KENNETH H. DARKE CONSULTANTS LIMITED

010

Preliminary Report

on

Electromagnetic & Magnetometer Surveys

Claim Group "A"; Whitney Township, Ontario

for

Oro Mines Limited

Kenneth H. Darke Consultants Limited

March 31, 1969

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Introduction :

The Claim Group "A", Whitney Township, Ontario property of Oro Mines is well located geologically with respect to known ore controls and host rocks in the Porcupine Gold Belt and is, therefore, considered to represent a highly favourable exploration target area for the search for additional gold deposits. Any fractured, silicified, or sulphide-bearing zones located on the Property are to be investigated in detail in an effort to determine if they do contain associated gold-bearing vein systems.

Since some of the gold deposits in the Whitney Township Area are directly related to silicified, sulphide-rich and/or graphitic zones within sediments and intercalated volcanic flows and tuffs, then Electromagnetic Surveys could be utilized to detect such deposits. The sulphide concentrations and/or graphitic zones would be indicated by E.M. Anomalies or Conductors.

Also, because of their presence in neighbouring regions, any exploration program covering Claim Group "A" should also take into consideration the possibility of finding economic concentrations of nickel sulphides and/or asbestos fibre associated with Serpentinized Peridotites. The presence of such ultrabasic intrusives (Peridotites) could be determined by a Magnetometer Survey since contained Magnetite or Pyrrhotite mineralization would produce Magnetic "Highs" or anomalous zones.

A Preliminary Exploration Program consisting of linecutting, a Magnetometer Survey, and an Electromagnetic Survey have just recently (March 20th) been completed on the Property.

Purpose & Scope :

The purpose of this Report is to describe the Preliminary Exploration Program completed to date on Claim Group "A", and to make additional work recommendations.

The scope of the Report will include a description of the Geophysical Surveys completed, results attained, and a brief description of the general geology of the Property with particular emphasis being given to the probable cause of Anomalous Zones located in said Geophysical Surveys.

Property Description :

The Property described in this Report (Oro Mines' Claim Group "A") consists of eight, unpatented mining claims all located within Whitney Township, Porcupine Mining Division, Ontario and described as follows :

P. 95952 & 54	2 claims
P. 97748 & 49	2 claims
P. 97972 & 73	2 claims
P. 98414 & 15	2 claims
	8 claims

Location & Access :

The Property is located in the central part of Whitney Township approximately eight miles east of the town of Timmins, Ontario; or approximately 340 air miles north of Toronto.

Access to the Property is readily gained via paved Highway 101 which passes through the southeastern claims; a gravel road passes in a north-south direction through the center of the Claim Group; and the Ontario Northland Railway cuts through the northwestern claims.

Topography :

Claim Group "A" consists essentially of low, rounded rock ridges and knobs and spruce-covered sand hills rising above low-lying muskeg and alder-filled clay basins. Water saturated "spruce & alder swamp" areas are prevalent - there is less than ten percent rock outcrop.

General Geology :

All the consolidated rocks of the immediate area are of Precambrian age - they consist essentially of Keewatin age fragmental lavas, tuffs and

interflow sediments on the southeastern claims; these rock types are overlain by younger, Timiskaming age sediments (greywacke, arkose, quartzite, slate) in the central portion of the Claim Group. Although there is no outcrop on the northern claims, Aeromagnetic data indicates that a zone of ultrabasic intrusives (Peridotite) cuts through the extreme northwestern part of the Property.

The presence of a 'scarp' indicates that a strong fault zone passes through the southerly claims in a general northeasterly direction. This fault zone parallels the strike direction (N 61-71 E) of the bedding and schistosity which dips steeply (80^{o}) northwest.

Numerous long linear north to northwest trending Diabase Dikes also occur in the general region. These Dikes are of Keweenawan age and, therefore, cut through all the other and older consolidated rocks of the area.

Preliminary Exploration Program :

1. Linecutting :

A geophysical control grid was recently established covering the entire eight mining claims that comprise Oro Mines' Claim Group "A" Property. The control grid consisted of three Base Lines spaced 1000 feet apart with crosscutting Picket Lines established at 200-foot spacings; individual stations were chained and marked by pickets at 100-foot intervals along each Picket Line.

Because of the desire for close accuracy on the linecutting, all Picket Lines were cut independently 500 feet north and south from each Base Line, and "control" Picket Lines 20W & 20E were independently and accurately established and cut throughout their lengths. The general procedures used in establishing the grid network eliminates any significant errors due to magnetic attractions, et cetera and, thereby, provides a quick method of eliminating "false" E.M. Conductors caused by inadvertent misorientation of transmitter and receiver coils due to inaccurate Picket Line spacing. That is, the errors in the grid are known because of the checks provided by the 'control' Picket Lines; and any E.M. Conductors detected are evaluated accordingly. The aforementioned considerations are of particular importance when evaluating the 'weaker' E.M. Conductors.

Refer to accompanying Sketch Map for details of the Geophysical Control Grid.

2. Magnetometer Survey :

During the period March 15-20th, Magnetometer and Electromagnetic Surveys were completed over the entire control grid except for restricted "right-

of-way" areas adjacent to Ontario Highway No. 101 and the Ontario Northland Railway. Said geophysical surveys outlined several Magnetic Anomalies with coincident and/or adjacent strong E.M. Conductive Zones. Results of the geophysical surveys are shown on two accompanying maps.

The purpose of the Magnetometer Survey were threefold : (a) to outline possible ultrabasic intrusives and associated sulphide (Magnetite, Pyrrhotite) mineralization; (b) to aid in the determination of rock types (bedrock lithology) in overburden-covered areas; and (c) to aid in determining the presence of structural features such as faults and folds.

The Magnetometer Survey indicated that the lowest Magnetic intensities encountered (3352 gammas) corresponded with areas of known Timiskaming age sediments on the northeastern part of the Property; the southerly part of the Property contained magnetic intensities varying approximately from 3600-4100 gammas over areas of known Keewatin age lavas. Four, discontinuous, linear magnetic zones in this latter area (designated anomalies D_1 to D_4 inclusive) are interpreted as the same basic volcanic flow that has been displaced in part by faults. This linear magnetic zone has the same bearing as the known volcanic flows in that area. Detailed geological mapping of known outcrops in the immediate area is required when conditions allow, that is, after spring "breakup".

Magnetic Anomaly "C" trends at N 25 W which is almost at right angles to the prevailing bedrock strike. This crosscutting relationship, the magnetic intensity of the anomaly (approximately 700 gammas above background readings in sediments), and its linear shape all suggest that Anomaly "C" represents a Diabase Dike. This interpretation is further supported by the presence of a Diabase Dike located along strike approxmiately 3500 feet to the south.

The most significant Magnetic Anomalies detected, designated "A" & "B", occur in the central part of the Property. Although the two anomalies are narrowly separated and have two distinct zones of magnetic peaks, they probably represent the same general anomalous zone. This Magnetic zone trends parallel to the enclosing volcanic host rocks, but the magnetic intensities contained therein (maximum high of 5580 gammas) and the physical shape of the anomaly itself would suggest that is is caused by a localized, intrusive ultrabasic sill (Peridotite). The magnetic intensity of this Anomaly, 800 to 2200 gammas above background, is identical to the range of typical Serpentinized Peridotites found in the area.

Anomaly "A" has a distinct, linear (60 foot width; 1000-foot length) peak of magnetic highs that is geologically unusual. The cause of these linear orientated magnetic peaks is not known but the magnetic intensities present indicate either local concentrations of Magnetite mineralization along a shear zone, or a zone of massive Pyrrhotite mineralization.

The Magnetometer Survey indicated the presence of numerous fault zones and drag folds. The location of these faults is extremely important for geological interpretations since they often cause local displacements. A summary of known fault zone trends and other lineation directions as indicated by the Mag Survey are as follows :

(a) Major Faults : N 35-36 W; displaces northeast trending flows & sediments
N 23 W ; multiple fractures & displacement
N 15-16 W; multiple fractures & displacement
N 61-71 E; schistosity & bedding

(b) Tension Fractures (Diabase Dikes) : N 14-16 W; N-S

(c) Stream Lineations : N 8 W
N 21 E
N 69 E

(d) Magnetic Trends : N 8 W N 21 E
N 16 W N 55 E
N 25 W N 65 E
N 35 W N 71 E
N 75 W

3. Electromagnetic Survey :

(a) Equipment Used :

The E.M. Survey was performed with a McPhar Model SS15 Vertical Loop Electromagnetic Unit. This is a dual frequency unit; however, because of electrical interference from nearby power transmission lines at the 5000 cps. frequency only the lower 1000 cycles per second frequency was utilized. In order to obtain deep penetration, the minimum distance (spread) between transmitter and receiver coils was kept at 600 feet.

(b) General Considerations :

The electromagnetic method of geophysical exploration is based

on the use of two fundamental physical phenomena, electricity and magnetism. An alternating current flowing in a loop of wire suspended above the surface of the earth will cause currents to flow in buried conductors. E.M. Conductors are caused by : (a) sulphide or magnetite concentrations - the more massive the concentration the better the conductivity; (b) graphitic shear zones within sediments or tuffs; (c) conductive overburden; and (d) electrolytic-filled (acidic waters) shear zones.

In the technique employed by McPhar, a coil of wire (transmitter) is suspended in a vertical plane from a mast. A strong alternating current is passed through this coil creating an alternating magnetic field (primary field) near the coil. If a conductive mass is near the coil, currents are "induced" in this mass. These induced currents in the conductive body in turn create another alternating magnetic field (secondary field) which distorts the primary magnetic field. This distortion can be measured by a search coil (receiver) in terms of dip angles. In general, the higher the dip angles detected, the better the conductivity of the buried mass.

Over barren ground, the dip angles are practically zero. The approach to a conductor is marked by increasing dip angles which in turn decrease to zero (crossover) directly above the conductor, and then increase, but in the opposite sense, beyond the conductor. Far from the conductor the dip angles return to zero again.

To overcome extraneous dip angles arising from elevational and topographical effects, the plane of the transmitting coil is oriented for each observation as as to contain the point of observation. If the relative locations of the transmitter coil and the search coil are known to within a few feet, the transmitter coil can be oriented so as to make errors negligible - even in the most rugged terrain. Hence, the dip angle profiles are directly interpretable and require no topographic or other correction. When the coils are properly oriented the occurrence of a dip angle indicates a conductor. Because of the extremely accurate control grid established on Oro's Claim Group "A", all E.M. Anomalies detected there are considered to indicate "true" conductors.

(c) E.M. Anomalies Detected :

The Electromagnetic Survey on Claim Group "A" detected several strong Anomalies including:(a) a long Anomalous Belt (designated EM-1&3) of variable conductivity that generally trended parallel to the regional stratigraphy; (b) two Conductors (EM-2&4) that apparently follow local fault zones; and (c) a separate and strong Conductor (designated EM-5) located on the eastern portion of

the Property - indications are such that this Conductor may actually join EM-3 but further detailed work in that area is required. In general, the dip of the E.M. Conductors is steeply north and northwest - the same as the local stratigraphy.

The E.M. Survey results were particularly noteworthy because of the number of maximum or "off scale" dip angles obtained; that is, the conductive mass detected exhibited perfect conductivity. The cause of these E.M. Conductors is as yet undetermined, but those areas containing these maximum dip angles are considered to represent massive sulphides and/or heavy concentrations of Graphite. Maximum dip angles occurred in Conductor EM-3 over a minimum strike length of 600 feet, in EM-4&5 over 200 feet, and in EM-2 on one Station.

Conductor EM-3 is of particular geological interest because of the number of maximum dip angles contained, and because it is coincident in part with the strongest Mag Anomaly ("A") detected on the Property. The E.M. cross-overs do not coincide with the peak Magnetic Highs and, therefore, the conductivity cannot be directly attributed to the presence of massive sulphides (including Pyrrhotite) alone. The apparent lack of complete E.M. & Mag High coincidence may be due to the presence of a mixture of sulphides (Pyrite, Pyrrhotite) and Graphite associated with local but not necessarily the highest concentrations of Magnetite.

Picket Line 12W was surveyed twice using two separate transmitter locations - one at a spread of 400 feet and the other at 1200 feet. The shorter spread gave only minor dip angles (7^{o}) while the wide spread gave off scale (maximum) dip angles and a more northerly (80 ft.) crossover. This northerly shift in the crossover and the far greater conductivity from the wider spread indicates that the Conductor is deep and dips steeply north. This same conclusion is suggested by several other dip angle profiles including those crossing Conductor EM-3 - the deepest penetrations (widest spreads) gave the best conductivity.

Anomaly EM-5 was accurately located with definite crossovers on Picket Lines 24E & 26E only; however, the dip angle profiles indicate that this same conductive zone continues and extends westward from Picket Line 24E to 6E and may join Conductor EM-3. Detailed E.M. Surveying at wide spreads of this area is recommended.

Summary & Conclusions :

The Magnetometer Survey showed that the lowest magnetic susceptibilities (gamma readings) detected corresponded to areas of sediments, intermediate

readings to volcanics and a Diabase Dike, and the highest readings were interpreted as indicating an Ultrabasic (Peridotite) Sill. The Mag Survey also indicated the presence of numerous fault or shear zones and drag folds.

The Electromagnetic Survey (McPhar Model SS15 Vertical Loop Unit) located several well defined Anomalies and Conductive Zones - one of which (EM-3) was coincident in part with the strongest Mag Anomaly (Peridotite Sill ?) located on the Property. Conductor EM-3 generally trends parallel to the local stratigraphy and dips steeply to the north; the best conductivity occurs at depth.

The E.M. Survey results were particularly noteworthy because of the number of maximum or "off scale" dip angles obtained. The cause or economic significance of these E.M. Conductors is as yet undetermined, but those areas containing these maximum dip angles are considered to represent massive sulphides and/or heavy concentrations of Graphite.

Conductor EM-3 is of particular potential economic importance because of the possibility that the Anomalous E.M. Zones are caused by nickel-copper sulphide concentrations associated with a Peridotite Sill.

Conductors EM-2&4 apparently follow local fault zones, and should be investigated further to determine whether or not they represent gold-bearing sulphide and/or graphitic zones since such gold deposits are found in nearby areas.

The area encompassing Conductor EM-5 should be further covered by a deep penetrating E.M. Survey in order to determine the full extent of the Anomaly more accurately. The cause of this E.M. Conductor should also be investigated since it is located in part at least along the flank of the indicated Peridotite Sill and could represent concentrations of nickel-copper sulphides.

Recommendations :

1. Complete detailed Geological Mapping of the entire Property with special attention to E.M. Conductive Zones and Magnetic Anomalies.

2. Conduct an E.M. Survey at wide spreads covering the area encompassed by E.M. Conductor EM-5; that is, survey Picket Lines 0+00 to 26E from Base Line 0+00 south to Highway 101.

3. Test by means of diamond drilling the cause of E.M. Conductors EM 2, 3, 4 & 5. Because of the apparent deep burial of said Conductors, the drill holes should

be deep holes bearing Grid South; and should be spotted initially so as to intersect areas of maximum dip angles.

* * * * * * * * * * * * * *

Respectfully submitted,

KENNETH H. DARKE CONSULTANTS LIMITED

K. H. Darke

K. H. Darke, B.A.Sc.
Consulting Geological Engineer

Timmins, Ontario
March 31, 1969

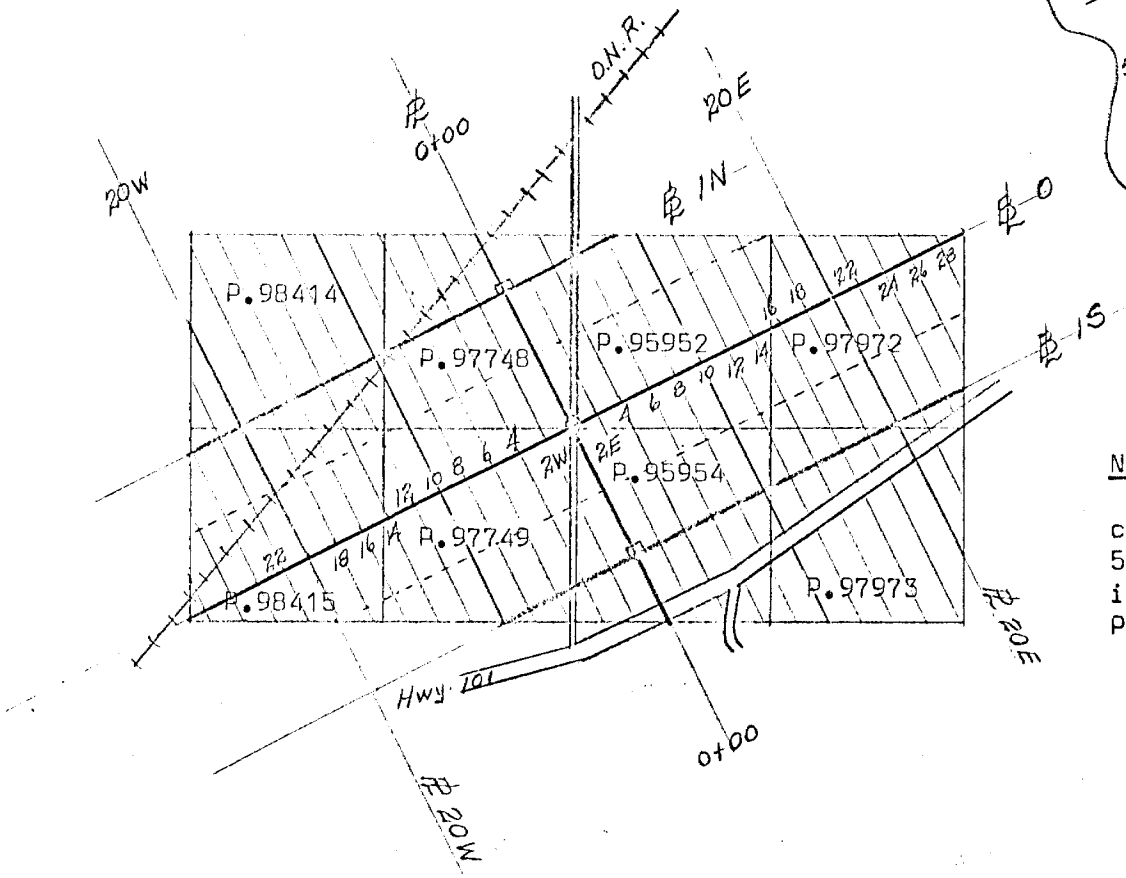
Whitney Township, Ontario

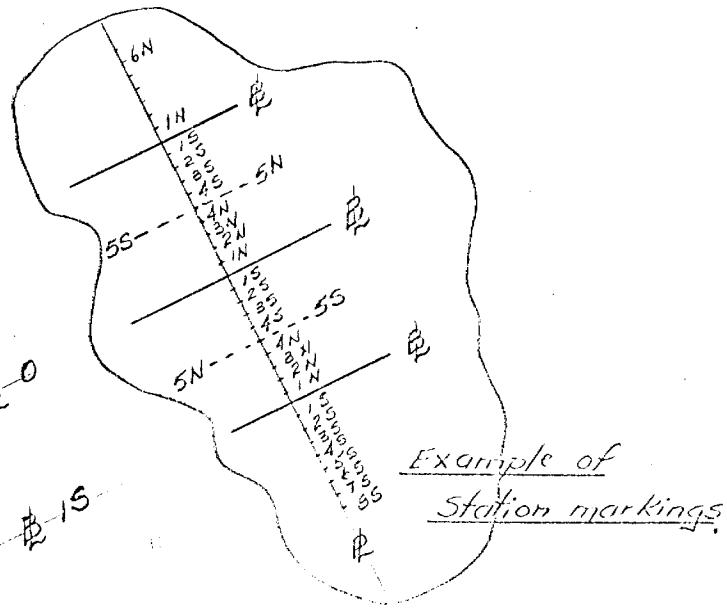
ORO MINES LIMITED

CLAIM GROUP "A"

Proposed Geophysical Grid

Scale: 1 inch = 1320 feet



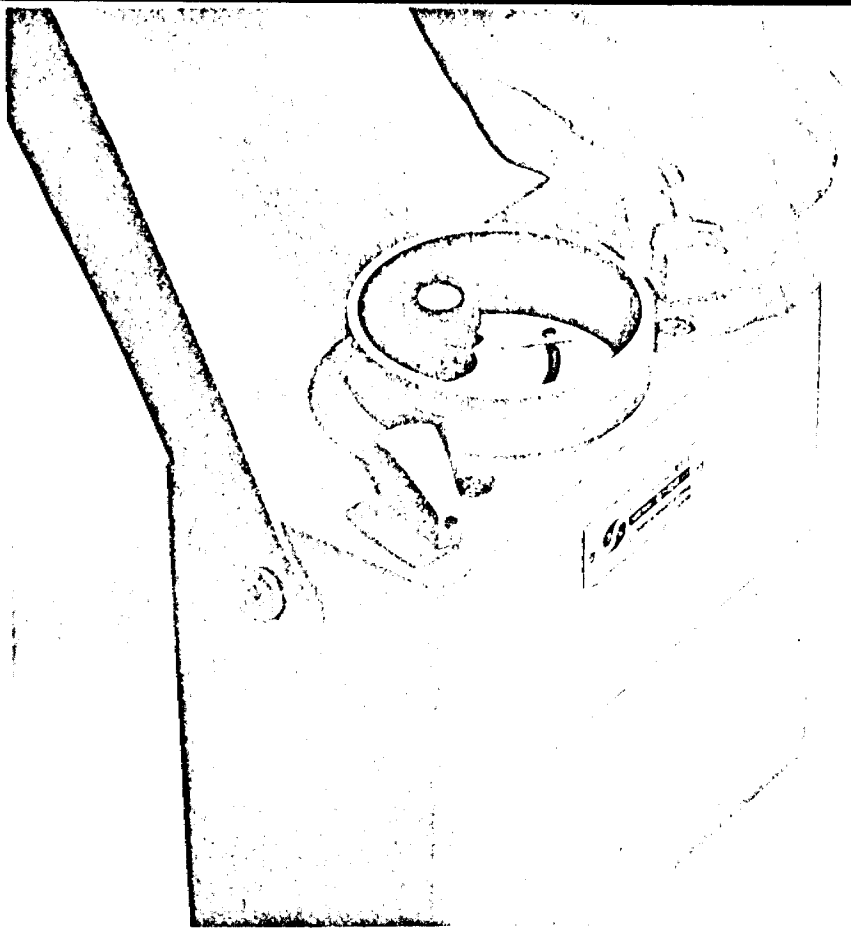


NOTE: For greater accuracy and control, the Picket Lines are to be cut & chained independently 500 ft. North and 500 ft. South from each Base Line as indicated above with special "through" Picket Lines at 0+00, 20W & 20E.

KENNETH H. DARKE CONSULTANTS LTD.

February 24, 1969

MF-1 FLUXGATE MAGNETOMETER



A first order fluxgate type vertical component magnetometer. Advanced transistorized circuitry and extensive temperature compensation is the core of its accuracy comparable to precision tripod mounted Schmidt type magnetometers.

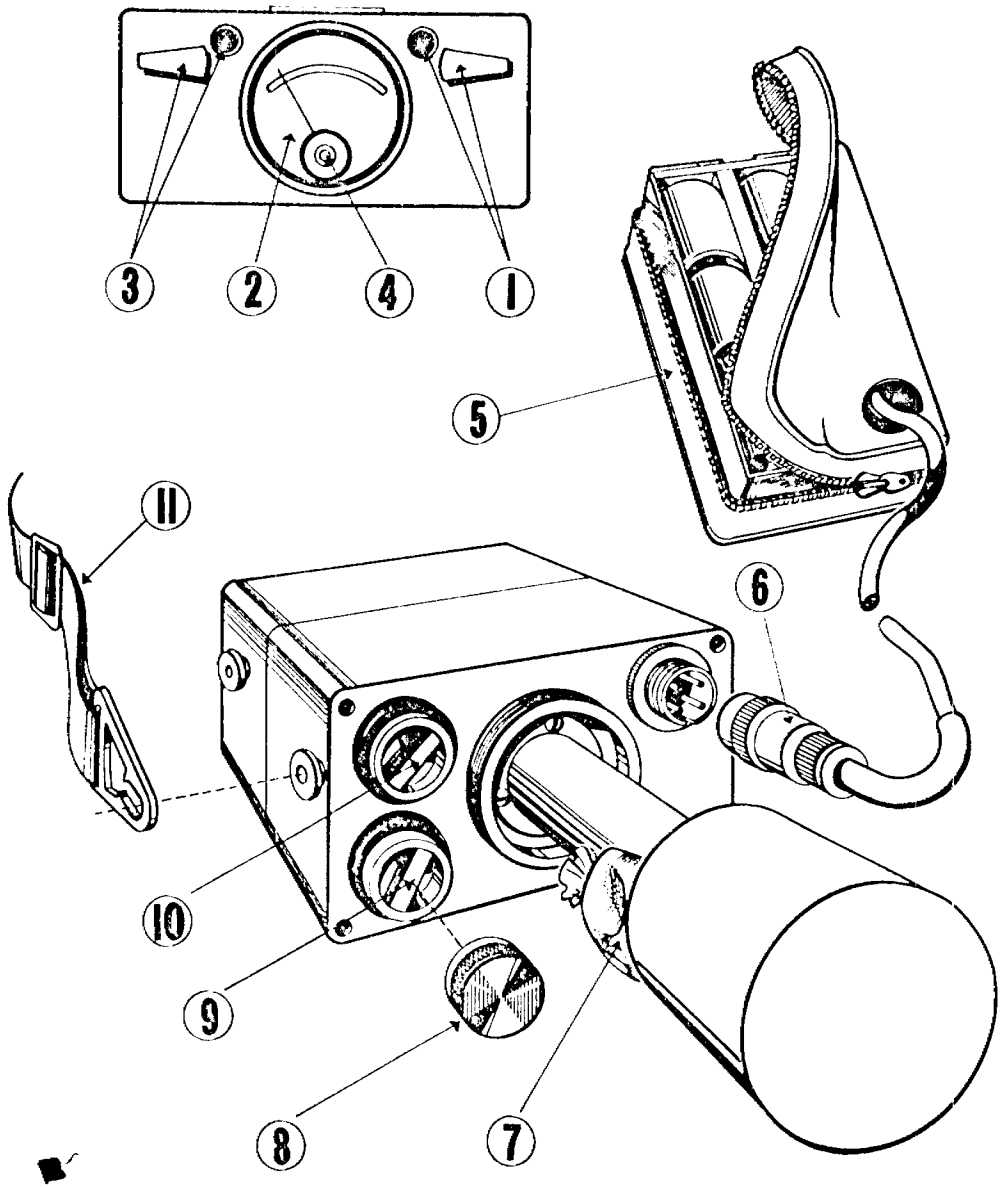
It is a hand held instrument and needs only coarse levelling and no orientation. Features such as direct reading of gamma values and the possibility of accurate zero setting at base stations ensure simplicity of operation and higher field economy.

The Model MF-1 Fluxgate Magnetometer is designed for accurate ground surveys in the mining industry as well as a basic component for air surveying by small aircraft. Technical data and comparison charts available on request.

SPECIFICATIONS

MAXIMUM SENSITIVITY:	20 gammas (per scale division) on 1000 gamma range.
READABILITY:	5 gammas (¼ scale division on 1000 gamma range.
RANGES: (FULL SCALE)	1,000 gammas 3,000 gammas 10,000 gammas 30,000 gammas 100,000 gammas
MAXIMUM RANGE:	± 100,000 gammas
LATITUDE ADJUSTMENT RANGES:	10,000 to 75,000 gammas, Northern hemisphere convertible to: 10,000 to 75,000 gammas, Southern hemisphere or ± 30,000 gammas equatorial.
DIMENSIONS: (INCLUDING BATTERY CASE)	7" x 4" x 16"
WEIGHT: (INCLUDING BATTERY CASE)	9 lbs.
BATTERIES:	12 Flashlight Batteries ("C" cell).

DESCRIPTION OF FLUXGATE MAGNETOMETER MODEL MF-1

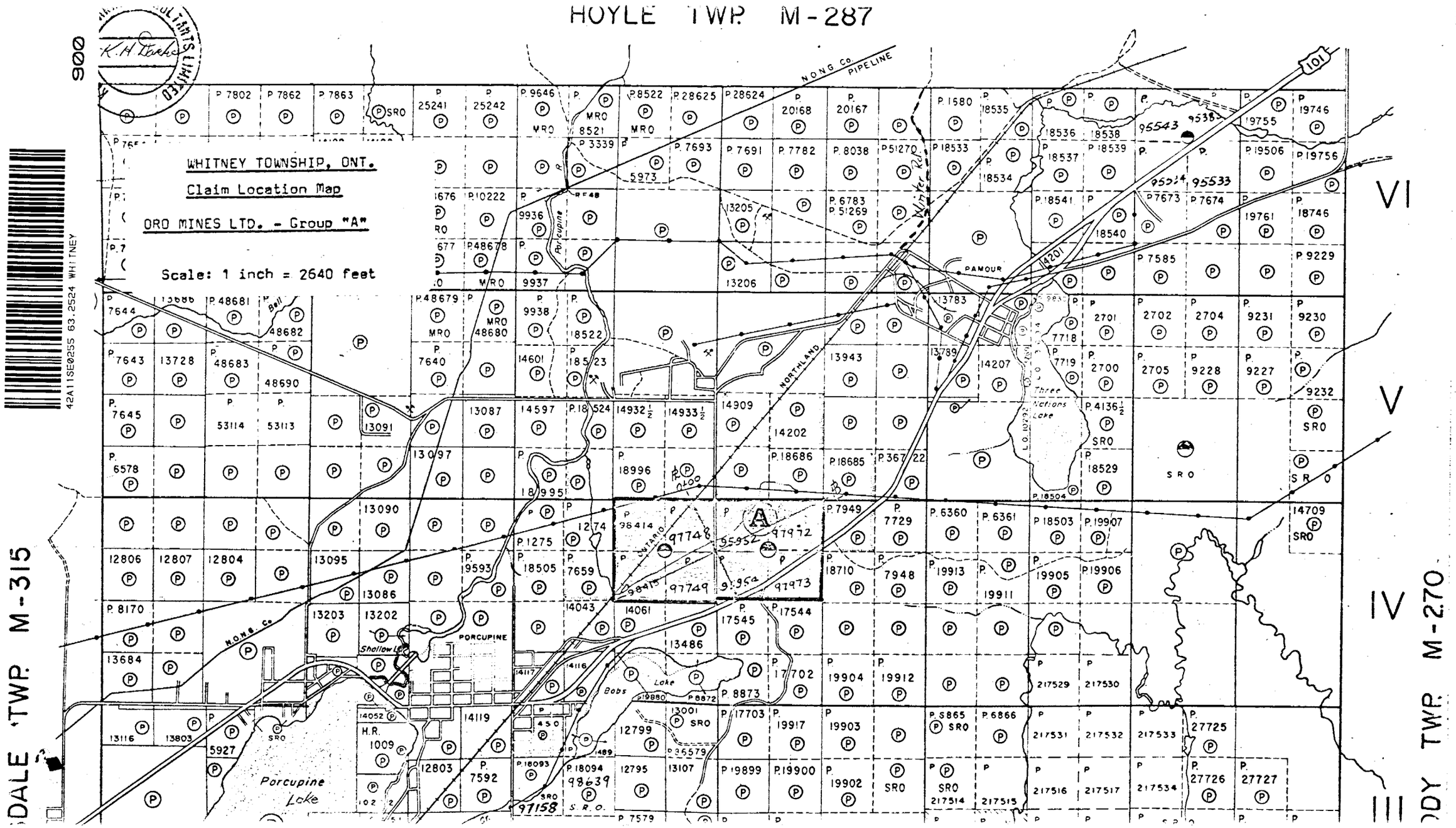


1. RANGE SWITCH
2. METER
3. MAIN SWITCH
4. LEVEL
5. BATTERY PACK
6. BATTERY CONNECTOR
7. SILICA GEL BAG
8. PROTECTION CUP
9. LATITUDE ADJUSTMENT CONTROL—FINE
10. LATITUDE ADJUSTMENT CONTROL—COARSE
11. CARRYING STRAP

This unit is also available in geodetic or observatory models.

SHARPE INSTRUMENTS OF CANADA LIMITED
79 MARTIN ROSS AVE.
DOWNSVIEW, ONTARIO

PRINTED IN CANADA


HOYLE TWP. M-287
WHITNEY TOWNSHIP, ONT.
Claim Location Map
ORO MINES LTD. - Group "A"
Scale: 1 inch = 2640 feet
900
VI
V
IV
III
DALE TWP. M-315
DY TWP. M-270
NONG Co. PIPELINE
NORTHLAND
PAMOUR
Three Nations Lake
PORCUPINE
Shallow Lake
Bobs Lake
Porcupine Lake
Porcupine R.
Whitney R.P.
ONTARIO
NONG Co.
S.R.O.
42A11SE0255 63.2524 WHITNEY

HOYLE TWP. M-287

TISDALE TWP. M-315

CODY TWP. M-270

SHAW TWP. M-311

VI

V

IV

III

II

I

12 11 10 9 8 7 6 5 4 3 2 1

THE TOWNSHIP
OF

WHITNEY

DISTRICT OF
COCHRANE

PORCUPINE
MINING DIVISION

SCALE: 1-INCH 40 CHAINS

LEGEND

PATENTED LAND	(P)
CROWN LAND SALE	C.S.
LEASES	(L)
LOCATED LAND	Loc.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	M.R.O.
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KING'S HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	
CANCELLED	C.
S.R.O. PATENTED	

NOTES

400' Surface rights reservation around all lakes and rivers.

No disposition of sand & gravel on lands lying north of the O.N.R., from May 8th 1964 until further notice D.O.M. file - 650.13.

Any restakings in area within stippling "Subject to rights and privileges granted to Pamour Porcupine Mines Limited" for tailings disposal.

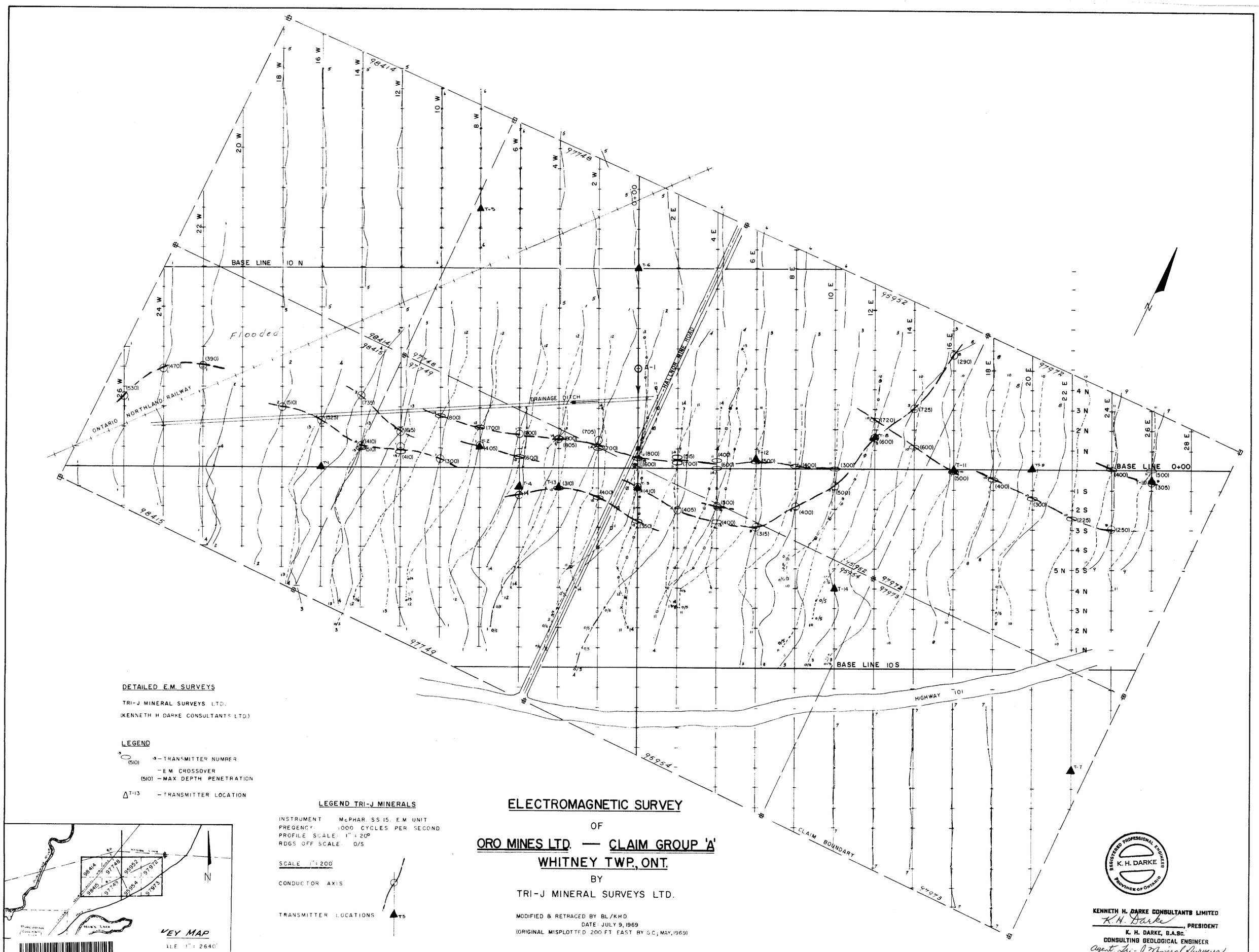
PLAN NO. M-319

DEPARTMENT OF MINES

— ONTARIO —

42A11SE0255 63.2524 WHITNEY

200



DETAILED E.M. SURVEYS

TRI-J MINERAL SURVEYS LTD.

(KENNETH H. DARKE CONSULTANTS LTD.)

LEGEND

(510) 13 — TRANSMITTER NUMBER

— E.M. CROSSOVER

(510) — MAX. DEPTH PENETRATION

Δ^{T-13} — TRANSMITTER LOCATION

LEGEND TRI-J MINERALS

INSTRUMENT: McPHAR. S.S.15. E.M. UNIT

FREQENCY: 1000 CYCLES PER SECOND

PROFILE SCALE: 1" = 20°

RDGS. OFF SCALE: O/S

SCALE 1" = 200'

CONDUCTOR AXIS

TRANSMITTER LOCATIONS T5

KEY MAP

SCALE 1" = 2640'

ELECTROMAGNETIC SURVEY

OF

ORO MINES LTD. — CLAIM GROUP 'A'

WHITNEY TWP., ONT.

BY

TRI-J MINERAL SURVEYS LTD.

MODIFIED & RETRACED BY BL/KHD.

DATE: JULY 9, 1969

(ORIGINAL MISPLOTTED 200 FT. EAST BY G.C.; MAY, 1969)

REGISTERED PROFESSIONAL ENGINEER K. H. DARKE PROVINCE OF ONTARIO

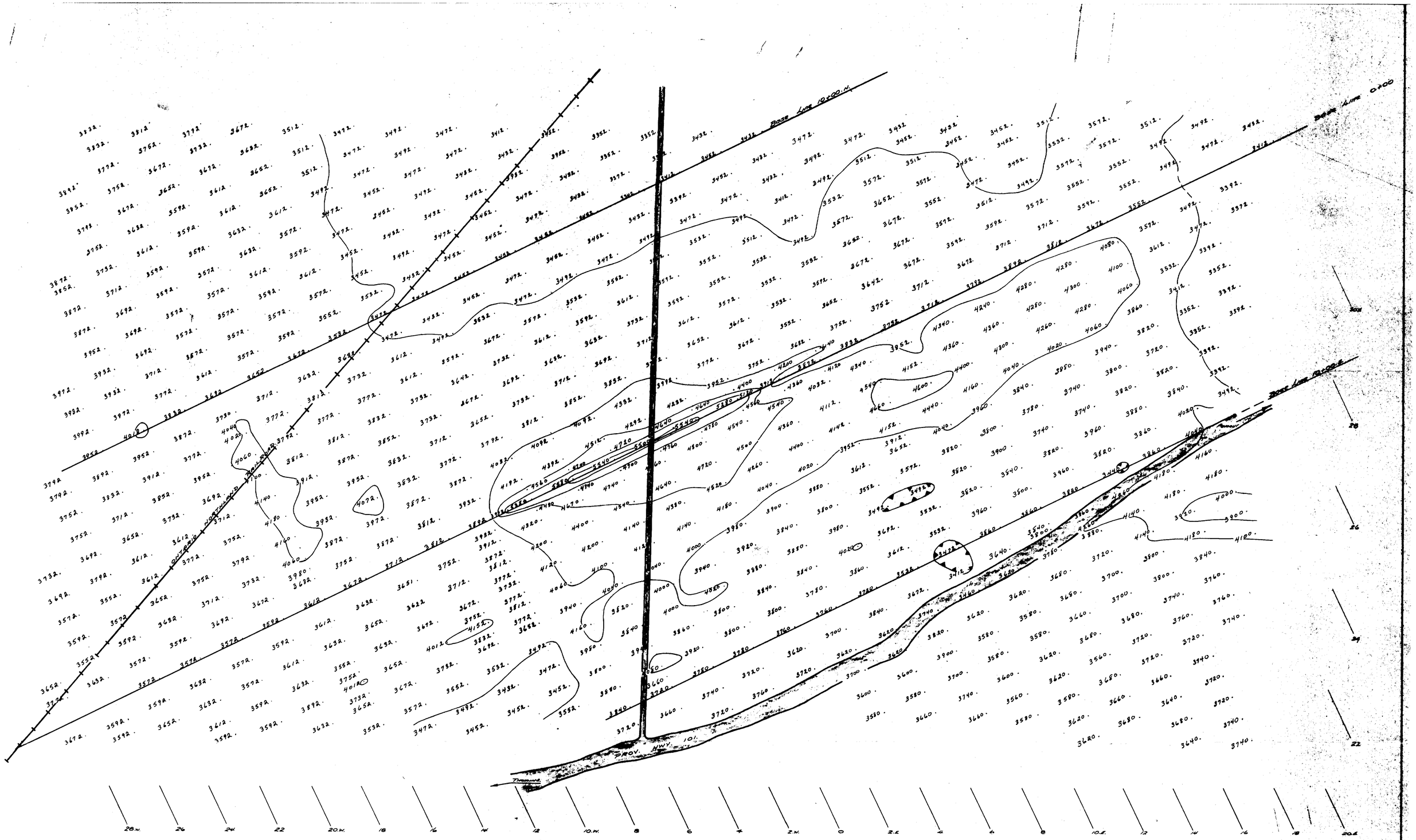
KENNETH H. DARKE CONSULTANTS LIMITED

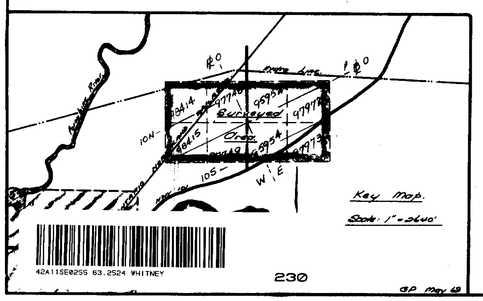
K.H. Darke, PRESIDENT

K. H. DARKE, B.A.Sc.

CONSULTING GEOLOGICAL ENGINEER

Agent, Tri-J Mineral Surveys





Legend:

Instrument : Sharpe A.2. Magnetometer.
Constant : 20.
Readings : Plotted in Gammas.
Contours : Every 500 Gammas.

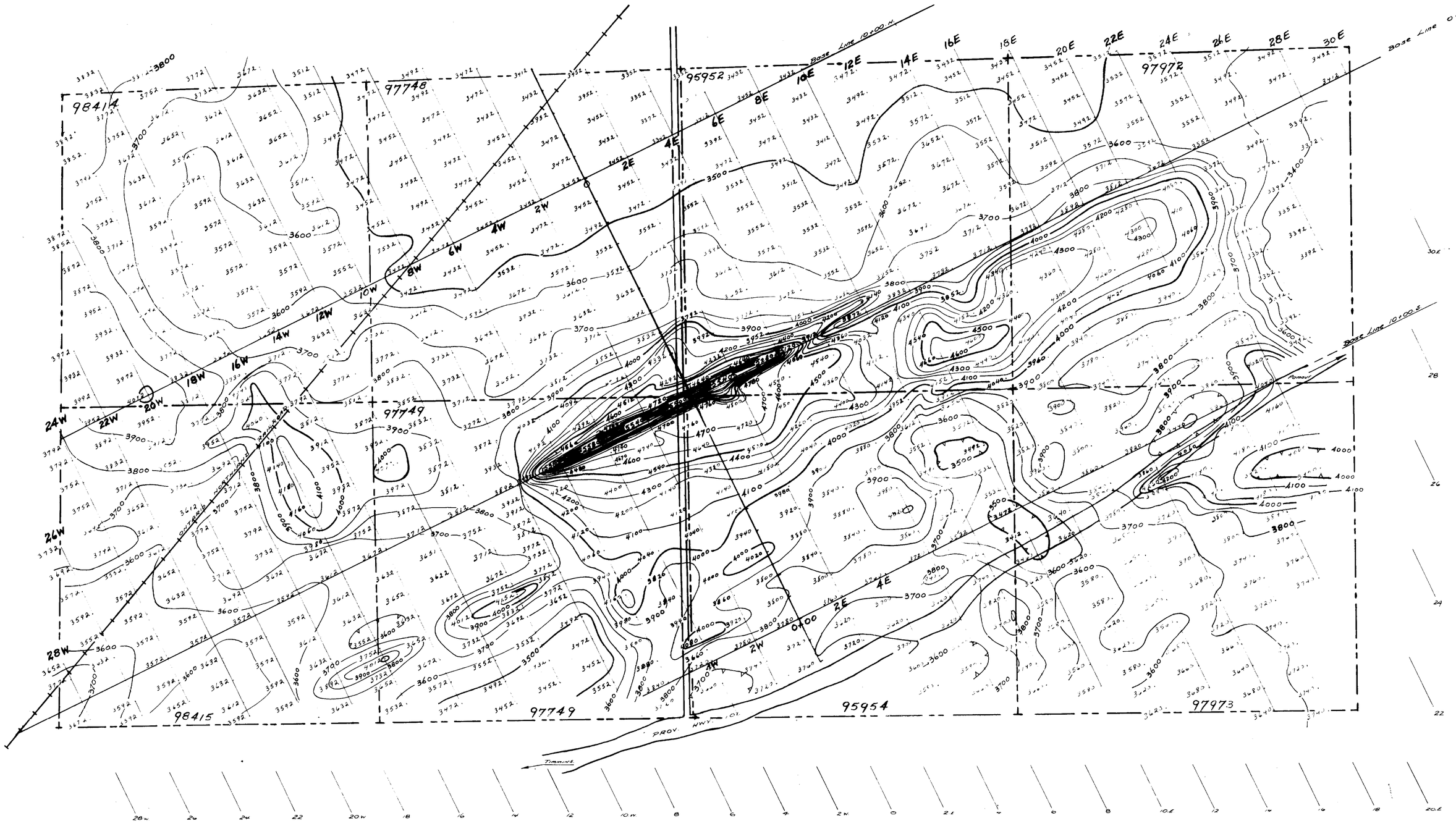
Scale : 1" = 200'

Control Stations : Base Line 0+00.

KENNETH H. DARKE CONSULTANTS LIMITED
June 9/69
K.H.D.

MAGNETOMETER SURVEY
of
ORO MINES LTD ____ CLAIM GROUP 'A'
WHITNEY TWP., ONT.
by
Tri-J Mineral Surveys Ltd.

KENNETH H. DARKE CONSULTANTS LIMITED
K. H. Darke PRESIDENT
K. H. DARKE, B.A.Sc.
CONSULTING GEOLOGICAL ENGINEER
Agent, Tri-J Mineral Surveys



MAGNETOMETER SURVEY

of

ORO MINES LTD ___ CLAIM GROUP 'A'

WHITNEY TWP

by

Tri-J Mineral Surveys Ltd.

REGISTERED PROFESSIONAL ENGINEER
K. H. DARKE
PROVINCE OF ONTARIO

KENNETH H. DARKE CONSULTANTS LIMITED
K.H. Darke, PRESIDENT
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