological ____ days	
Geochemical ____ days	
Man days ☐ Airborne ☐	
Special provision ☐ Ground ☒	

Notice to recorded holder:

☒ Survey reports and maps in duplicate must be submitted to the Projects Unit, Toronto within 60 days from the date of recording of this work.

☐ Reports and maps are being forwarded to the Projects Unit with this letter.

Mining recorder

c.c. Sulpetro Minerals Ltd.-Tor.

#81-79; #81-80

Form LA-065 (03/74)

3/.....

CLAIM #	DAYS		CLAIM #	DAYS	
566829	40		566865	40	
566830	40		566866	40	
566831	40		566867	40	
566832	40		566868	40	2.4052.
566833	40		566869	40	
566834	40		566870	40	
566835	40		566871	40	
566836	40		566872	40	
566837	40		566873	40	
566838	40		566874	40	
566839	40		566875	40	
566840	40		566876	40	
566841	40		566877	40	
566842	40		566878	40	
566843	40		566879	40	
566844	40		566880	40	
566845	40		566881	40	
566846	40				
566847	40		589078	40	
566848	40		589079	40	
566849	40		589080	40	
566850	40		589081	40	
566851	40				
566852	40				
566853	40				
566854	40				
566855	40				
566856	40				
566857	40				
566858	40				
566859	40				
566860	40				
566861	40				
566862	40				
566863	40	2.4052			
566864	40				

Ministry of Natural Resources

Ontario

52 K/1 SW

Your file: 32

Our file: 2.4052

Ministry of Natural Resources RECEIVED JAN 1 8 1981 RESIDENT GEOLOGIST SIOUX LOOKOUT

January 13, 1982

Albert Hanson
Mining Recorder
Ministry of Natural Resources
P.O. Box 669
Sioux Lookout, Ontario
POV 2TO

Dear Sir:

Re: Geophysical (Electromagnetic and Magnetometer) Survey on Mining Claims Pa.566862 to 72 inclusive, in the Area of Whipper Lake.

The Geophysical (Electromagnetic and Magnetometer) Survey assessment work credits as shown on the attached statement have been approved as of the above date.

Please inform the recorded holder of these mining claims and so indicate on your records.

Yours very truly,

E.F. Anderson
Director
Land Management Branch

Whitney Block, Room 6450
Queen's Park
Toronto, Ontario
M7A 1W3
Phone: 416/965-1380

A. Barr/bk

Encl.

cc: Sulpetro Minerals Ltd.
Toronto, Ontario

cc: Resident Geologist
Sioux Lookout, Ontario

Ministry of Natural Resources
Ontario

Technical Assessment Work Credits

January 13, 1982

File
2.4052

Final Letter

Recorded Holder
Sulpetro Minerals Ltd.

Township or Area
Whipper Lake Area

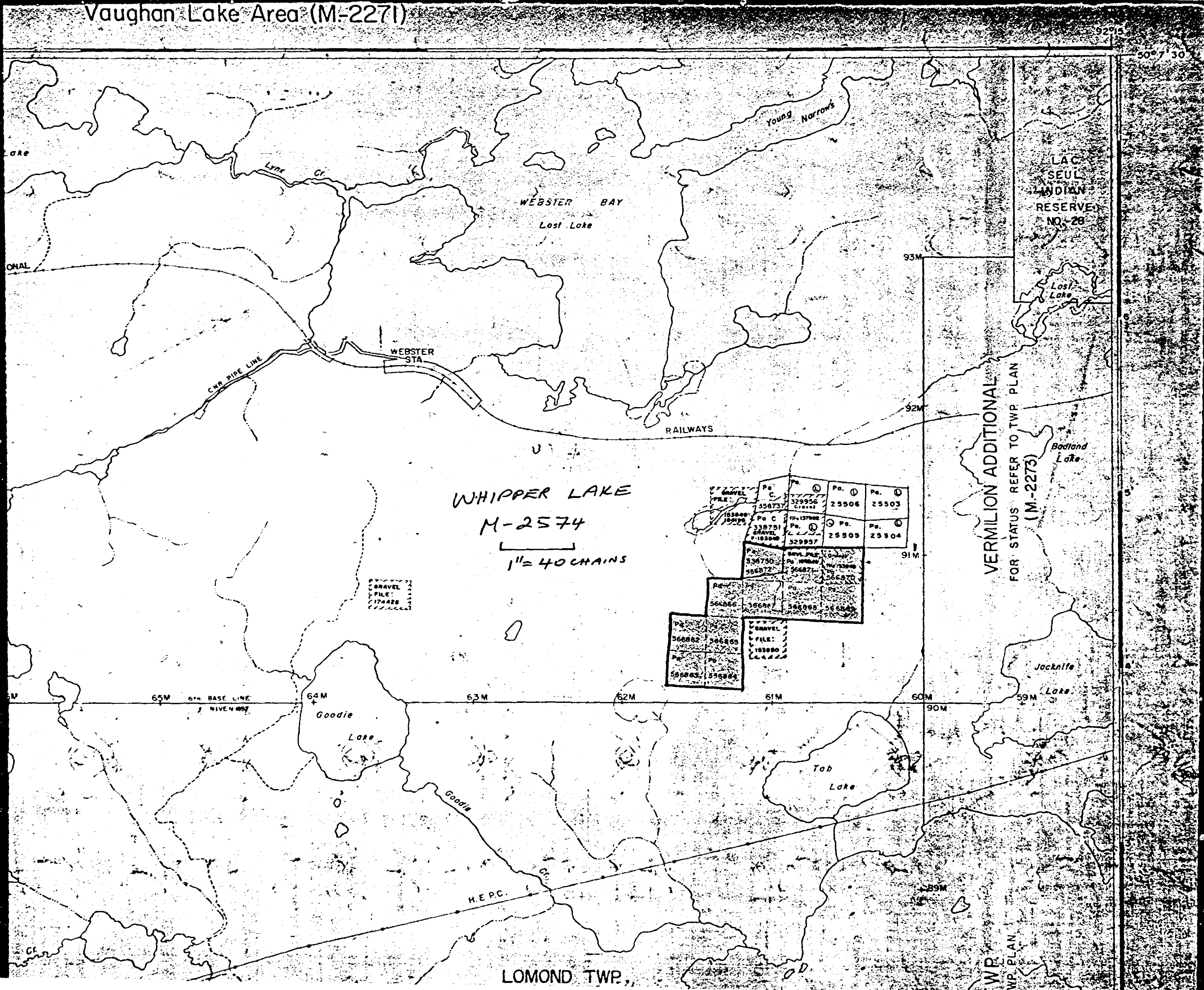
Type of survey and number of Assessment days credit per claim	Mining Claims Assessed
Geophysical	
Electromagnetic 40 days	
Magnetometer 20 days	Pa.566862 to 72 incl.
Radiometric ______ days	
Induced polarization ______ days	
Section 86 (18) ______ days	
Geological ______ days	
Geochemical ______ days	
Man days ☐ Airborne ☐	
Special provision ☒ Ground ☒	
☐ Credits have been reduced because of partial coverage of claims.	
☐ Credits have been reduced because of corrections to work dates and figures of applicant.	

Special credits under section 86 (15a) for the following mining claims

No credits have been allowed for the following mining claims

☐ not sufficiently covered by the survey ☐ Insufficient technical data filed

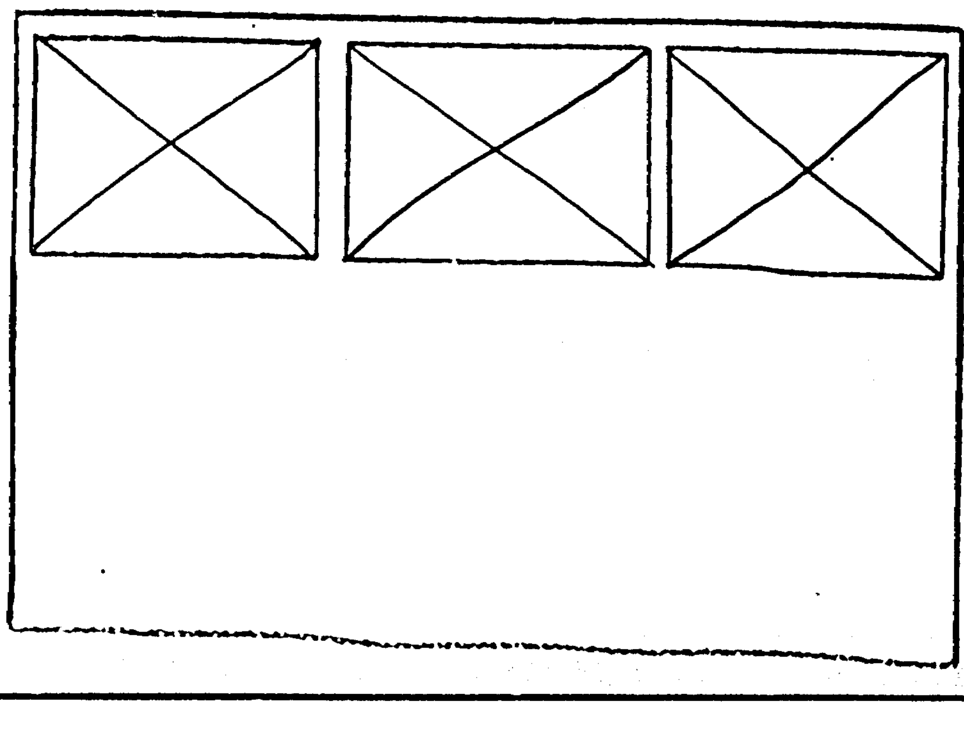
The Mining Recorder may reduce the above credits if necessary in order that the total number of approved assessment days recorded on each claim does not exceed the maximum allowed as follows: Geophysical — 80; Geological — 40; Geochemical — 40; Section 86(18)-60;


Vaughan Lake Area (M-2271)
WEBSTER BAY
Lost Lake
Young Narrows
Lyne Cr.
WEBSTER STA.
CNR PIPE LINE
RAILWAYS
LAC SEUL INDIAN RESERVE NO. 28
VERMILION ADDITIONAL
FOR STATUS REFER TO TWP. PLAN (M-2273)
Badland Lake
WHIPPER LAKE
M-2574
1" = 40 CHAINS
GRAVEL FILE: 174428
Jacknife Lake
Goodie Lake
Goodie Cr.
Tab Lake
6TH BASE LINE NIVEN 1897
H.E.P.C.
LOMOND TWP.

SEE ACCOMPANYING MAP(S) IDENTIFIED AS

52K/01SW-0020, #1,2,3

LOCATED IN THE MAP CHANNEL IN THE FOLLOWING SEQUENCE (X)

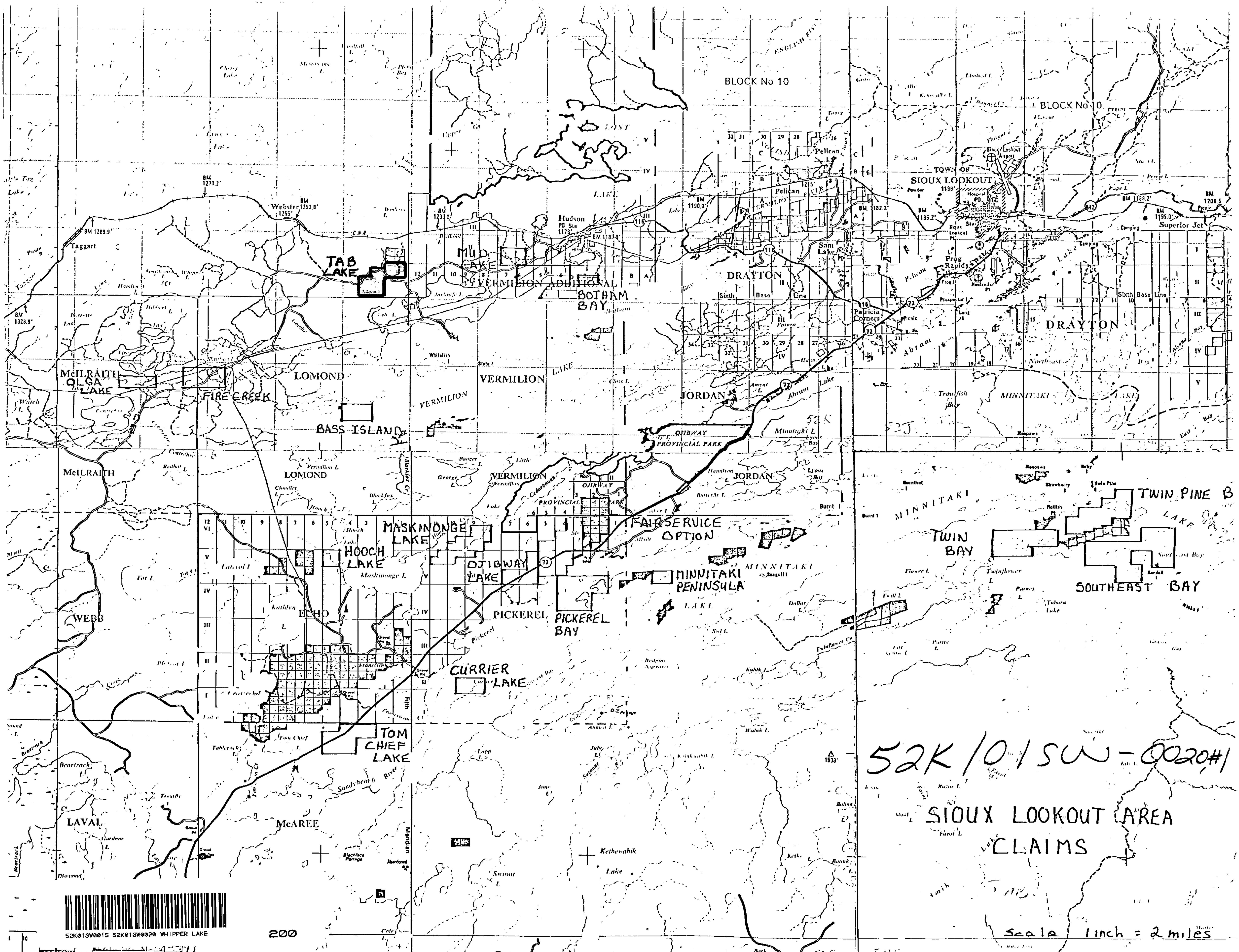


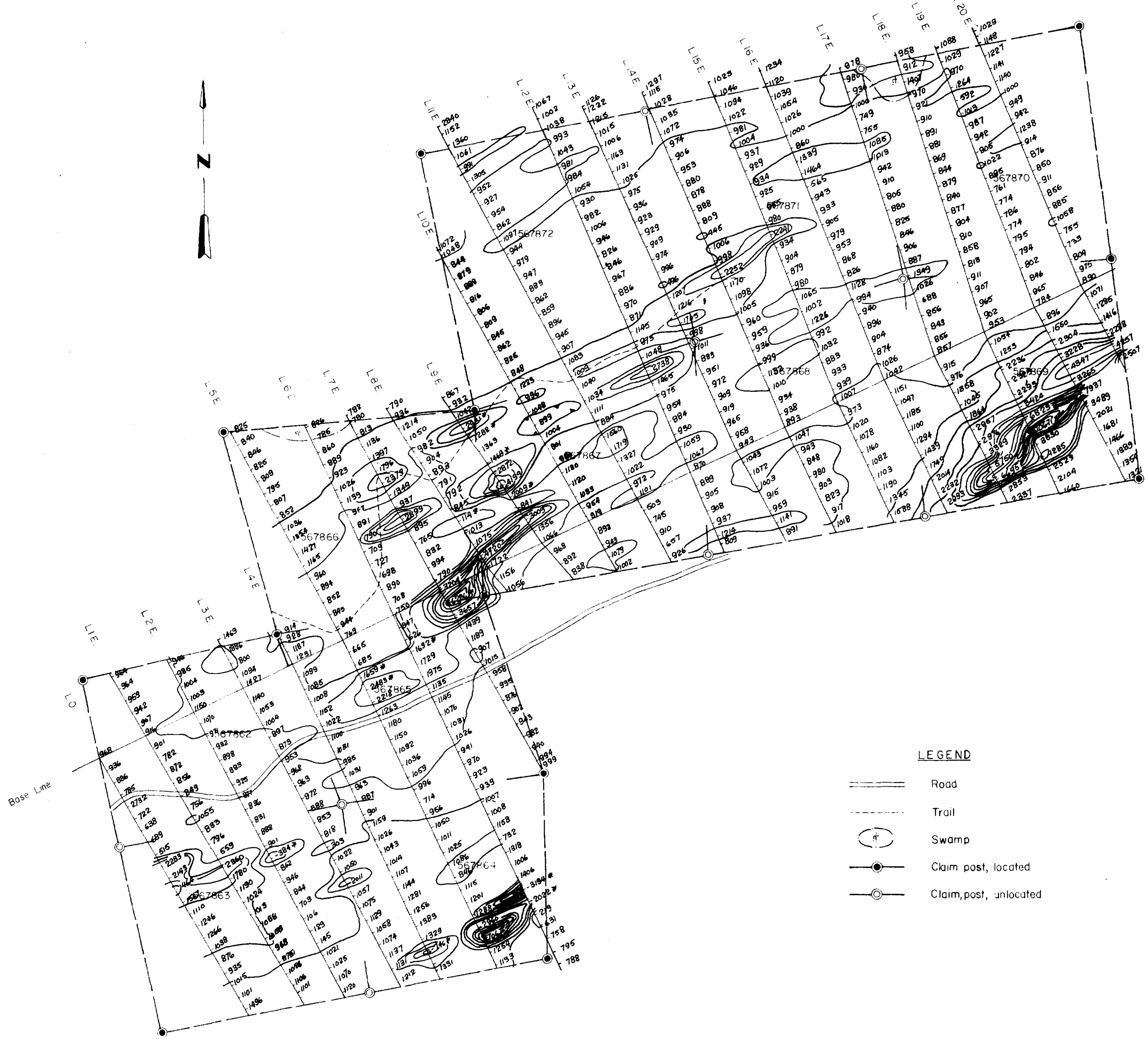
FOR ADDITIONAL

INFORMATION

SEE MAPS:

52K/01SW-0020 #4


BLOCK No 10
TAB LAKE
MUD LAKE
VERMILION ADDITIONAL
BOTHAM BAY
TOWN OF SIOUX LOOKOUT
Hudson
DRAYTON
Sixth Base Line
Patricia Corners
Superior Jct
McILRAITH
OLGA LAKE
FIRE CREEK
LOMOND
VERMILION
VERMILION LAKE
BASS ISLAND
JORDAN
OJIBWAY PROVINCIAL PARK
MINNITAKI LAKE
MASKINONGE LAKE
HOOCH LAKE
OJIBWAY LAKE
FAIRSERVICE OPTION
MINNITAKI PENINSULA
TWIN BAY
TWIN PINE B
SOUTHEAST BAY
WEBB
ECHO
PICKEREL
PICKEREL BAY
CURRIER LAKE
TOM CHIEF LAKE
LAVAL
McAREE
52K/01SW-0020#1
SIOUX LOOKOUT AREA CLAIMS
Scale 1 inch = 2 miles
52K01SW0015 52K01SW0020 WHIPPER LAKE
200



INSTRUMENTATION: Barringer GM-122 Magnetometer
Scintrex MBS-2 Base Station
BASE STATION LOCATION: 41 Lakeshore, Sioux Lookout, Ont.
BASE STATION VALUE: 60500 γ
DATUM SUBTRACTED: 59000 γ
LINE SPACING: 100 m.
STATION INTERVAL: 25 m.
CONTOUR INTERVAL: 500 γ
✱ FORCED READING
PERSONNEL: P. Churcher, I. Macdonald, A.P. Drost
SURVEY DATE: February 16, 1981.

LEGEND

Road
Trail
Swamp
Claim post, located
Claim, post, unlocated

ST. JOSEPH EXPLORATIONS LIMITED
TORONTO, CANADA
James L. Wright

TAB LAKE CLAIMS, N.W. ONTARIO

MAGNETOMETER SURVEY

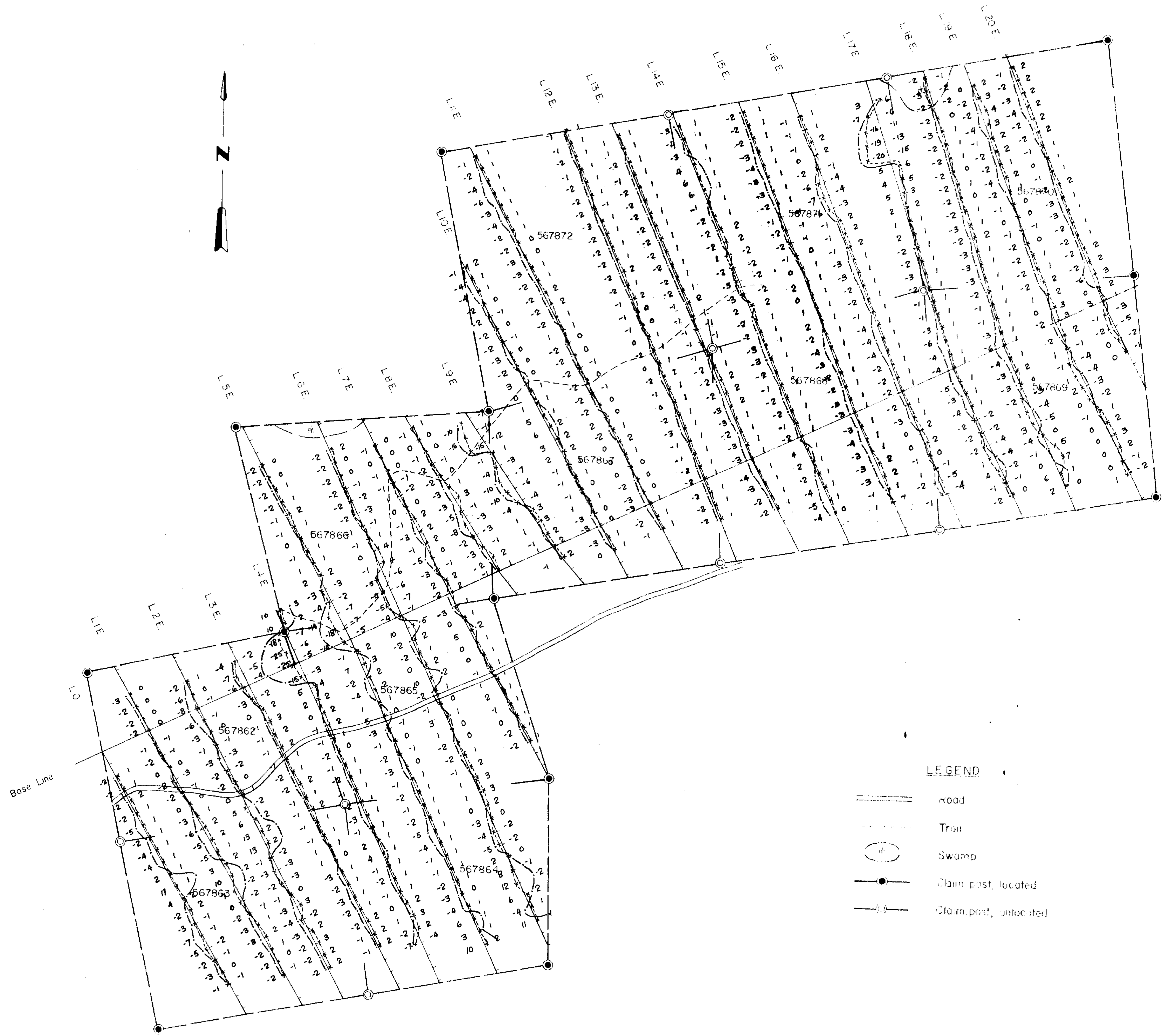
SCALE 1:5000

APPROX LAT & LONG OF LOWER RT COR OF DWG ° ′ ″ LATITUDE / LONGITUDE	PROJECT NO. 3352	SHEET NO. OF
	REPORT NO.	N.T.S. 52K/1

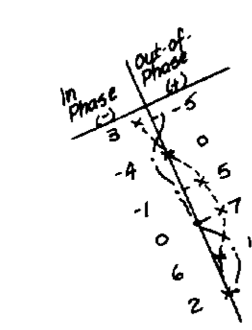
52K01SW0015 52K01SW0020 WHIPPER LAKE

210

52K/01SW-0020,#2



INSTRUMENTATION : Apex Parametrics Max-Min II
FREQUENCY : 1777 Hz.
COIL SEPARATION : 100 m.
STATION INTERVAL : 25 m.
LINE SPACING : 100 m.
PROFILE SCALE : 1 cm. = 20%
I.P. ———
O.P. ×---×---×---×
PERSONNEL : A.P. Drost, I. Lowe-Wylde
SURVEY DATES : January 20-23, 1981.



ST. JOSEPH EXPLORATIONS LIMITED

TORONTO CANADA

James J. Wright

TAB LAKE CLAIMS, N.W. ONTARIO

H.L.E.M. SURVEY - 1777 Hz.

SCALE 1:5000

PROJECT NO. 3352

REPORT NO.

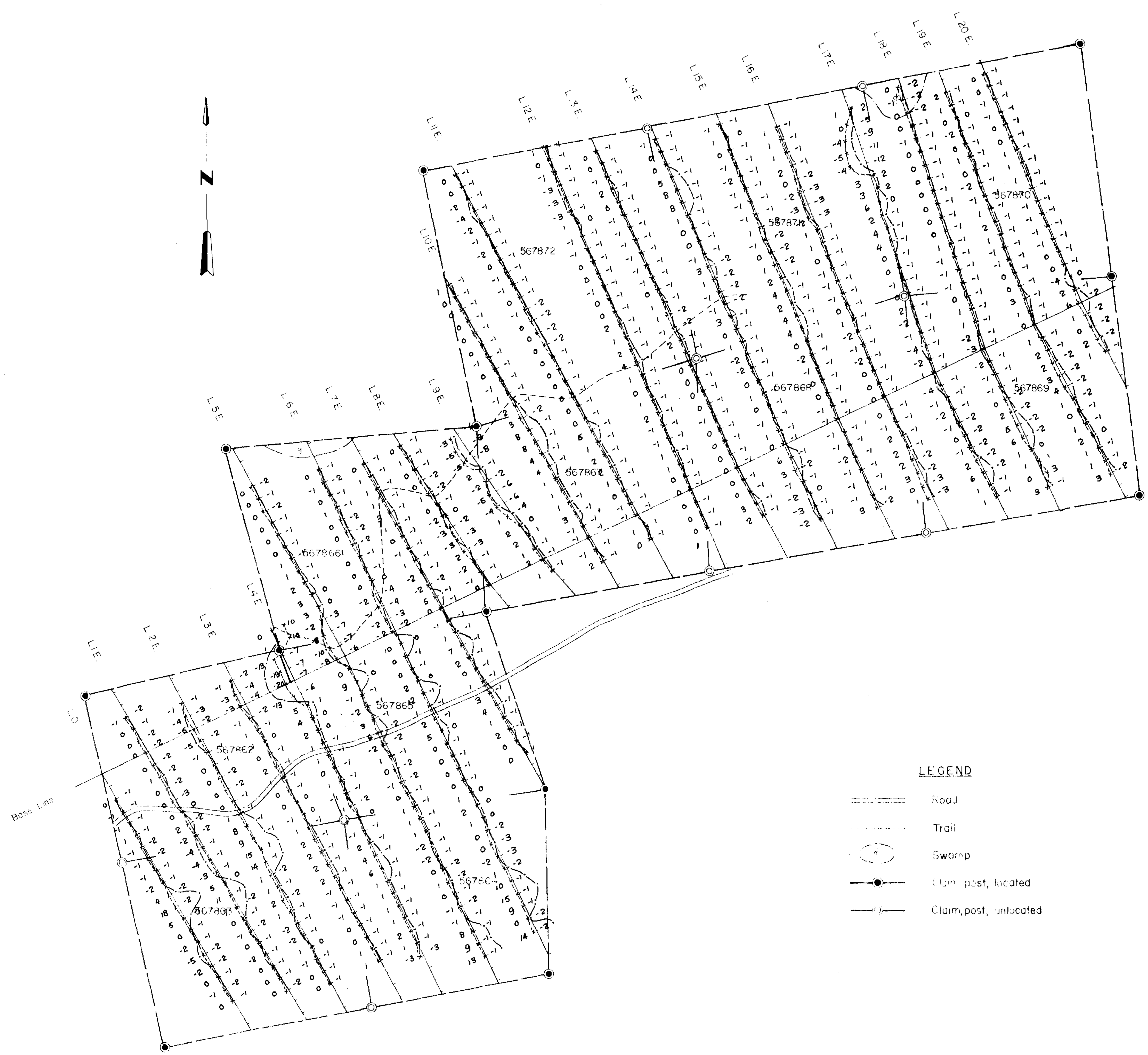
SHEET NO. ___ OF ___

N.T.S. 52 K/1

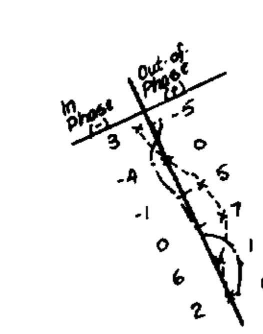
52K/01SW-0020 #3

52K01SW0015 52K01SW0020 WHIPPER LAKE

220



INSTRUMENTATION: Apex Parametrics Max-Min II
FREQUENCY: 444 Hz.
COIL SEPARATION: 100 m.
STATION INTERVAL: 25 m.
LINE SPACING: 100 m.
PROFILE SCALE: 1 cm. = 20%
I.P. —·—·—
O.P. x---x---x---x
PERSONNEL: A.P. Drost, I. Lowe-Wylde
SURVEY DATES: January 20-23, 1981.



LEGEND

Road
Trail
Swamp
Claim post, located
Claim, post, unlocated

ST. JOSEPH EXPLORATIONS LIMITED
TORONTO CANADA

TAB LAKE CLAIMS, N.W. ONTARIO

H.L.E.M. SURVEY - 444 Hz.

SCALE 1:5000

APPROX. LAT. & LONG. OF LOWER RT. COR. OF DWG.	PROJECT NO. 3352	SHEET NO.
LATITUDE		OF
LONGITUDE	REPORT NO.	N.T.S. 52 K/1

52K01SW0015 52K01SW0020 WHIPPER LAKE

230

52K/01SW-0020, # 4