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MAUDE LAKE GOLD MINES LIMITED

1986 REPORT ON EXPLORATION

Beatty, Coulson, Wilkie, and Carr Townships

Larder Lake Mining Division, Ontario

Robert A. Bennett, PEng.

March 26, 1987

OM86-6-P-177

CONCLUSIONS and RECOMMENDATIONS

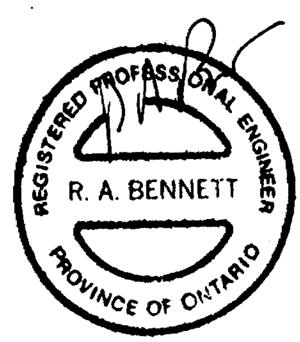
During 1986, Maude Lake Gold Mines Ltd. continued its exploration effort over the Company's large gold property in the Matheson Area of Northeastern Ontario. The work included preliminary 'first stage' evaluation over most of the Company's *NORTHEAST GROUP* of claims located in northeastern Beatty and southeastern Coulson Townships. In addition, detailed IP/Resistivity survey coverage along the Pipestone Break was continued over the Salve Lake section of the *SALVE GROUP* of claims. Finally, several exploration boreholes were drilled throughout the Property to test old buried "known" gold occurences and alteration zones; to test buried IP and EM targets; and, to explore geological targets south of the Pipestone Break.

The 'first stage' exploration over the Northeast Group included prospecting, and VLF-EM and Radiometric Surveys. The results of the work not only assisted in the geological understanding for the area, but also located specific target areas that warrent follow-up. The EM results indicated 3 distinct sets of anomalies: a WNW set that reflects the volcanic stratigraphy (graphitic interflows, mineralized flow tops, conductive strike faults, etc); an ENE set that traces the contacts of a large olivine diabase dyke; and, an easterly set that may reflect conductive cross structures. Geological mapping is recommended for the Northeast Group. Most of the EM anomalies are recommended for detailed prospecting while 3 are potential drill targets. The radiometrics located three weakly anomalous areas that can be checked by mapping.

The detailed IP/Resistivity survey shows that the Salve Lake area is buried under a thick blanket of conductive overburden. Despite this, 4 important IP Zones were identified. The Pipestone Structure [C-10] was extended through the SALVE GROUP, just north of the Lake. A subtle but important 'shoulder' anomaly [C-10A] south of the Pipestone is known to carry gold mineralization 2,400 ft to the west. Two other zones [C-11 and C-12] may be caused by overburden /bedrock contrasts but should be tested. Three of the IP Zones are recommended for drill testing, while the last can be surface prospected.

Two exploration boreholes [WC86-1 and WC86-2] drilled to test "known" gold mineralization returned only very low assays and no further work is warrented. WC86-3 was drilled to test an VLF-EM target but failed to explain the anomaly. WC86-4 was drilled to test both an EM and Till Sample target. The hole entered a diabase dyke and had to be abandoned. IP/Resistivity surveys are recommended before any further diamond drilling in this area. Hole S86-1 was drilled to explore the geology and an air-EM anomaly beneath Salve Lake. The hole intersected favourable geological formations with a few low grade gold values. Hole S86-3 was drilled to test a weak IP target. It intersected a weakly graphitic flow top. Both these holes should be deeped to test IP targets. Hole S82-2 was drilled to test the <u>best</u> IP anomaly found to date, but the hole was lost at 150 ft in sand. This target <u>must</u> be drill tested.

All the results and recommendations from the **1986 Program** will be considered as Maude Lake continues to explore its Matheson gold properties.



March 26th, 1987
Matheson, Ontario

Robert A. Bennett, MSc., PEng.
Consulting Geologist

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1986 Report on Exploration

INTRODUCTION

For the past 6 years, Maude Lake Gold Mines Limited has been systematically exploring and developing its large, wholly owned 15,200 acre Gold Property in the Matheson Area of Northeastern Ontario. The positive results of all this work have outlined a significant gold deposit, the **5 Zone**; some high grade gold veins, the **Shaft** and **#2 Veins**; and several high potential gold targets on the Company's ***Main Group*** of claims. Development on the 5 Zone has advanced to the stage where a full feasibility assessment of its mining potential has been started.

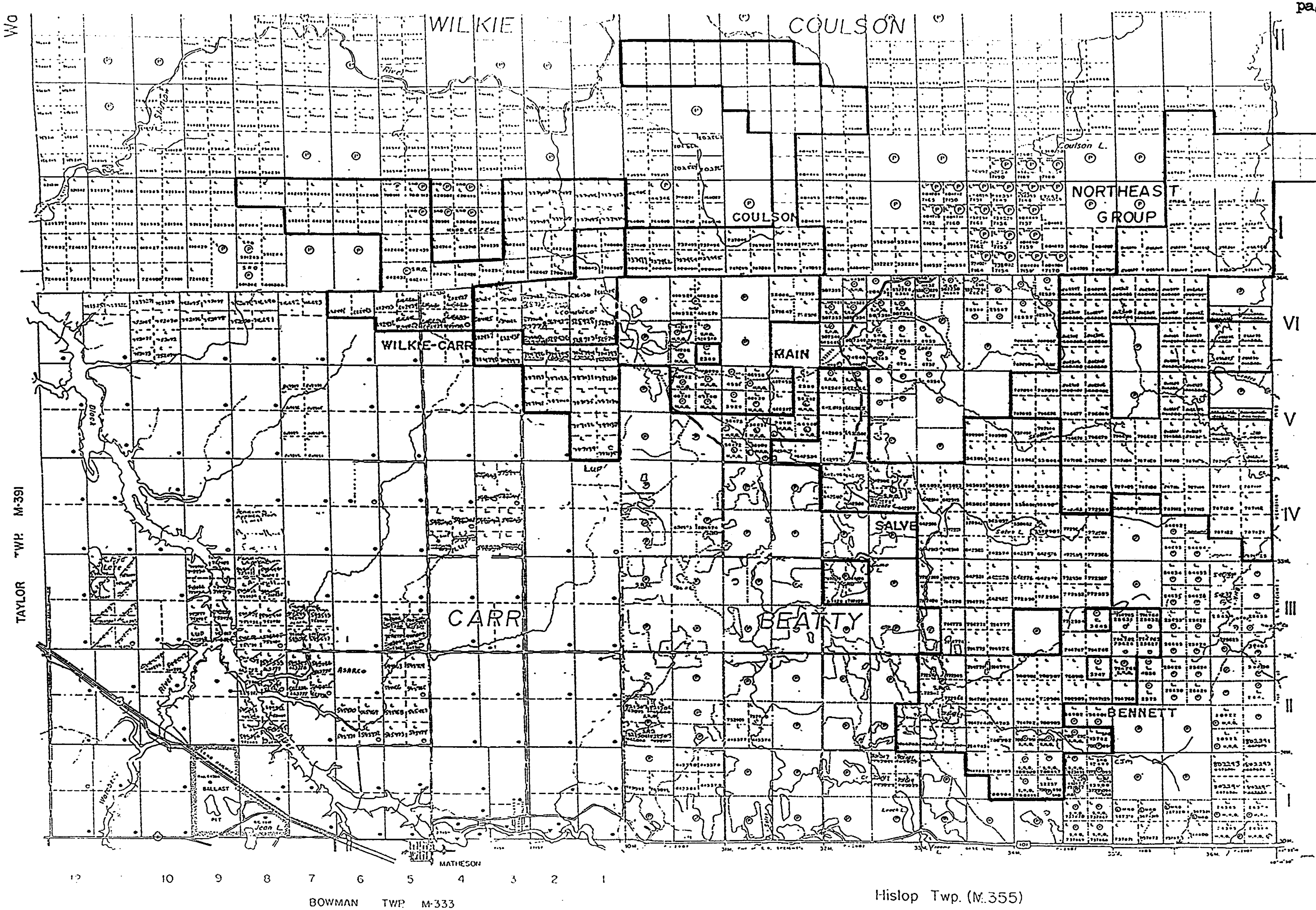
As part of the Company's continuing exploration efforts, the 1986 Program was completed over parts of the Outside Properties; namely, the ***Wilkie-Carr Group***, the ***Salve Group***, and the ***Northeast Group***. The principal objectives of the 1986 Exploration Program were:

1.- to complete preliminary "First Stage" exploration over previously untested claims to evaluate their economic potential - *Northeast Group*.

2. - to continue detailed Induced Polarization/Resistivity Surveys along the Pipestone Break to locate anomalous target areas for diamond drill testing- *Salve Group* (claims covered by Salve Lake).

3. - to diamond drill test buried "known" gold mineralization (*Wilkie-Carr Group*), and exploration drill untested target areas (*Salve Group*).

This report presents the results of all the work completed over Maude Lake's Outside Properties during 1986. The Program was completed with the aid of an Ontario Mineral Exploration Program grant, contract number OM86-6-P-177.



MAUDE LAKE GOLD MINES LTD.

Claim Map

Fig. 1

THE PROPERTY

As of March 20th, 1987, Maude Lake Gold Mines' properties consist of 380 claims or equivalents covering an area of some 15,200 acres centered around Beatty Township. The Properties comprise six "groups", as follows:

MAIN GROUP - 37 claim equivalent in Beatty Township consisting of patented parcels, patented and leased claims.

north and south half, lot 11, conc VI [8 claim equivalent]
north and south half, lot 13, conc VI [8 claim equivalent]
L.3939, L.4521, L.40779 - 82, L.41286 & 87, L.46938 & 39 = Pat.
L.550885, L.571647, L.618455, L.618517 - 522 = leased
L.772555 and 556 = staked claims.

COULSON GROUP - 46 staked mining claims in coulson Township, directly north of the Main Group.

L.737470 - 482 inclusive, L.737493 - 496 inclusive
L.787085 - 092 inclusive, L.943217 - 246 inclusive.

WILKIE-CARR GROUP- 67 staked mining claims in Wilkie and Carr Tps.

L.682425 - 459 inclusive, L.700911 - 913 inclusive,
L.714793 - 798 inclusive, L.787130 - 141 inclusive,
L.943260.

SALVE GROUP- 75 staked mining claims in central Beatty Township.

L.550880 - 884 inclusive, L.565052 - 059 inclusive,
L.560061 & 062, L.578942, L.598904 - 907 inclusive,
L.642501 & 502, L.642505 - 509 inclusive,
L.642513 - 522 inclusive, L.642565 - 567 inclusive,
L.642572 - 579 inclusive, L.642777, L.642785 & 86, L.642807,

L.650114, L.714769 - 771 inclusive, L.772550 - 554 inclusive,
L.772557 - 564 inclusive, L.893471 - 474 inclusive.

NORTHEAST GROUP - 103 staked mining claims in NE Beatty, SE Coulson, and Warden Townships.

L.7374497, L.787093 & 094, L.787099 - 105 inclusive,
L.787108 - 122 inclusive, L.787125 - 129 inclusive,
L.787144, L.796676 - 682 inclusive, L.800394,
L.801020 - 024 inclusive, L.802281 - 290 inclusive,
L.802297 - 310 inclusive, L.822807 - 824 inclusive,
L.822827 - 829 inclusive, L.822832 - 835 inclusive,
L.892840, L.892843, L.935243 - 250 inclusive,
L.935415 & 416, L.935310 & 311.

BENNETT-BEATTY GROUP - 52 staked mining claims in Beatty Township.

L.700894 - 910 inclusive, L.714759 - 768 inclusive,
L.714772 - 792 inclusive, L.772565 - 568 inclusive.

The registered owner for all these claims and patented parcels is Maude Lake Gold Mines Limited, 300 Elm Street West, Sudbury, Ontario, P3C 1V4. A Claim and Location Map for all the claims is provided over leaf, Figure 1.

LOCATION and ACCESS

The Maude Lake properties are located in the Larder Lake Mining Division of Northeastern Ontario, approximately 40 miles east of Timmins, 40 miles northwest of Kirkland Lake, and 6 miles northeast of the Town of Matheson.

Matheson is a small rural/mining service and transportation center (population = 3200) at the junction of Trans Canada Highway #11 and Highway 101.

All-weather gravel roads running north from Highway 101 provide excellent access to most sections of the properties. Beatty Township Road #6 ends at the 5 Zone Open Pit.

GENERAL GEOLOGY - REGIONAL SETTING

The Maude Lake Properties lie within the Archean-aged **ABITIBI GREENSTONE BELT** in the Superior Province of the Canadian Shield. The Belt is approximately 500 by 150 miles in dimension and hosts a large number of world-class gold camps; namely the Porcupine, the Kirkland Lake-Larder Lake, the Cadillac-Malartic-Val d'Or, the Joutel-Casa Berardi, and the Chibougamau Camps. The Abitibi Belt is truncated on the southeast by the middle Proterozoic 'Grenville Province (which does contain some re-worked Archean), and on the west by the 'Kapuskasing Structure', a feature that appears to have been activated by post-Archean tectonic events. The supracrustal lithologies within the Abitibi are dominated by varous volcanic formations and their derived sediments which have been folded and intruded by batholiths of granitic composition. The lavas are predominantly tholeiitic basalts with lesser komatiitic-tholeiites, calc-alkaline andesites to rhyolites, and rare alkalics. Syn-volcanic intrusives include peridotite and gabbro to syenite and feldspar porphyry. The sediments are mostly locally derived clastics that can contain cherty exhalites, banded iron formation, and carbonate beds. The volcano-sedimentary succession can be divided stratigraphically and lithochemically into 4 mega-cycles (Map 1., overleaf).

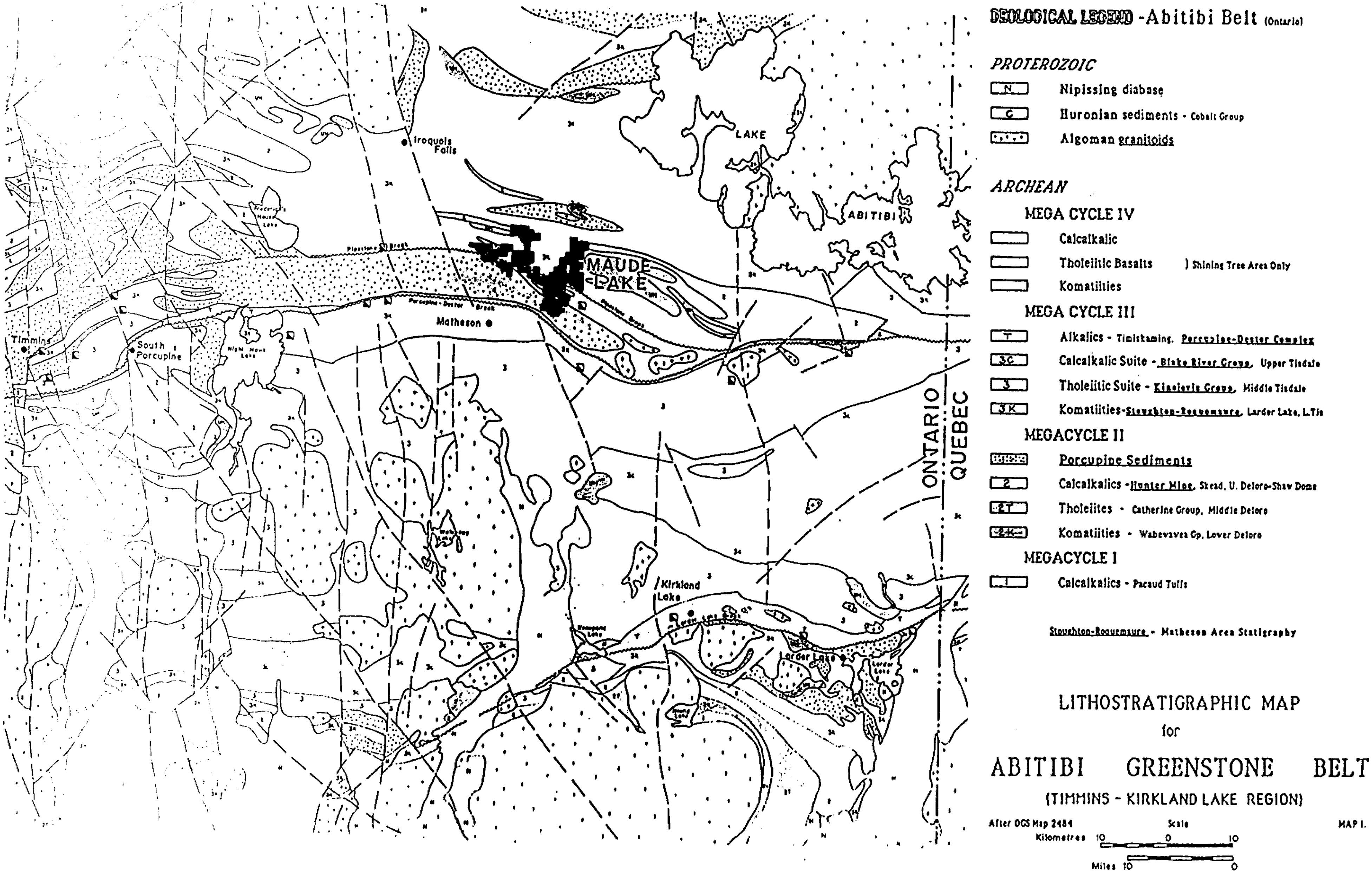
The Maude Lake Properties occur near the base of the third cycle, in the Stoughton-Roquemaure Group. Gold deposits hosted by this type/age of formation include: the Dome, the Hollinger, the McIntyre, Kidd's Hoyle Pond Mine, Canamax's Bell Creek and Clavos Mines, the Pamour, the Ross, the Holt-McDermott, the Kerr Addison, as well as most of the Cadillac-Val d'Or gold mines in Quebec. All the important gold deposits are associated with major structural events or "Breaks" such as the Porcupine-Destor, the Pipestone, and the Cadillac-Larder Lake.

1986 EXPLORATION PROGRAM - OUTSIDE PROPERTIES

Part A - *NORTHEAST GROUP*

As the preliminary 'first stage' of exploration, VLF- Electromagnetic and Radiometric Surveys were completed over Maude Lake Gold Mines' **Northeast GROUP** of claims located in Beatty and Coulson Townships.

The Northeast Group is located in the northeastern corner of Beatty Township and the southeastern corner of Coulson Township, approximately 10 miles northeast of the Town of Matheson. Access to the claims is by Highway 101 east from Matheson to the Beatty-Carr Township boundary road and then north and east along all-weather gravel township roads to the Painkiller Lake road. The seasonal Painkiller road trends north and east to within a mile of the claims. Two "Bush Machine" trails have been cut-out to the center of the claim group.


Iroquois Falls
LAKE
ABITIBI
MAUDE LAKE
Matheson
Timmins
South Porcupine
Kirkland Lake
Larder Lake
ONTARIO
QUEBEC
GEOLOGICAL LEGEND - Abitibi Belt (Ontario)
PROTEROZOIC
N Nipissing diabase
C Huronian sediments - Cobalt Group
Algoman granitoids
ARCHEAN
MEGA CYCLE IV
Calcalkalic
Tholeiitic Basalts) Shining Tree Area Only
Komatiities
MEGA CYCLE III
T Alkalics - Timiskaming, Porcupine-Destor Complex
3C Calcalkalic Suite - Blake River Group, Upper Tisdale
3 Tholeiitic Suite - Kinojevis Group, Middle Tisdale
3K Komatiities-Stoughton-Roquemaure, Larder Lake, L.Tis
MEGACYCLE II
Porcupine Sediments
2 Calcalkalics - Hunter Mine, Skead, U. Deloro-Shaw Dome
2T Tholeiites - Catherine Group, Middle Deloro
2K Komatiities - Wabewawa Gp, Lower Deloro
MEGACYCLE I
1 Calcalkalics - Pacaud Tuffs
Stoughton-Roquemaure - Matheson Area Statigraphy
LITHOSTRATIGRAPHIC MAP
for
ABITIBI GREENSTONE BELT
(TIMMINS - KIRKLAND LAKE REGION)
After OGS Map 2484
Scale
MAP I.
Kilometres 10 0 10
Miles 10 0

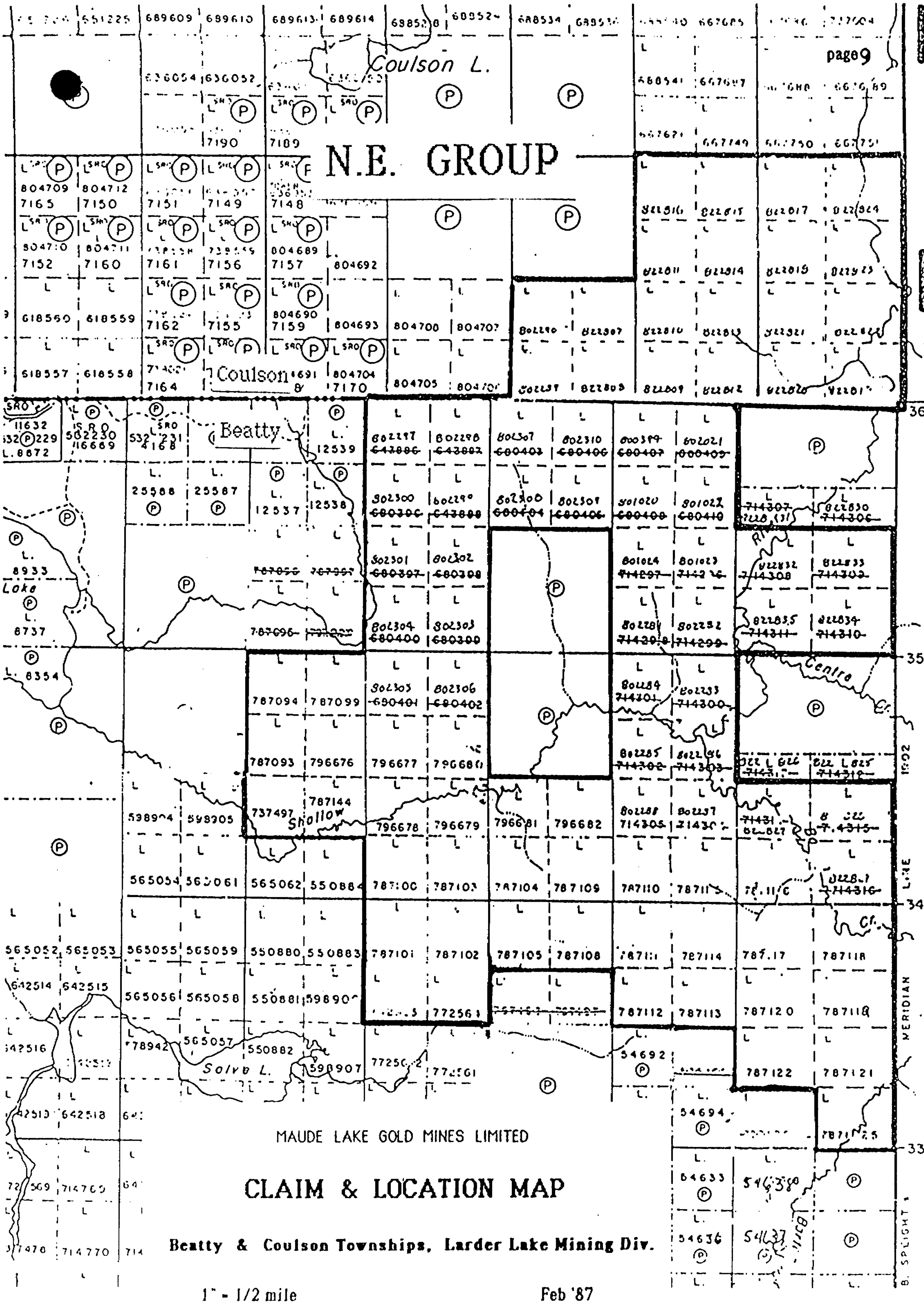
A claim map of that portion of the Property surveyed is provided overleaf.

N.E. Group - GENERAL GEOLOGY & HISTORY

The general geology of the area is described by J. Satterly and H. Armstrong (ODM Volume LVI, Part VII, 1947 - Geology of Beatty Township) and illustrated on ODM Preliminary Map P-157, Coulson Township by E. Leahy and R. Ginn, 1961 as being underlain by Archean mafic pillow lavas which form a broad syncline (axis strikes west-northwest). The lavas are intruded by seemingly conformable peridotite, gabbro, and diorite bodies and cut by a few north-trending Matachewan quartz diabase dykes and a large, northeast striking Keweenawan olivine diabase dyke. Recent re-classification of the Abitibi Greenstone Belt (OGS Map 2484 - Litho-stratigraphic Map of the Abitibi Subprovince, 1984) suggest the area is underlain by Stoughton-Roquemaure Group tholeiitic lavas and ultramafic flows. During the course of the exploration layout and general prospecting of the area, the author charted several outcrop areas showing spinifexoidal komatiitic flows. It is likely that many of the 'peridotites' will become komatiitic lavas when re-mapped.

The Northeast Group has seen only minor 'grass-roots' exploration in the past. In 1957, Orunum Copper Mines drilled 5 short diamond drill holes into an exposed quartz vein in present claim L.787125 with apparently little success. Later, in 1972, Shenandoah Mines Limited completed geophysical and geological surveys over the same claim.

In 1972, Canadian Johns-Manville completed geological and ground geophysical surveys over the southeast portion of the Property. No follow-



MAUDE LAKE GOLD MINES LIMITED

CLAIM & LOCATION MAP

Beatty & Coulson Townships, Larder Lake Mining Div.

1" - 1/2 mile

Feb '87

up was apparently done. In 1979-80, Amax Minerals completed airborne Mag and EM Surveys and reconnaissance mapping over the southern portion of the GROUP. Two follow-up diamond drill holes intersected graphitic interflow sediments with minor pyrite and pyrrhotite.

Immediately north of the survey area, Shallow River Mines Limited drilled several holes to test a gold showing in 1939. The best results from this work included:

Hole #1 - **0.30** troy oz/ton over **7** feet @ 113.5 ft
Hole #2 - **0.56** troy oz/ton over **30** feet @ 150 ft.
Hole #3 - **1.64** troy oz/ton over **5** feet @ 140 ft.
Hole #4 - **0.16** troy oz/ton over **1.1** feet @ 36 ft.

No other work is reported in the assessment files at the Resident Geologists office in Kirkland Lake. However, the area must have seen some additional prospecting as evidenced by the several old pits and trenches located during the course of the current exploration work.

N.E. Group - EXPLORATION WORK

GRIDDING

Two control **baselines** were cut, chained, and picketed for a total of 4.7 miles. The <u>north</u> baseline follows the east-west Coulson-Beatty Township Boundary from the Lots 4/5 Survey Post to the eastern corner of the township (2.06 miles). The <u>south</u> baseline approximates the Beatty Concession IV/V boundary from Lots 5/6 to the eastern boundary of the township (2.64 miles).

The **crosslines** were run every 400 feet on a compass line assisted by airphoto location. 'Winter-weight' fluorescent flagging was tied to the vegetation every 50 feet. Every second flag (ie: every 100 feet) was labeled with a permanent ink felt-tipped marker pen (ie: 140E, 26N). Distance between the flags was measured with a standard "BELT CHAIN" and "TOPO-LINE" string. A total of **78.1 miles of crosslines** were flagged over the Property. Grid control using this method was very good, although there were some magnetic effects near the large olivive diabase dyke. Each grid line has been accurately plotted on the maps that accompany this report.

Base Stations were established at 76E on the north baseline and at 92E on the south baseline for geophysical survey tie-in purposes.

VLF - ELECTROMAGNETIC SURVEY

The VLF-EM Survey was completed over the claims between August 28th, 1986 and February 6th, 1987 by Robert Wright. The Phoenix VLF-2 EM Unit was used and readings were taken every 100 feet along all the crosslines. At each station, the dip angle, phase angle, and field strenth were measured. The VLF stations used were that at Cutler, Maine (24.0 KHz) and Seattle, Washington (24.8 KHz). These stations were read to test for easterly striking structures and/or conductive zones. The Cutler station was preferred and always read on Tuesday, Wednesday, and Thursday. The Seattle station was read on Monday and Friday or any other time the Cutler station was 'out'.

All the dip angles are plotted at 1 inch - 40 degrees. The field strength readings were tied into the base stations on a daily basis. A summary of the Phoenix VLF-2 EM Units specifications is appended.

The **results** of the Electromagnetic survey are plotted on the North and South Sheet Maps (1"-400'), in the back pocket. A total of 4,186 readings were recorded.

The cross-over anomalies have been categorized into two groups; those having high field strengths and those with low field strengths. As a general rule of thumb for interpreting VLF-EM data, high field strength cross-over anomalies usually reflect bedrock features whereas low field strength cross-over anomalies typically are caused by overburden contrasts. A total of 28 cross-over anomalies were located within the survey area and these are tabulated and described individually on **Tables 1 and 1a**. In general, there are three distinct sets of anomalies: a west-northwest set, a east- northeast set, and a lesser east-trending set. The bulk of the anomalies strike west-northwest and are likely the result of stratigraphy effects such as graphitic interflow beds, sulphide-rich flow top breccias, sulphide-rich intrusive contacts, and/or conductive strike faults. The marked east-northeast anomalies occur near the contacts of the large olivine diabase dyke that cuts the volcanics. The east trending anomalies fall over interpreted cross structures and are likely the result of conductive shears. Some of the anomalies have been tested by past explorers. Others require further testing by prospecting and drilling methods.

RADIOMETRIC SURVEY

A radiometric survey was completed over the claim group between August 28th, 1986 and February 6, 1987 by Wayne Fuller. This was done to assist the geological interpretation and to test for potassium-rich felsic intrusions and/or alteration zones that can be associated with gold mineralization events. A **URTEC** UG 130 **Scintillometer** was used and the total field readings (all energy above 0.08 MeV) over a 1.0 second sample rate were taken every 100

Table 1. - VLF-EM ANOMALIES - North Sheet

Number	Probable Cause	Recommendation
1,1a	Sulphides/Graphite in a volcanopause near an important gold showing (Shallow River).	Drill Target Prospecting
2, 2a, 2b	Contact effects of Olivine Diabase Dyke.	
3	Mineralized flow top breccia (ftb) that originates in an outcrop area.	Prospecting
4, 4a	Mineralized or graphitic ftb, Strike fault	Prospecting
5	Mineralized or graphitic interflow or ftb buried in overburden	-
6	Mineralized or graphitic interflow or ftb near outcrop.	Prospecting
7, 7a	Mineralized or sheared base of Gabbro sill	Possible Drilling
8,8a	Mineralized interflow or ftb buried by overburden	-
9	Mineralized ftb &/or diabase/gabbro ct	Prospecting
10	Mineralized or graphitic interflow or ftb.	-
11, 11a	Possible synformal axis shear or ftb	Prospecting
12	Mineralized or graphitic interflow or ftb	Prospecting

Table 1a. VLF-EM ANOMALIES - South Sheet

Anomaly	Probable Cause	Recommendation
14	Mineralized or Graphitic interflow / ftb Continuation of Anomaly 10, North Sheet	-
15	Mineralized or sheared base of gabbro sill	Prospecting
16	Mineralized or graphitic interflow or ftb buried by overburden.	-
17	Mineralized or graphitic interflow or ftb buried by overburden	-
18, 18a	Mineralized or graphitic interflow or ftb	Prospecting
19, 19a	Mineralized or graphitic interflow or ftb	Prospecting
20	Graphitic interflow drilled by AMAX	Prospecting
21, 21a	Mineralized or graphitic interflow or ftb	Prospecting
22,22a	Graphitic interflow drilled by AMAX	Prospecting
23, 23a, b	Mineralized or graphitic interflow or ftb	Prospecting
24	Pyritic flow top breccia in outcrop	Prospecting
25	Probable conductive fault zone as suggested by Satterly (Pipestone?)	Drill Target
26	Possible fault zone buried by overburden	-
27	Contact effects of olivine diabase dyke. Continuation of Anomaly 2, North Sheet.	-
28	Contact effects of olivine diabase dyke.	-

feet along all the crosslines. In all, 4,186 stations were read. The readings were tied into the base stations and corrected for diurnal drift using the time - linear method. The general topography, vegetation, and outcrop areas were also charted during the course of the survey. A summary of the URTEC UG130 Scintillometer's specifications is appended.

The **results** of the radiometric survey are plotted on two maps (1"=400'), in the back pocket. The total field readings ranged from 18 to 105 counts per second for the entire survey area. The readings can be easily grouped into distinct populations based on the the rock types in outcrop areas and the overburden conditions elsewhere. The lowest readings (18-25 cps) always occur over open water such as beaver ponds (L.822812) and wet, swampy areas (southern half of L.822819). Low areas vegetated with alder and/or spruce typically ranged between 20 and 45 cps. Areas underlain by outwash sand deposits and covered by birch trees (L.802298) typically had very consistent values between 50 and 60 counts per second. In the clay-rich areas usually forested by poplar, the reading range between 60 and 100 counts per second. The highest readings occur over the thickest clay deposits, reflecting the high potassium levels in the clays.

Most of the outcrop areas returned total count readings averaging between 30 and 70 cps. The basaltic flows ranged from 35 to 65 cps while the olivine diabase ranged between 30 and 40 cps. Three 100+ readings in outcrop areas were found within the South Sheet map area : at 60E, 24S; 72E, 14S; and 72E, 24S. These anomalous highs could represent lamprophyre dykes, feldspar porphyry dykes, or sericite alteration zones and should be followed-up during future prospecting and/or mapping surveys.

N.E. Group - CONCLUSIONS & RECOMENDATIONS

Preliminary 'first stage' exploration that included VLF-EM and Radiometric surveys was completed over part of Maude Lake Gold Mines' **NORTHEAST GROUP** of claims in Beatty and Coulson Townships, Larder Lake Mining Division, Ontario. The results of the work have not only assisted the geological understanding of the area, but also located specific geophysical targets that warrent follow-up exploration.

The VLF-EM results located three distinct sets of anomalies: a west-northwest set that likely reflect the volcanic stratigraphy (graphitic interflows, mineralized flow top breccias, conductive strike faults); an east-northeast set that trace the contacts of an olivine diabase dyke; and, an easterly set that may locate conductive cross-structures. It is recommended that most of these anomalies be further evaluated by detailed prospecting and geological mapping methods. Three are recommended as potential drill targets.

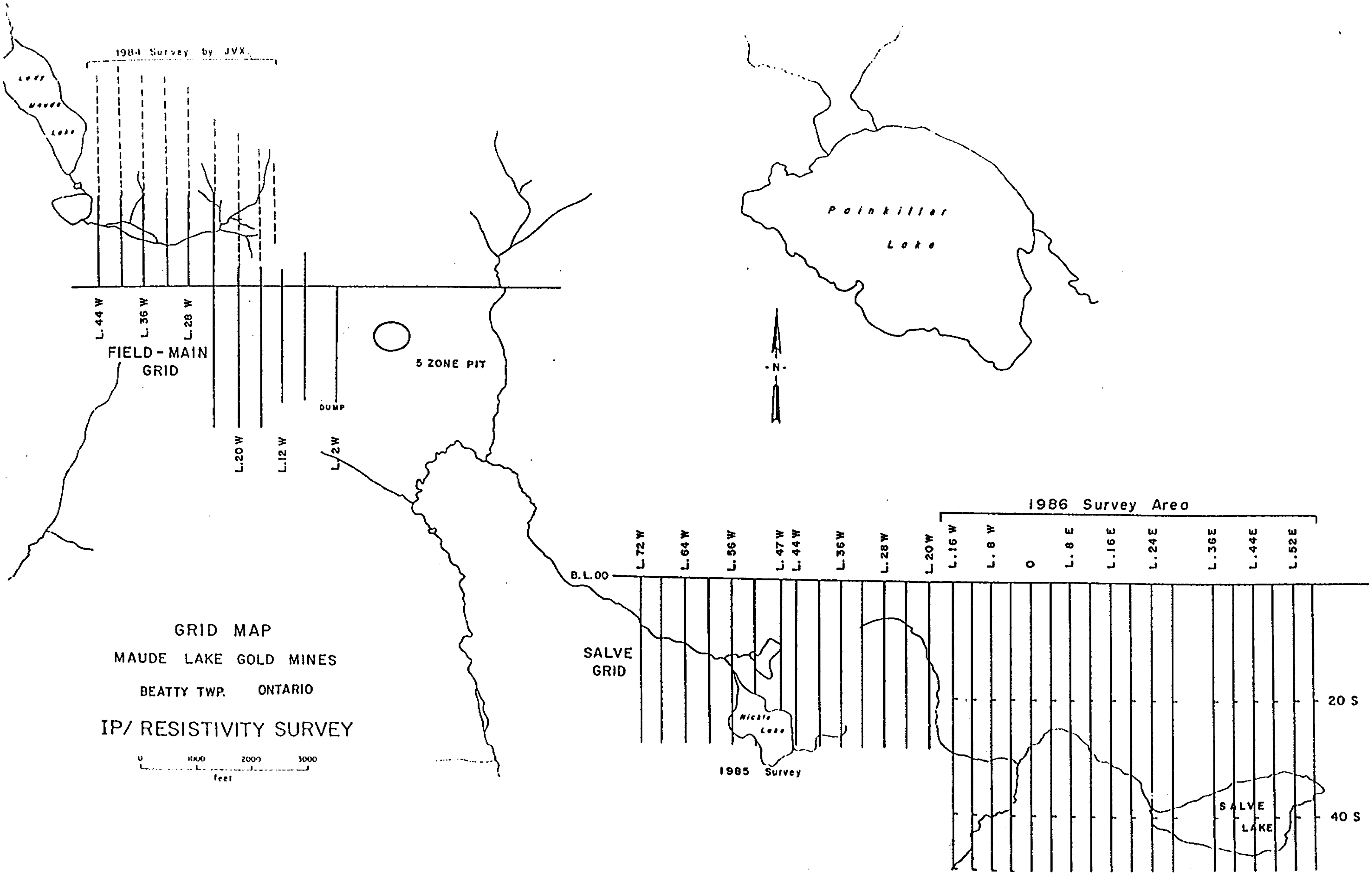
The radiometric survey located three weakly anomalous areas that can be followed-up by geological mapping.

Part B - *IP/RESISTIVITY SURVEY* - *Salve Group*

A detailed Induced Polarization/Resistivity Survey was completed over the Salve Lake portion of the Salve Group of claims between December 5th and December 13th, 1986 by JVX Limited of Thornhill, Ontario. The Scintrex IPR-11 Time Domain Microprocessor-based Receiver and the Scintrex TSQ-3 three kw Time Domain Transmitter was employed. Instrument specifications for the IPR-11 Recieiver and the TSQ-3 Transmitter are appended.

The IP Survey employed the time domain method with a pole/dipole array and an 'a'-spacing of 200 feet. Six potential dipoles (n=1 to n=6) were read over 8 miles of picket line. In addition, a gradient array with the same 'a'-spacing was read over 3.5 line-miles to test the effectiveness of the array in penetrating the thick, conductive clays under Salve Lake. A location map of the IP Survey area is provided overleaf.

The **objectives** of the survey were to extend the IP coverage along the Pipestone Break, to assist the geological understanding and, to map any areas of disseminated sulphide mineralization. The results of earlier IP surveys showed that the Pipestone Fault and associated ultramafics are marked by a broad and strong chargeability high - resistivity low. The 5 Zone Gold Deposit is marked by a very subtle east-west trending chargeability increase and resistivity decrease on the south flank or shoulder of the strong ultramafic IP feature. This small chargeability high reflects the slight increase in disseminated sulphides associated with the 5 Zone mineralization, and the resistivity decrease may reflect the structural effects. However, parts of the Deposit donot show any resistivity effects and this may be the result of silicification of the lavas off-setting the structural effects. Of course, it is


1984 Survey by JVX
Lady Maude Lake
L. 44 W
L. 36 W
L. 28 W
FIELD - MAIN GRID
L. 20 W
L. 12 W
L. 2 W
DUMP
5 ZONE PIT
Painkiller Lake
N
1986 Survey Area
B. L. 00
L. 72 W
L. 64 W
L. 56 W
L. 47 W
L. 44 W
L. 36 W
L. 28 W
L. 20 W
L. 16 W
L. 8 W
0
L. 8 E
L. 16 E
L. 24 E
L. 36E
L. 44E
L. 52E
SALVE GRID
Nickle Lake
1985 Survey
20 S
40 S
SALVE LAKE
GRID MAP
MAUDE LAKE GOLD MINES
BEATTY TWP. ONTARIO
IP/ RESISTIVITY SURVEY
0 1000 2000 3000
feet

recognized that several other physical conditions could yield the same IP responses, ie: graphitic horizons, mineralized flow top breccias, mineralized interflow sedimentary horizons, narrow conductive shear zones, and conductive overburden.

RESULTS

The **results** of the IP survey are illustrated on the psuedo-sections and Plates 1 through 3, in back pocket. The COMPILATION MAP , Plate 3 was interpreted by Blaine Webster of JVX Limited with the author making a few minor amendments and adding the topographical features.

In general, the IP data shows that the Salve Lake area is buried under a significant cover of conductive overburden. However, some important IP/Resistivity features can be identified.

ZONE C-10 is the most prominant IP anomalous zone. It stretches from Line 16W to 36E and may be evidenced on Line 52E from the gradient data. The C-10 anomaly is characterized by very weak to weak chargeability values and a very weak resistivity low. Anomaly C-10 is interpreted to be caused by the Pipestone Break/ultramafics and should be systematically diamond drill tested along its southern contact.

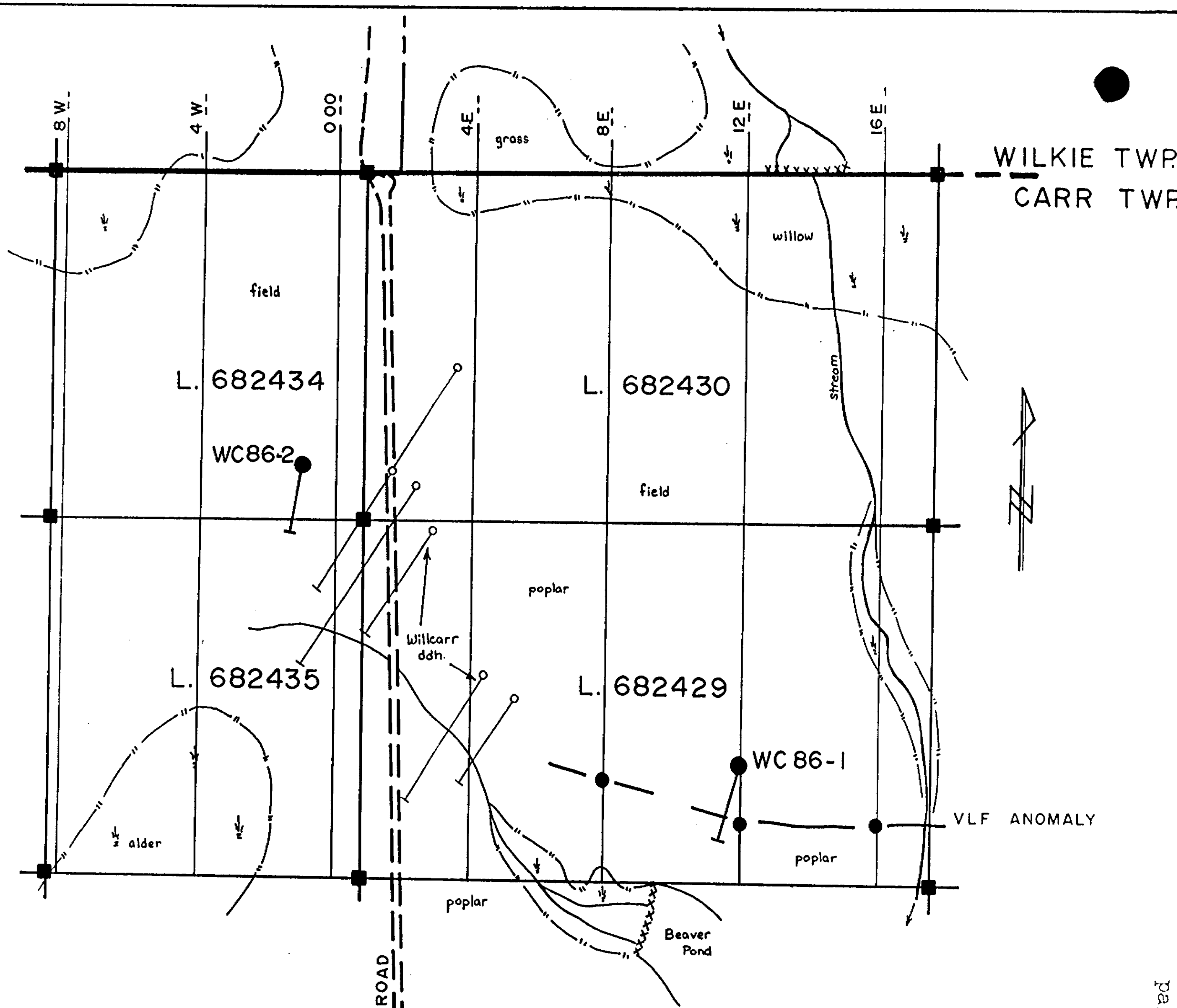
ZONE C-10A is a very subtle but significant "shoulder" chargeability anomaly. A borehole drilled in 1985 by the Company (Hole 85-15 collared at 32+00W, 28+00S, -52°N) intersected significantly anomalous gold values in a weakly graphitic, ankeritic and sericitic basalt breccia. C-10A may be an extension of this mineralization and should be diamond drill tested. Zones C-10B, C, D, and E are single line, very weak anomalies and their causes are not interpretable with the current data base.

ZONE C-11 is a very weak anomalous IP zone near the southern end of Lines 8E through 16E. The survey coverage did not provide a complete definition of the Zone and it is unclear if the cause of the anomaly is a background change in the bedrock or a narrow sulphide horizon. Anomaly C-11 should be diamond drill tested.

ZONES C-12 and 12A are very strong IP anomalies along the northern edge of the survey area. They occur close to an overburden/outcrop interface and may be caused by overburden contrasts rather than sulphide mineralization. Since both anomalies occur near bedrock outcropping, surface prospecting would be the best 'next-step' of evaluation.

PART C - *EXPLORATION DIAMOND DRILLING*

Seven diamond drill holes totalling 3,755 feet were drilled on Maude Lake's OUTSIDE PROPERTIES between November 5th, 1987 and February 3rd, 1987 by McKnight Diamond Drilling Limited of Haileybury, Ontario. A Longyear "38" wire-line drill was used, the core size was BQ, and acid dip tests were taken every 200 feet of hole length. Individual borehole logs and sections describing the geology and assay results are appended. All the core, sample pulps and rejects are stored at Maude Lake's office in Matheson.



Scale: 1" = 400'

LOCATION PLAN

DEC. 1986

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The **objectives** of the exploration drilling were to test buried 'known' gold mineralization and alteration zones, to test selected IP-indicated gold targets, and to explore untested geology south of the Pipestone Break.

DRILLING RESULTS

<u>**Borehole WC86-1**</u> - 12+00E, 76+50S; -50° @ 190° Az for 350 feet.

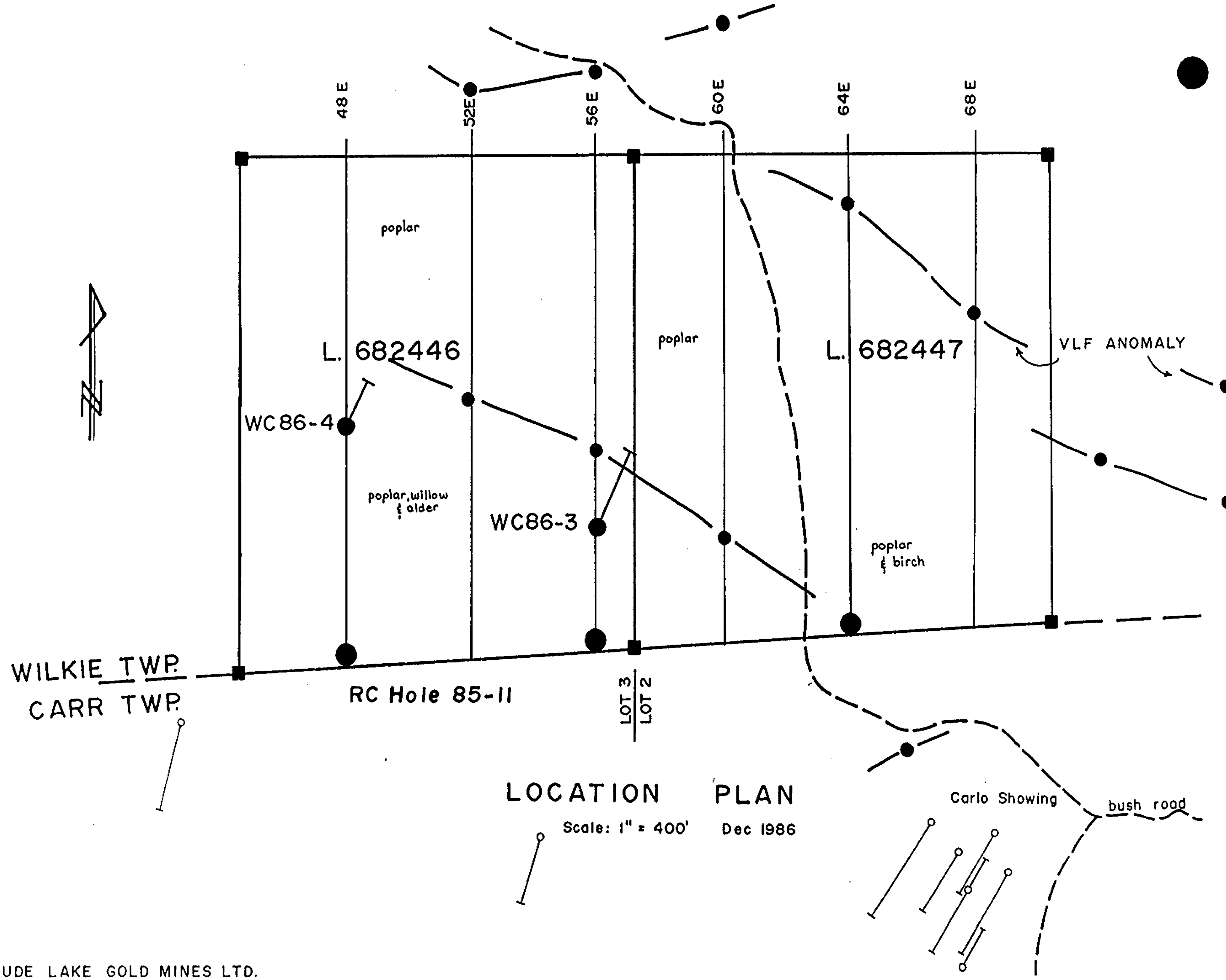
This hole was drilled to test an east-west striking VLF cross-over anomaly approximately 800 feet east of a "known" gold occurrence (.20 troy oz/ton Au over 1.2 ft in Wilcarr Hole #31).

WC86-1 intersected medium grained, well bedded to graded (tops north), grey, typically massive greywacke with minor interbedded siltstone. A few sections of the hole showed weak to moderate sericite alteration which turned the sediments a 'buff' colour. A few quartz veins and quartz-calcite breccia zones carried minor disseminated sulphides but no significant gold assays were returned from the hole. The VLF cross-over was not explained and no further work is recommended for this anomaly.

Borehole WC86-2 - 1+00W, 68+50S, -55° @ 190° Az for 350 ft.

This hole was drilled to sample a weakly auriferrous, highly carbonatized and sericitized section of metasediments described in old Wilcarr Holes 22, 28, 29 and 30.

Most of Hole WC86-2 intersected highly sericitized and calcic greywackes and interbedded siltstones. A few sections carried narrow white quartz-calcite



LOCATION PLAN

Scale: 1" = 400' Dec 1986

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veinlets with minor pyrite. The best assay returned only 0.018 troy oz/ton Au over 3 feet at 116 feet. Prior to any further diamond drilling of this large alteration zone, it is recommended that an IP/Resistivity survey be completed over the area to locate disseminated sulphide mineralization.

Borehole WC86-3 - 56+00E, 52+00S, -50° at 25° Az for 400 feet.

This hole was drilled to test a weak VLF-EM cross-over anomaly near the interpreted location of the Pipestone Break.

WC86-3 intersected fine grained, grey-green, massive to pillowed tholeiitic basalts and basaltic pillow breccias with a few quartz filled fractures carrying minor disseminated pyrite. No significant gold assays were returned. It is likely that the VLF cross-over was caused by overburden contrasts. Perhaps the best 'next step' evaluation for this area would be IP coverage to locate the Break and sulphide mineralization - alteration.

Borehole WC86-4 - 48+00E, 49+00S, -55° at 25° Az for 255 feet.

This hole was drilled to test a VLF cross-over anomaly immediately 'up-ice' from an anomalous reverse circulation drill hole till sample. The heavy mineral grain count from RC Hole 85-11 gave 9 gold (4 irregular), 5 galena, 15 arsenopyrite, 20 marcasite, and 5% pyrite. The concentrate assayed 0.432 oz/ton.

WC86-4 collared in magnesium-rich basaltic komatiites that became very highly altered and riddled with quartz-carbonate veinlets north of a 3 ft wide serpentine-chlorite-calcite mud fault zone. The hole entered a Matachewan-type diabase dyke at 130 ft and the hole was stoped at 255 ft, still in diabase. The target was not reached. It is recommended that this area also be IP surveyed to help locate the source of the anomalous tills. It is further recommended that a detailed magnetometer survey be done to held locate the north-striking diabase dykes.

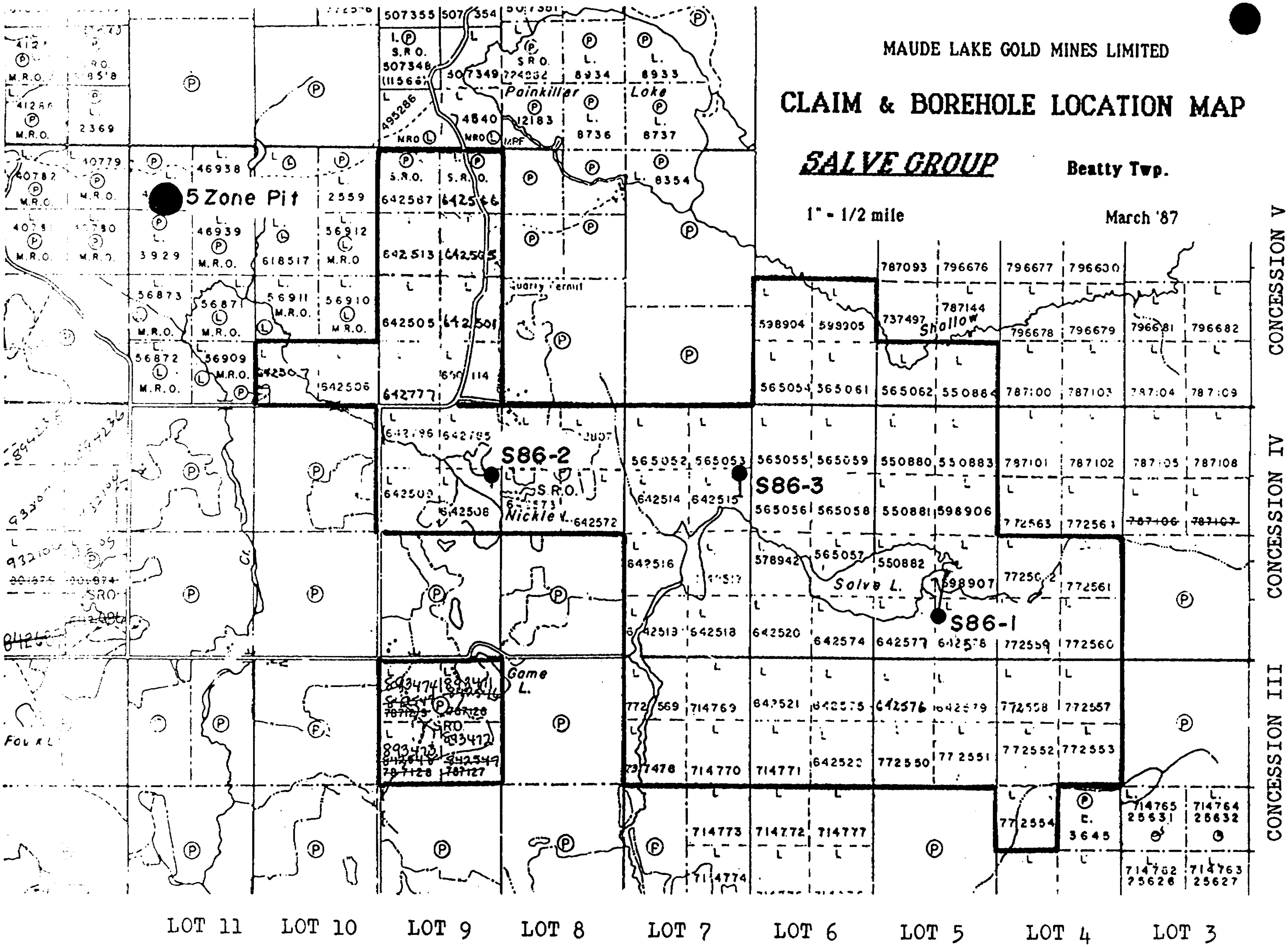
Borehole S86-1 - 46+00E, 50+00S, -45° at 15° Az for 1,545 ft.

This hole was drilled to explore the geology beneath Salve Lake and to test an airborne EM anomaly shown on OGS Map 80585.

S86-1 collared in fine grained, fresh, massive, and pillowed andesites. The lavas become buff coloured adjacent to quartz-calcite veinlets and fracture fillings, but these altered zones failed to yield any significant gold assays. Only one of the many white quartz veins returned all but background gold assays: 0.023 troy oz/ton Au over 1.5 feet at 812 feet. The .5 ft wide chloritic mud/fault zone at 1077 ft is weakly conductive but certainly not enough to produce an air-EM anomaly. A 15 ft wide grey feldspar - quartz porphyry dyke was intersected at 1493 ft and the hole bottomed at 1545 ft in pillow breccia. The hole was stopped due to drilling equipment limitations and should be deepened 500 ft to test the gradient IP anomaly under the Lake.

Borehole S86-2 47+00W, 16+60S, -62°S for 150 feet.

This hole was drilled to test the best 'shoulder' IP chargeability/resistivity anomaly encountered to date. Hole 85-16 attempted to test this target last year, but the hole had to be abandoned at 250 ft in sand. It was originally


MAUDE LAKE GOLD MINES LIMITED
CLAIM & BOREHOLE LOCATION MAP
SALVE GROUP
Beatty Twp.
1" = 1/2 mile
March '87
5 Zone Pit
S86-1
S86-2
S86-3
Painkiller Lake
Shallow
Solve L.
Nickle L.
Game L.
CONCESSION V
CONCESSION IV
CONCESSION III
LOT 11
LOT 10
LOT 9
LOT 8
LOT 7
LOT 6
LOT 5
LOT 4
LOT 3

planned to drill the anomaly off the ice of Nickle Lake. Unfortunately, this was not possible due to the unusually mild winter conditions.

S86-1 was lost in sand at 150 feet due to drilling equipment limitations and had to be abandoned. This priority anomaly must be diamond drill tested. It is recommended that a larger diamond drill capable of penetrating at least 300 ft of overburden, with experienced deep-overburden drill crews be contracted to complete at least 2 holes into this target.

Borehole S86-3 4+00E, 17+00S, -40°S for 605 ft.

This hole was drilled to test two weak IP anomalies: the eastern extension of C-10D, and a weak resistivity low north of the Pipestone.

S86-3 collared in massive to pillowed basalt with a few fracture fill-type quartz calcite veinlets. The hole intersected a 7 ft wide graphitic flow top breccia/volcanopause with significant pyrite mineralization at 551 ft which likely explains the IP response. The hole bottomed at 605 ft in weakly altered and fractured pillow basalt. It is recommended that S86-3 be deeped approximately 1000 feet to test IP Anomaly C-10.

March 26, 1987

Matheson, Ontario

REFERENCES

1. Bennett, Robert A., PEng.

   - 1981 Exploration Report [OMEP], August 31, 1981
   - Salve Lake Group- Magnetometer Survey, Dec. 31, 1981
   - Salve Lake Group, Geology & VLF-EM Survey Report, Sept 28, 1982
   - Salve West Claim Group - Report on Exploration, March 19, 1983
   - Salve South Claim Group - Report on Exploration, May 18, 1983
   - Exploration Report - Wilkie-Carr Group, December 28, 1984
   - 1984 Report on Exploration [OMEP], February 12, 1985
   - 1985 Report on Exploration [OMEP], December 20, 1985

2. JVX Limited (Blaine Webster)

   - IP/Resistivity Survey- NW Main Group, September 1984
   - IP/Resistivity Survey - Main and Salve West Groups, June 1985

3. MacNeal, K. (Overburden Drilling Management Ltd)

   - Heavy Mineral Gold Anomalies from R.C. Drilling, September 1985

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   - Assessment File Reports and Maps

5. Prest, K. V.

   - Geology of the Carr Township Area, ODM Vol LX, Part IV - 1951

6. Satterly, J. and Armstrong, H.

   - Geology of Beatty Township, ODM Vol LVI, Part VII - 1947

R. A. BENNETT MSc., PEng.
Consulting Geologist

577 Pearson Street
RR#4, Site 37, Box 1
Sudbury, Ontario
P3E 4M9
705-522-7682

CERTIFICATE OF QUALIFICATIONS

I, Robert A. Bennett do hereby certify that:

1. I reside at 577 Pearson Street, Sudbury, Ontario, P3E 4M9

2. I am a member in good standing of:
   - The Association of Professional Engineers of the Province of Ontario
   - The Canadian Institute of Mining and Metallurgy, and
   - The Prospector's and Developers Association of Canada.

3. I am a graduate of the Haileybury School of Mines' two year MINING TECHNOLOGY program(1967); and I hold an honours Bachelor of Science Degree in GEOLOGICAL ENGINEERING (1970), and a Masters of Science Degree in ECONOMIC GEOLOGY from Michigan Technological University.

4. I have been continuously engaged in my profession since graduation as a mining company explorationist and as an independent consultant.

5. The foregoing report entitled " **1986 Report on Exploration**" for Maude Lake Gold Mines Limited dated March 26, 1987 is based on:
   a) - My knowledge of the Property through direct supervision of all the Maude Lake operations described herein,
   b) - Published government reports and maps, and unpublished Private Company Reports by myself and other professionals as listed on page 28 of this Report, and
   c) - My personal knowledge of the Abitibi Greenstone Belt from 16 years of continuous geological work throughout the area.

6. I am a director and shareholder in private company Maude Lake Gold Mines Limited.

REGISTERED PROFESSIONAL ENGINEER
R. A. BENNETT
PROVINCE OF ONTARIO

Dated this 26th day of March in the Year 1987 at Matheson, Ontario.

Robert A. Bennett, MSc., PEng.
Consulting Geologist

APPENDIX

1986 Exploration Borehole Logs

WC86-1 and Drill Section (1"=50')

WC86-2 and Drill Section (1"=50')

WC86-3 and Drill Section (1"=50')

WC86-4 and Drill Section (1"=50')

S86-1 - Drill Section (1"=50') in pocket

S86-2

S86-3 and Drill Section (1"=50')

Instrument Specifications

PHOENIX VLF-2 Electromagnetic Unit

URTEC UG130 Scintillometer

SCINTREX IPR-11 Receiver

SCINTREX TSQ-3 Transmitter

MAUDE LAKE GOLD MINES LIMITED

WILKIE-CARR

1986 BOREHOLE LOG SUMMARY

WC86-1

HOLE # WC86-1 CO-OR 12E.76+50S DIP 50 @190 Az LENGTH 350 ft.

FOOTAGE ft	GEOLOGY	CA	SAMPLE #	ASSAY troy opt	Other
0-67	Overburden, Start of core				DIP TESTS
67-79.6	Greywacke-fg, gy, locally bxt'd- bedding @	35			200'- 50
79.6-81.6	Altd Gwke- buff colour (sericite), bedding @	60	50557	.002	350'- 50
	Locally bxtd + a 1" white qv @ 60				
81.6-83	Altd Gwke as above				
83.0-101.1	Gwke-mg, gy, wkly calcic, few white qc vnlts	30			
	Few cherty silt beds suggest TOPS UP HOLE.				
101.1-104.8	Altd Gwke-buff, mg, occ bedding @39, LC @	36			
104.8-109	Altd Siltstone-vfg, Strong buff altn centered	85	50558	tr	
	around a .5" and a .75" white qtz vein				
109-111	Altd Siltstone-as above, white qv	50	50559	tr	
111-113	Altd Gwke-buff,wkly altd,mg, few qc vnlts	60			
113-151.0	Gwke-grey, mg, massive + few qc vnlts				
151.0-155	Altd Gwke-buff,mg,wkly altd,+ few qtz vnlts		50560	tr	
155-158.5	Altd Gwke-buff with 1" qtz vn + py,po,cpy	62	50561	tr	cpy
158.5-168.8	Gwke-massive, gy, poorly bedded, LC @	55			
168.8-172	Gwky-very wkly buff altd				
172-172.5	Gwky-as above + 1.5" white qtz vn @	65	50562	tr	
172.5-177.7	Gwky-vwkly altd as above				
177.7-203.7	Gwky-massive, gy, poorly bedded, few qv				
203.7-222.5	Gwky-vwkly buff altd, m-cg, 3" qtz bx @ 219.5				
222.5-223.7	Siltstone-vfg,wkly buff altd, Well bedded @	30°			
223.7-225	Gwky-fresh with few qc vnlts				
225-225.5	Gwky-fresh as above + bx zone & 2 qtz vnlts	59	50563	tr	
225.5-232	Siltstone with 20% interbedded gwke	35			
	Graded bedding show tops to the North				
232-234.6	Altd Gwke-mod buff(sericite) + qc bx, qtz vns	66	50564	tr	
234.6-237.6	Qtz-Carb-Bx with several qv & fine diss py	66	50565	tr	
237.6-247	Altd Gwke-mod buff altn as above				
247-248	Altd Gwke-as above + 2" qv with dissem py	70	50566	tr	
248-267	Gwke-wkly buff altd, massive, buff, diss py				
267-270	Gwke-as above + svrl qtz veins	75	50567	tr	
270-283	Gwke-wkly buff altd as above				
283-283.7	Gwke with a chlorite slip @ 17 in silty bed				
283.7-285.5	Gwke-wkly buff altd,massive				
285.5-288	Gwky-as above + qv with py	60	50568	tr	
288-293	Gwky-wkly buff altd as above				

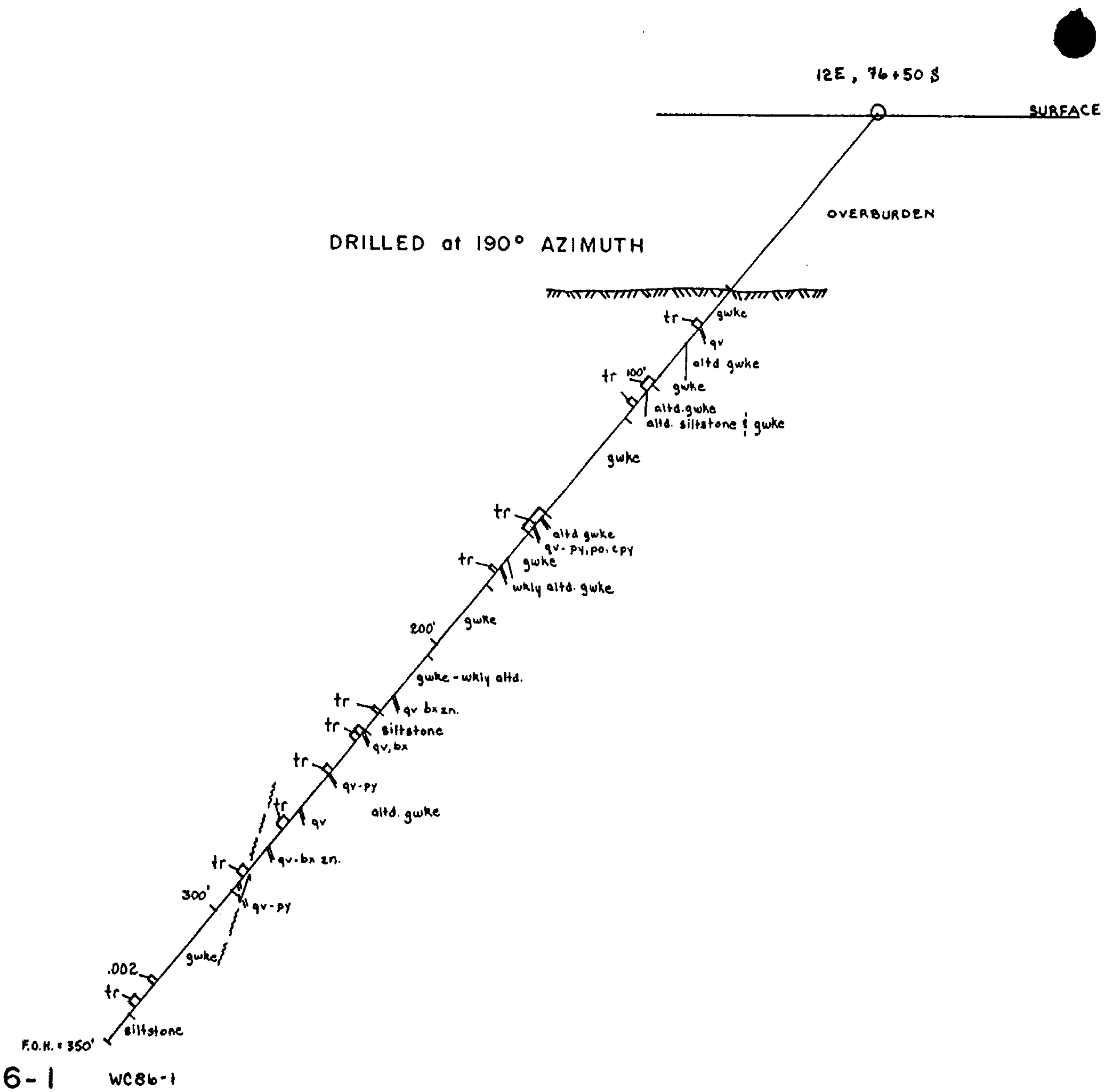
continued

293-325	Gwke-gy, massive, few narrow qtz vnlts		
325-327	Gwke-wkly buff altd		
327-328	Gwke-wkly buff altd as above + bx zone	50569	.002
328-334	Gwke-wkly buff altd as above		
334-337	Gwke-wkly buff altd as above	50570	tr
337-350	Siltstone-vfg, gy to wk buff, well bedded @ 32°		

350' - FOOT OF HOLE

WC86-1 started drilling November 5/86 and was completed November 7/86.

WC86-1 drilled on Claim L.682429, approximately 560 ft West and 650 ft South from the Number 1 Post.



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WILKIE-CARR GROUP

DRILL SECTION - HOLE WC86-1

Scale : 1" = 50'

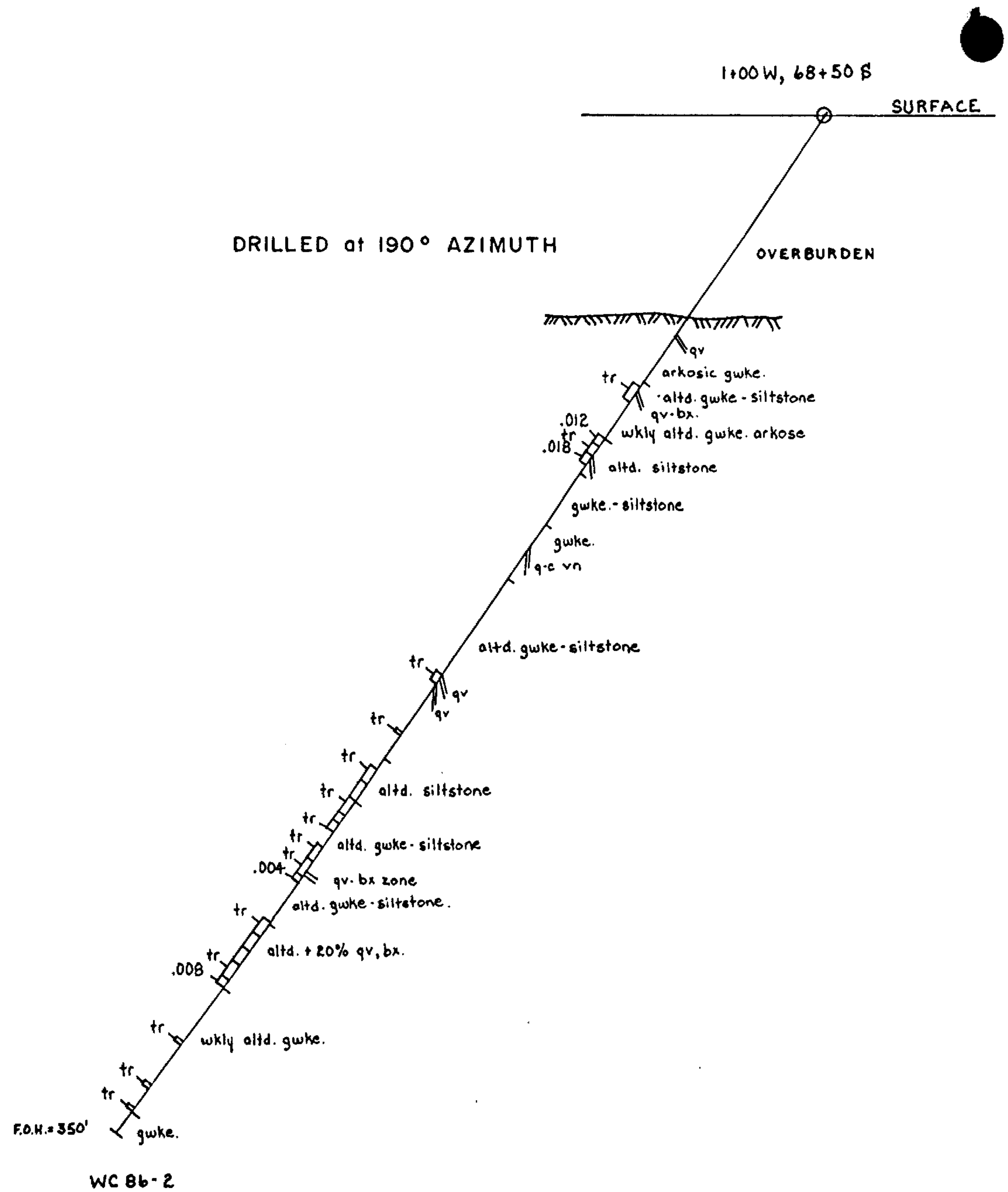
DEC 1986

MAUDE LAKE GOLD MINES LIMITED — WILKIE-CARR

1986 BOREHOLE LOG SUMMARY — WC86-2

HOLE #WC86-2 CO-OR 1W, 68+50S DIP 55 @190 Az LENGTH 350 ft.

FOOTAGE ft	GEOLOGY	CA	SAMPLE #	ASSAY troy opt	Other
0-70	Overburden, Start of core				**DIP TESTS**
70-90.5	Arkosic Gwke-gy,m-cg,poorly bedded + few qv	70			200' - 55
90.5-93.5	Altd Gwke & Siltstone-buff, well bedded @	42			350' - 53
93.5-98.5	Altd Gwke as above + 10" qv & bx zone	55	50571	tr	
98.5-110	Gwke-very wkly buff altd, few q-c vnlts				
110-113	Altd Siltstone-buff, good bx zone, minor py		50572	.012	
113-116	Altd Siltstone-as above + qv		50573	tr	
116-119	Altd Siltstone-as above + 2" qv	40	50574	.018	
119-122	Altd Siltstone-as above				
122-140	Gwke + interbedded silty beds, well bedded @	40			Nov 7-9/86.
140-159	Gwke-gy, m-cg, poorly bedded, few qc vnlts @	45			
159-192.5	Altd Gwke-buff, sericite altn, interbded silt.	45			Cl. L.682434
192.5-193.5	Altd Gwke as above + qtz vns @ 30&50 deg		50575	tr	200'W and
193.5-210	Altd Gwke as above				870'S of #1
210-210.5	Altd Gwke as above + qtz vein		50576	tr	Post.
210.5-220	Altd Gwke as above				
220-223	Altd Siltstone-buff sericite altn, bedding @	40			
223-228	Altd Siltstone as above, 40% qtz + qtz vns,	0-65	50577	tr	
228-233	Altd Siltstone as above		50578	tr	
233-238	Altd Gwke- buff + svrl white & gy qtz, qcvns	60	50579	tr	
238-241	Altd Gwke as above		50580	tr	
241-244	Altd Gwke-as above		50581	tr	
244-249	Altd Gwke-as above				
249-254	Altd Gwke-as above		50582	tr	
254-259	Altd Gwke-as above		50583	tr	
259-261	Altd Gwke-as above+nice qv & bx zone,py		50584	.004	
261-275	Altd Gwke-buff,as above				
275-280	Altd Gwke-highly sericite altd,20% q-bx zones	70	50585	tr	
280-285	Altd Gwke-highly altd as above		50586	tr	
285-290	Altd Gwke-highly altdn as above		50587	tr	
290-295	Altd Gwke-highly altd as above		50588	tr	
295-299	Altd Gwke-highly altd as above		50589	.008	
299-299.5	Altd Gwke-highly altd as above				
299.5-317.5	Gwke-weak buff altn, minor silty beds	40			
317.5-318.5	Gwke-weak buff altn as above		50590	tr	
318.5-332	Gwke-weak buff altn as above				
332-333	Gwke-weak buff altn as above		50591	tr	
333-342	Gwke as above but altn decreasing down hole				
342-343	Gwke as above		50592	tr	
343-350	Gwke -gy, mg, massive, fresh				
	350 - FOOT OF HOLE				



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WILKIE-CARR GROUP

DRILL SECTION - HOLE WC86-2

Scale: 1" = 50'

DEC 1986

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1986 BOREHOLE LOG SUMMARY

WC86-3

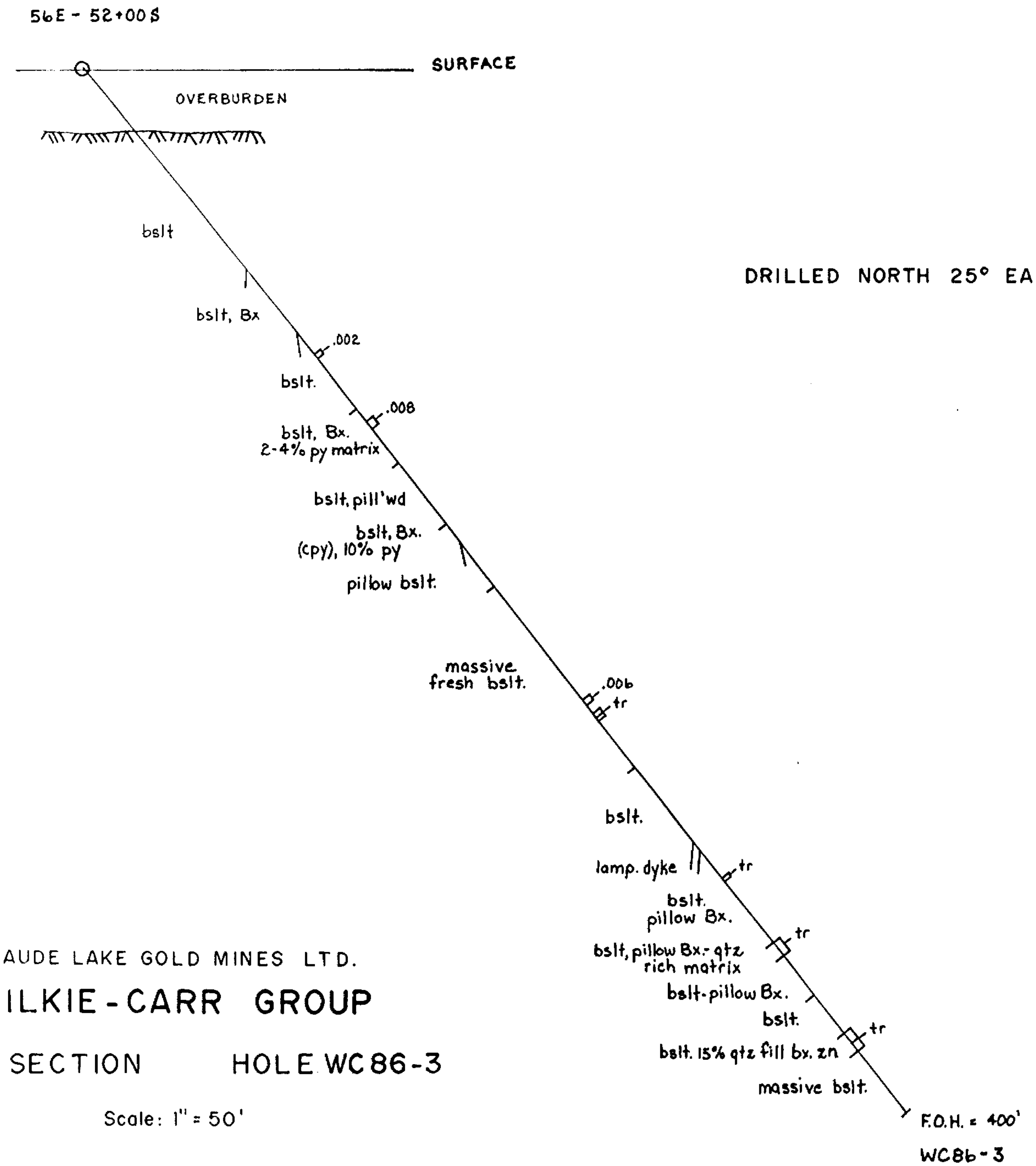
HOLE # WC86-3 **CO-OR 56E,52S** **DIP 50 @25 Az** **LENGTH 400 ft.**

FOOTAGE ft	GEOLOGY	CA	SAMPLE #	ASSAY troy opt	Other
0-25	Overburden, Start of core				**DIP TESTS**
25-79.1	Basalt- pale gy-grn, vfg-mg, locally bxt'd, LC @42				200' - 52
79.1-103.8	Bslt Bx-pale grn, pillow bx, loc shrd sharp LC	30			400' - 51
103.8-110.5	Bslt-loc bxt'd, fg, grn-gy, pillowed, few varioles				
110.5-112	Basalt as above + 4" qc vnlt	50	50598	.002	
112-132	Basalt-loc bxt'd, fg, grn-gy as above				
132-136	Basalt Breccia - grn angular bslt clasts in a calcite-rich matrix with up to2-4% pyrite				
136-139	Bslt Breccia as above + few qc vnlts, py		50599	.008	
139-152.4	Bslt Breccia as above				
152.4-176.4	Bslt-pill'd, grn, fg, loc bxt'd. Marked fotn @	32			
176.4-183.1	Bslt Pillow Breccia +calc, py(loc 10%), LC @	27			cpy
183.1-199	Bslt-pillowed, fg, dark grn, wkly fotd,qc vn @	30			
199-242.5	Bslt-mass, dark grn, chlc,wkly fold, amygd.				
242.5-244	Bslt-massive as above with qtz vnlts @ 40-60		50600	.006	
244-247	Bslt-massive, dk grn chloritic as above				
247-248.5	Bslt-massive as above + qtz vnlt		50084	tr	
249-250	Bslt-massive as above + qtz vnlt		50085	tr	
250-268	Bslt-massive, dk grn, chlc, few amygdules				
268-297.7	Bslt-mass, grn, vwkly fotd & sericitic, LC @	45			
297.7-300.6	Lamprophyre Dyke-biotite rich, f-mg, LC @	45			
300.6-310	Basalt Pillow Bx- fg, grn, few calc fract fills	40			
310-311	Basalt Pillow Breccia as above		50086	tr	
311-335.5	Basalt Pillow Breccia as above				
335.5-340.5	Bslt Pillow Bx with qtz rich matrix &py xl's		50087	tr	
340.5-355.5	Bslt Pillow Bx as before, dark grn				
355.5-369.3	Basalt-massive, dark grn, fg, minor calc slips				
369.3-373.5	Bslt with 15% qtz fill bx zones		50088	tr	
373.5-376.5	Bslt-qtz filled bx zones as above		50089	tr	
376.6-400	Bslt-mass, dark grn, few qtz swets & bx zones				

400' - FOOT OF HOLE

WC86-3 started drilling November 10/86 and was completed November 18/86.

WC86-3 drilled on Claim L.682426, approximately 100 ft West and 1.080 ft South from the Number 1 Post.



MAUDE LAKE GOLD MINES LTD.

WILKIE-CARR GROUP

DRILL SECTION HOLE WC86-3

Scale: 1" = 50'

DEC 1986

MAUDE LAKE GOLD MINES LIMITED

WILKIE-CARR

1986 BOREHOLE LOG SUMMARY

WC86-4

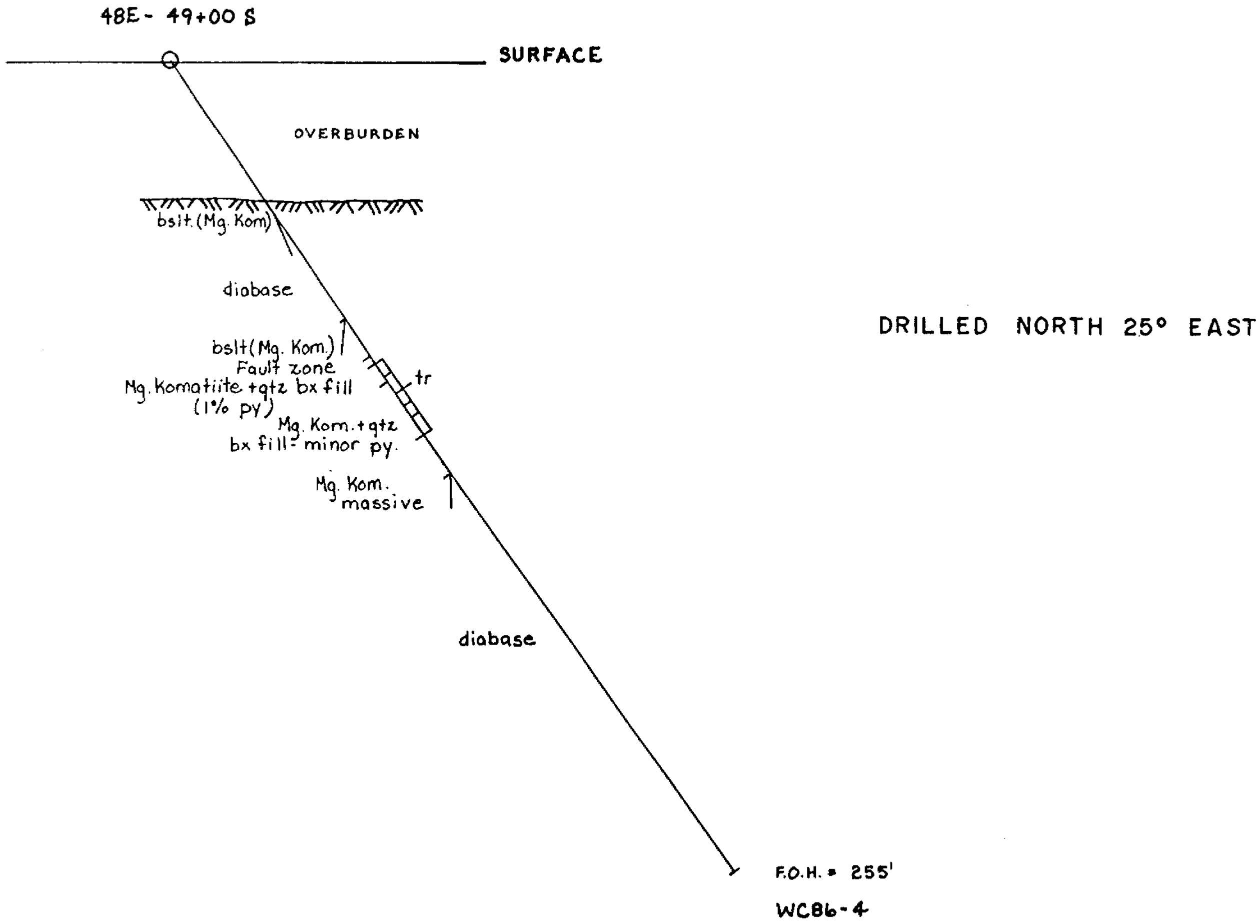
HOLE # WC86-4 CO-OR 48E, 49S DIP -55 @25 Az LENGTH 255 ft.

FOOTAGE ft	GEOLOGY	CA	SAMPLE #	ASSAY troy opt	Other
0-45	Overburden, Start of core				DIP TEST
45-49.5	Basaltic Komatiite (Mg-rich), dark grn, pill'd and locally brecciated. Sharp lower ct @	12			200' - 54
49.5-82	Diabase-Matachewan-type, vfg, dense, green, moderately magnetic. Good chill ct zone.				
82-92	Bslt Komatiite, fg, blk- grn, serpentinized				
92-95	FAULT ZONE- sheared serpentine-chlorite-calcite mud zone.				(1.5'missing)
95-96	Basaltic Komatiite -highly altd and qtz veined with upto 20% qc bx fill with 1% fine py				
96-99	Basaltic Komatiite as above		50593	tr	
99-104	Basaltic Kom as above; qtz bxdecreases to 3%		50594	tr	
104-108	Basaltic Kom as above, minor py, serpt'zd,foln	45	50595	tr	
108-112	Basaltic Komatiite as above		50596	tr	
112-117	Basaltic Komatiite as above		50597	tr	
117-129.5	Basaltic Kom- more massive, black grn, sharp LC @	35			
129.5-255	Diabase-Matachewan-type - dense, aphanitic to fg to mg with a few feldspar clots and epidote-rich fractures.				

255' - FOOT OF HOLE

WC86-4 started drilling November 19/86 and was completed November 22/86.

WC86-4 drilled on Claim L.682426, approximately 890 ft West and 850 ft South from the Number 1 Post.



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WILKIE-CARR GROUP

DRILL SECTION HOLE WC86-4

Scale: 1" = 50'

DEC 1986

MAUDE LAKE GOLD MINES LIMITED

SALVE

1986 BOREHOLE LOG SUMMARY

S86-2

HOLE # S86-1 CO-OR: 47W, 50S DIP -62°S LENGTH 150 ft.

FOOTAGE ft	GEOLOGY	CA	SAMPLE #	ASSAY troy opt	Other
0 - 150	Overburden - sand with minor gravel beds				

150' - FOOT OF HOLE

S86-2 started drilling December 6th, 1986 and was abandoned December 12, 1986.

S86-1 drilled on Claim L.642508, approximately 90 ft south and 140 ft west from the Number 1 Post.

VLF-2

Electromagnetic Unit

- Lightweight, low battery drain, rugged, simple to operate
- Two independent channels
- Each channel may select any station between 14.0 and 29.9 kHz
- Single crystal used for all frequencies
- Locking clinometer provides tilt-angle memory
- Superheterodyne detection and digital filtering provide extremely high selectivity and noise rejection

Military and time standard VLF transmitters are distributed over the world. These stations are used for geophysical EM surveying thus eliminating the need for a local transmitter and permitting one-man operation.

To ensure that a station excites the prospective conductor, two stations at approximately right angles are used during a survey (see data on back).

The choice of 160 frequencies in the range 14.0 to 29.9 kHz permits the use of a local EM transmitter when no suitable regular VLF station is available.

PHOENIX **GEOPHYSICS LIMITED**

Geophysical Consulting and Contracting, Instrument Manufacture, Sale and Lease.

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Specifications

Parameters Measured	Orientation and magnitude of the major and minor axes of the ellipse of polarization.
Frequency Selection, Front Panel	Dual channel, front panel selectable (F1 or F2) each with independent precision 10-turn dial gain control.
Frequency Selection, Internal	F1 and F2 can be selected by internal switches within the range 14.0 to 29.9 kHz in 100 Hz increments.
Detection And Filtering	Superheterodyne detection and digital filtering provide a much narrower bandwidth and thus greater rejection of interfering stations and 60 cycle noise than conventional receivers.
Meter Display	2 ranges: 0 to 300 or 0 to 1000. Background is typically set at 100. Meter is also used as dip angle null indicator and battery test.
Audio	Crystal speaker. 2500 Hz used as null indicator.
Clinometer	$\pm 90°$, $+0.5°$ resolution. Normal locking, push button release.
Battery	One standard 9v transistor radio battery. Average life expectancy - 1 to 3 months (battery drain is 3 mA)
Temperature Range	-40° to + 60° C.
Dimensions	8 x 22 x 14 cm (3 x 9 x 6 inches).
Weight	850 grams (1.9 pounds).

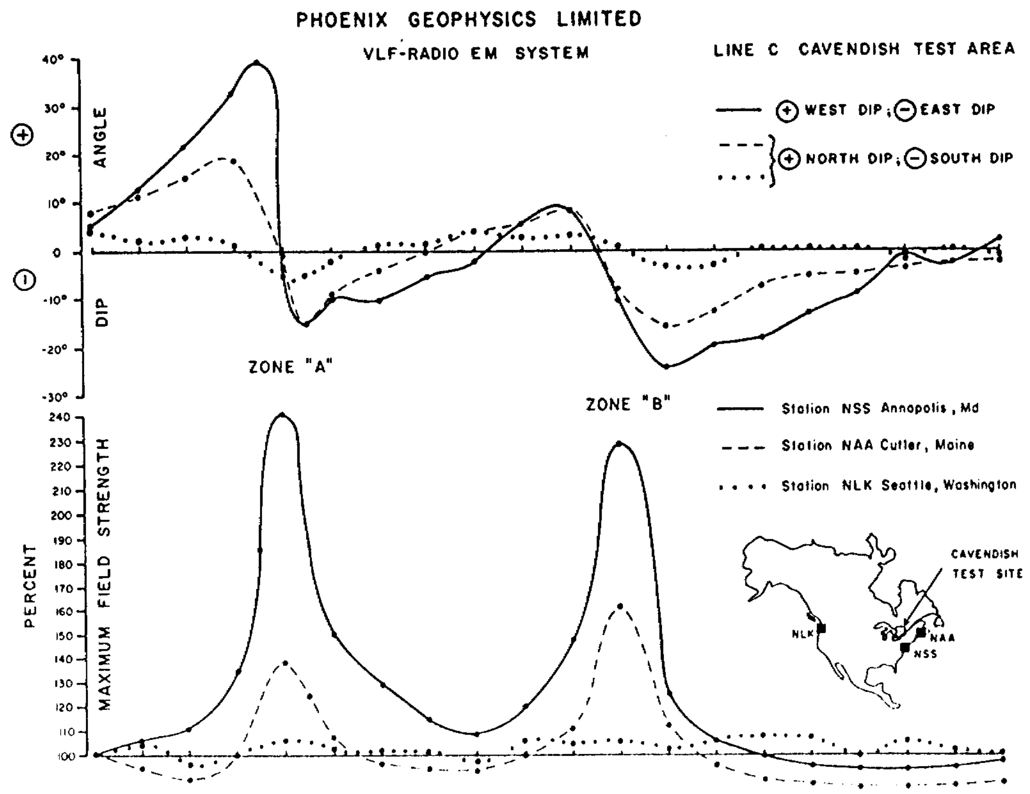
All of the established stations may be selected, or alternatively, a local VLF transmitter may be used which transmits at any frequency in the range 14.0 to 29.9 kHz.

VLF Station	Frequency (kHz)
Bordeaux, France	15.1
Odessa (Black Sea)	15.6
Rugby, U.K.	16.0
Moscow, U.S.S.R.	17.1
Yosamai, Japan	17.4
Hegaland, Norway	17.6
Cutler, Maine	17.8
Seattle, Washington	18.6
Malabar, Java	19.0
Oxford, U.K.	19.6
Paris, France	20.7
Annapolis, Maryland	21.4
Northwest Cape, Australia	22.3
Laulualei, Hawaii	23.4
Buenos Aires, Argentina	23.6
Rome, Italy	27.2

Field Data

The results below illustrate the need for using two orthogonal stations when the strike of the prospective conductor is not well-known. The dip angle and amplitude data measured using station NLK in Seattle, Washington, show only a very weak anomaly associated with the two conductive sulphide zones at Cavendish, Ontario.

The results obtained using Cutler, Maine reveal a more prominent anomaly, but the best response was obtained using Annapolis, Maryland since the station lies almost due south and the transmitted electromagnetic field is thus maximum-coupled with the North-South trending conductors.

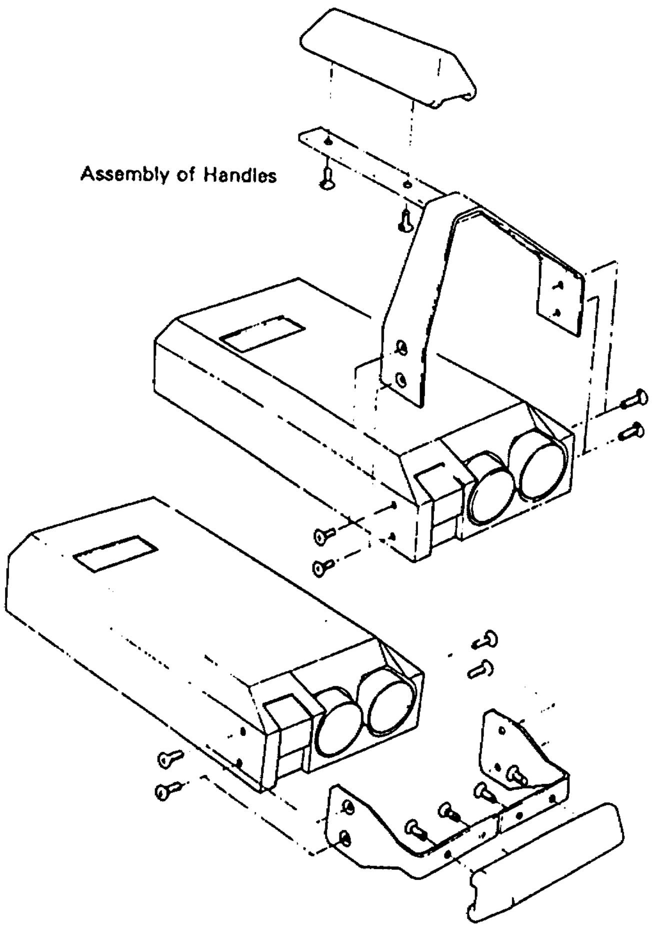


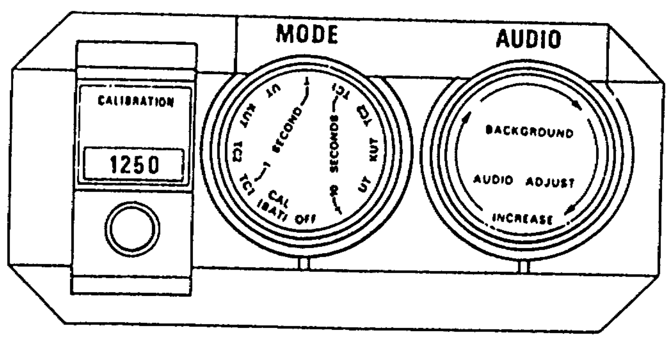
URTEC UG130 SCINTILLOMETER

Specifications

TECHNICAL SUMMARY

Selectable energy levels:	
CAL - Calibration	All energy above 0.30 MeV
TC1 - Total count I	All energy above 0.08 MeV
TC2 - Total count II	All energy above 0.40 MeV
KUT - Potassium + Uranium + Thorium	All energy above 1.36 MeV
UT - Uranium + Thorium	All energy above 1.66 MeV
T - Thorium	All energy above 2.46 MeV
Detector:	NaI (Tl) crystal; Volume, 66 cm^3 (4.0 cu in.), Mechanically ruggedized.
Spectral shift as a function of count rate:	3% or less from 0 CPS to 15000 CPS, Integrated over an energy interval from 80 keV to 1500 keV
Energy response linearity error:	Less than 2%
Visual display:	Ruggedized low temperature versiom five digit liquid crystal display. Readout in CPS regardless of selected sample rate. Excellent visibility in direct sunlight.
Display overflow:	When count exceeds 99999, two dots will indicate count rate overflow.
Sample rate:	1.0 or 10.0 seconds, auto recycle, for all energy levels, except the 'CAL' position
Power:	Three 'C' size alkaline batteries provide 40 hours continuous operation at 23°C ambient without audio.
Battery test monitor:	Three indicators provide battery charge status when required. When batteries are nearly discharged, a keyed audio alarm is activated, overriding count rate audio.
Audio:	The count rate may be monitored in a continuous mode or may be adjusted to monitor above any background threshold.





SCINTREX IPR-11 Broadband Time Domain IP Receiver

The microprocessor based IPR-11 is the heart of a highly efficient system for measuring, recording and processing spectral IP data. More features than any remotely similar instrument will help you enhance signal/noise, reduce errors and improve data interpretation. On top of all this, tests have shown that survey time may be cut in half, compared with the instrument you may now be using.

Function

The IPR-11 Broadband Time Domain IP Receiver is principally used in electrical (EIP) and magnetic (MIP) induced polarization surveys for disseminated base metal occurrences such as porphyry copper in acidic intrusives and lead-zinc deposits in carbonate rocks. In addition, this receiver is used in geoelectrical surveying for deep groundwater or geothermal resources. For these latter targets, the induced polarization measurements may be as useful as the high accuracy resistivity results since it often happens that geological materials have IP contrasts when resistivity contrasts are absent. A third application of the IPR-11 is in induced polarization research projects such as the study of physical properties of rocks.

Due to its integrated, microprocessor-based design, the IPR-11 provides a large amount of induced polarization transient curve shape information from a remarkably compact, reliable and flexible format. Data from up to six potential dipoles can be measured simultaneously and recorded in solid state memory. Then, the IPR-11 outputs data as: 1) visual digital display, 2) digital printer profile or pseudosection plots, 3) digital printer listing, 4) a cassette tape record or 5) to a modem unit for transmission by telephone. Using software available from Scintrex, all spectral IP and EM coupling parameters can be calculated on a desk top or mainframe computer.

The IPR-11 is designed for use with the Scintrex line of transmitters, primarily the TSQ series current and waveform stabilized models. Scintrex has been active in induced polarization research, development, manufacture, consulting and surveying for over thirty years and offers a full range of time and frequency domain instrumentation as well as all accessories necessary for IP surveying.

Major Benefits

Following are some of the major benefits which you can derive through the key features of the IPR-11.

Speed up surveys. The IPR-11 is primarily designed to save you time and money in gathering spectral induced polarization data.

For example, consider the advantage in gradient, dipole-dipole or pole-dipole surveying with multiple 'n' or 'a' spacings, of measuring up to six potential dipoles simultaneously. If the specially designed Multidipole Potential Cables are used, members of a crew can prepare new dipoles at the end of a spread while measurements are underway. When the observation is complete, the operator walks only one dipole length and connects to a new spread leaving the cable from the first dipole for retrieval by an assistant.

Simultaneous multidipole potential measurements offer an obvious advantage when used in drillhole logging with the Scintrex DHIP-2 Drillhole IP/Resistivity Logging Option.

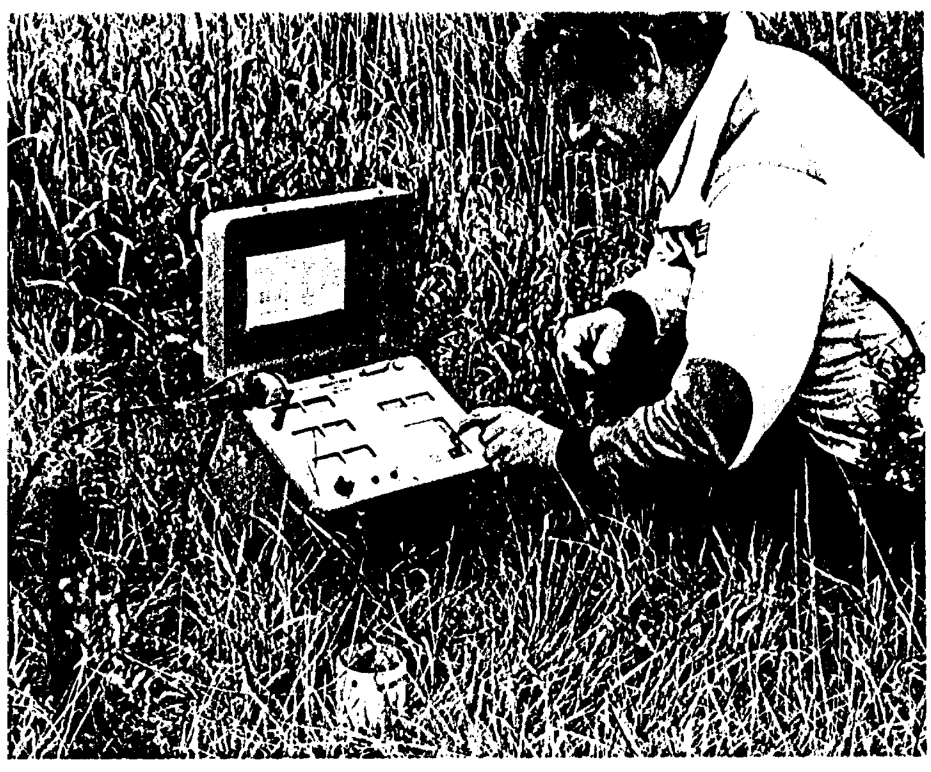
The built-in, solid state memory also saves time. Imagine the time that would be taken to write down line number, station number, transmitter and receiver timings and other header information as well as data consisting of SP, Vp and ten IP parameters for each dipole. With the IPR-11, a record is filed at the touch of a button once the operator sees that the measurement has converged sufficiently.

The IPR-11 will calculate resistivity for you. Further time will then be saved when the IPR-11 begins plotting your data in profile or pseudo-section format in your base camp on a digital printer. The same printer can also be used to make one or more copies of a listing of the day's results. If desired, an output to a cassette tape recorder can be made. Or, the IPR-11 data memory can be output directly into a modem, saving time by transmitting data to head office by telephone line and by providing data which are essentially computer compatible.

If the above features won't save as much time as you would like, consider how the operator will appreciate the speed in taking a reading with the IPR-11 due to: 1) simple keyboard control, 2) resistance check of six dipoles simultaneously, 3) fully automatic SP buckout, 4) fully automatic Vp self ranging, 5) fully automatic gain setting, 6) built-in calibration test circuits, and 7) self checking programs. The amount of operator manipulation required to take a great deal of spectral IP data is minimal.

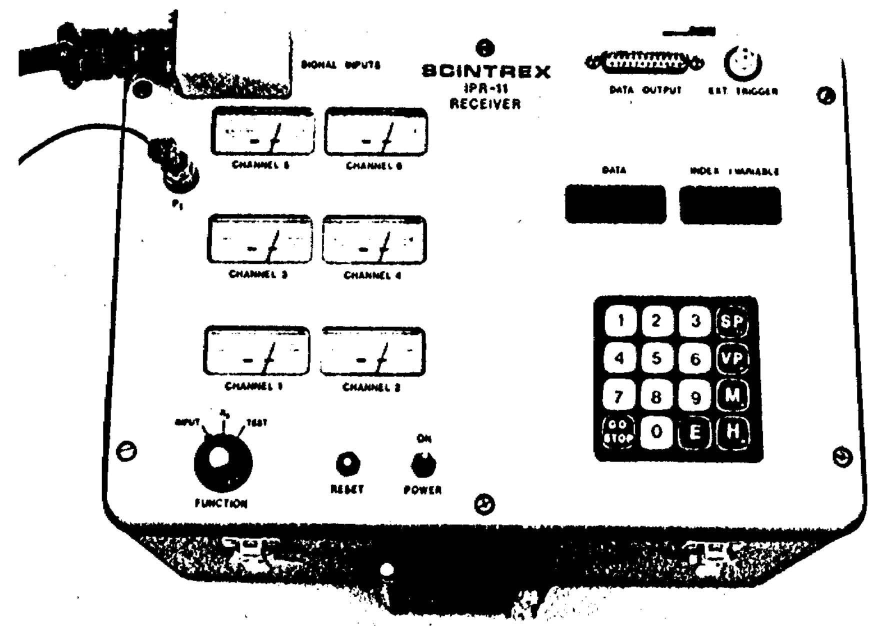
Compared with frequency domain measurements, where sequential transmissions at different frequencies must be made, the time domain measurement records broadband information each few seconds. When successive readings are stacked and averaged, and when the pragmatic window widths designed into the IPR-11 measurement are used, full spectral IP data are taken in a minimum of time.

Improved interpretation of data. The quasi-logarithmically spaced transient windows are placed to recover the broadband information that is needed to calculate the standard spectral IP parameters with confidence. Scintrex offers its SPECTRUM software package which can take the IPR-11 outputs and generate the following standard spectral IP parameters: M, chargeability; τ, time constant and C, exponent.



IPR-11 Broadband Time Domain IP Receiver

Interpretability of spectral IP data are improved since time domain measurements are less affected by electromagnetic coupling effects than either amplitude or phase angle frequency domain measurements, due to the relatively high frequencies used in the latter techniques. In the field, coupling free data are nearly always available from the IPR-11, by simply using chargeability data from the later transient windows. Then, in the base camp or office, the Scintrex SPECTRUM computer program may be used to resolve the EM component for removal from the IP signal. The electromagnetic induction parameters may also be interpreted in order to take advantage of the information contained in the EM component.



A further advantage of the IPR-11 in interpreting spectral IP responses is the amount of data obtainable due to the ability to change transmitted frequencies (pulse times) and measurement programs by keypad entry.

Enhance signal/noise. In the presence of random (non-coherent) earth noises, the signal /noise ratio of the IPR-11 measurements will be enhanced by $\sqrt{N}$ where N is the number of individual readings which have been averaged to arrive at the measurement. The IPR-11 automatically stacks the information contained in each pulse and calculates a running average for Vp and each transient window. This enhancement is equivalent to a signal increase of $\sqrt{N}$, or a power increase of N. Since N can readily be 30 or more (a 4 minute observation using a 2 second on/off waveform), the signal /noise improvement realized by the IPR-11 cannot be practically achieved by an increase in transmitter power. Alternatively, one may employ much lower power transmitters than one could use with a non-signal enhancement receiver.

The automatic SP program bucks out and corrects completely for linear SP drift; there is no residual offset left in the signal as in some previous time domain receivers. Data are also kept noise free by: 1) automatic rejection of spheric spikes, 2) 50 or 60 Hz powerline notch filters, 3) low pass filters and 4) radio frequency (RF) filters. In addition, the operator has a good appreciation of noise levels since he can monitor input signals on six analog meters, one for each dipole. Also, with the Optional Statistical Analysis Program, he can monitor relative standard error continuously on the digital display and then file these calculations in the data memory when the observation is complete.

Noise free observations can usually be made using the self-triggering feature of the IPR-11. The internal program locks into the waveform of the signal received at the first dipole (nearest a current electrode) and prevents mistriggering at any point other than within the final 2.5 percent of the current on time. In particularly noisy areas, however, synchronization of the IPR-11 and transmitter can be accomplished either by a wire link or using a high stability, Optional Crystal Clock which fits onto the lid of the instrument.

Reduce Errors. The solid state, fail-safe memory ensures that no data transcription errors are made in the field. In base camp, data can be output on a digital printer or a read-after-write cassette tape deck and played back onto a digital printer for full verification. The fact that the IPR-11 calculates resistivity from recorded Vp and I values also reduces error.

The self check program verifies program integrity and correct operation of the display, automatically, without the intervention of the operator. If the operator makes any one of ten different manipulation errors, an error message is immediately displayed.

The Multidipole Potential Cables supplied by Scintrex are designed so there is no possibility of connecting dipoles to the wrong input terminals. This avoids errors in relating data to the individual dipoles. The internal calibrator assures the operator that the instrument is properly calibrated and the simple keypad operation eliminates a multitude of front panel switches, simplifying operation and reducing errors.

Features

Six Dipoles Simultaneously. The analog input section of the IPR-11 contains six identical differential inputs to accept signals from up to six individual potential dipoles. The amplified analog signals are converted to digital form, multiplexed and recorded with header information identifying each group of dipoles. Custom-made multidipole cables are available for use with any electrode array.

Memory. Compared with tape recording, the IPR-11 solid state memory is free from problems due to dirt, low temperatures, moving parts, humidity and mechanical shock. A battery installed on the memory board ensures memory retention if main batteries are low or if the main batteries are changed. The following data are automatically recorded in the memory for each potential dipole: 1) receiver timing used, 2) transmitter timing used, 3) number of cycles measured, 4) self potential (SP), 5) primary voltage (Vp) and 6) ten transient IP windows (M_i). In addition, the operator can enter up to seventeen, four digit numerical headers which will be filed with each set of up to six dipole readings. Headers can include, for example, line number, station number, operator code, current amplitude, date, etc.

In the standard data memory, up to 200 potential dipole measurements can be recorded. Optional Data Memory Expansion Blocks can be installed in the IPR-11 to increase memory capacity in blocks of about 200 dipoles each to a total of approximately 800 dipoles. Memory capacities will be reduced somewhat if the Optional Statistical Analysis Program is used.

Memory Recall. Any reading in memory can be recalled, by simple keypad entry, for inspection on the visual display. For example, the operator can call up sequential visual display of all the data filed for the previous observation or for the whole data memory.

Carefully Chosen Transient Windows. The IPR-11 records all the information that is really needed to make full interpretations of spectral IP data, to remove EM coupling effects and to calculate EM induction parameters. Ten quasi-logarithmically spaced transient windows are measured simultaneously for each potential dipole over selectable total receive times of 0.2, 1.0, 2.0 or 4.0 seconds.

After a delay from the current off time of t, the width of each of the first four windows is t, of the next three windows is 6t and of the last three windows is 12t. The t values are 3, 15, 30 or 60 milliseconds. Thus, for a given dipole, up to forty different windows can be measured by using all four receive times. The only restriction is, of course, that the current off time must exceed the total measuring time. Since t is as low as 3 milliseconds and since the first four windows are narrow, a high density of curve shape information is available at short times (high frequencies) where it is needed for confident calculation of the EM coupling parameters.

Calculates Resistivity. The operator enters the current amplitude and resistivity geometry (K) factors in header with each observation. If the K factors remain the same, only a code has to be entered with each observation. Then, using the recorded Vp values, the IPR-11 calculates the apparent resistivity value which can be output to the printer or cassette tape recorder.

Normalizes for time and Vp. The IPR-11 divides the measured area in each transient window by the width of the window and by the primary voltage so that values are read out in units of millivolts/volt (mils).

Signal Enhancement. Vp and M values are continuously stacked and averaged and the display is updated for each two cycles. When the operator sees that the displayed values have adequately converged, he can terminate the reading and file all values in memory.

Vp Integration. The primary voltage can be sampled over 50 percent or more of the current on (T) time, depending on the transmit and receive programmes selected. The integrated result is normalized for time. Long Vp integration helps overcome random noise.

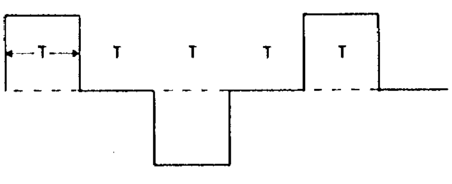
Digital Display. Two, four digit LCD displays are used to display measured or manually entered data, data codes and alarm codes.

Automatic Profile Plotting. When connected to a digital printer such as the Scintrex DP-4 having an industry standard RS-232C, 7 bit ASCII serial data port, data can be plotted in a base camp. The IPR-11 is programmed to plot any selected transient window and resistivity in pseudo-section or profile form. Line orientation is maintained consistent, that is station numbers on profiles are sorted in ascending number. In the profile plot, the scale for resistivity is logarithmic with 10 to 100,000 ohmmeters in four decades with another four decades of overrange both above and below. The chargeability scale is keypad selectable. In the pseudo-section plot, any one chargeability window can be presented in conventional pseudo-section form.

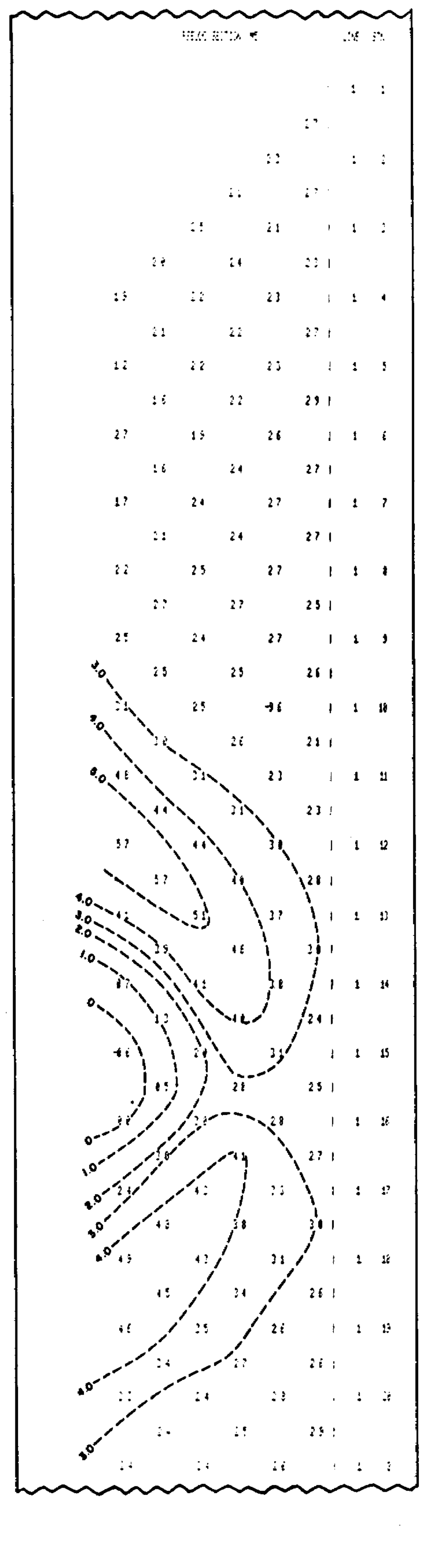
Printed Data Listing. The same digital printer can be used to print out listings of all headers and data recorded during the day's operation. Several copies can be made for mailing to head office or for filing in case copies are lost. Baud rate is keypad selectable at 110, 300 or 1200 baud, depending on the printer used.

Cassette Tape Output. A cassette recorder having an industry standard RS-232C, 7 bit ASCII serial interface may be used for storing data directly from the IPR-11. If all six dipoles are used, then 16, 80 character blocks of data per observation are transferred at a rate of 1200 baud. The storage capacity of one side of cassette tape is approximately 1400 blocks or about 90 six dipole observations. The MFE Model 2500 is recommended since it has a read-after-write feature for data verification.

The recording format is compatible with the Texas Instruments 'Silent 700' terminals and records are made on standard digital grade cassettes. Once a cassette tape record is made, the tape can be played back onto the DP-4 Digital Printer for an additional verification that the data on tape are correct.

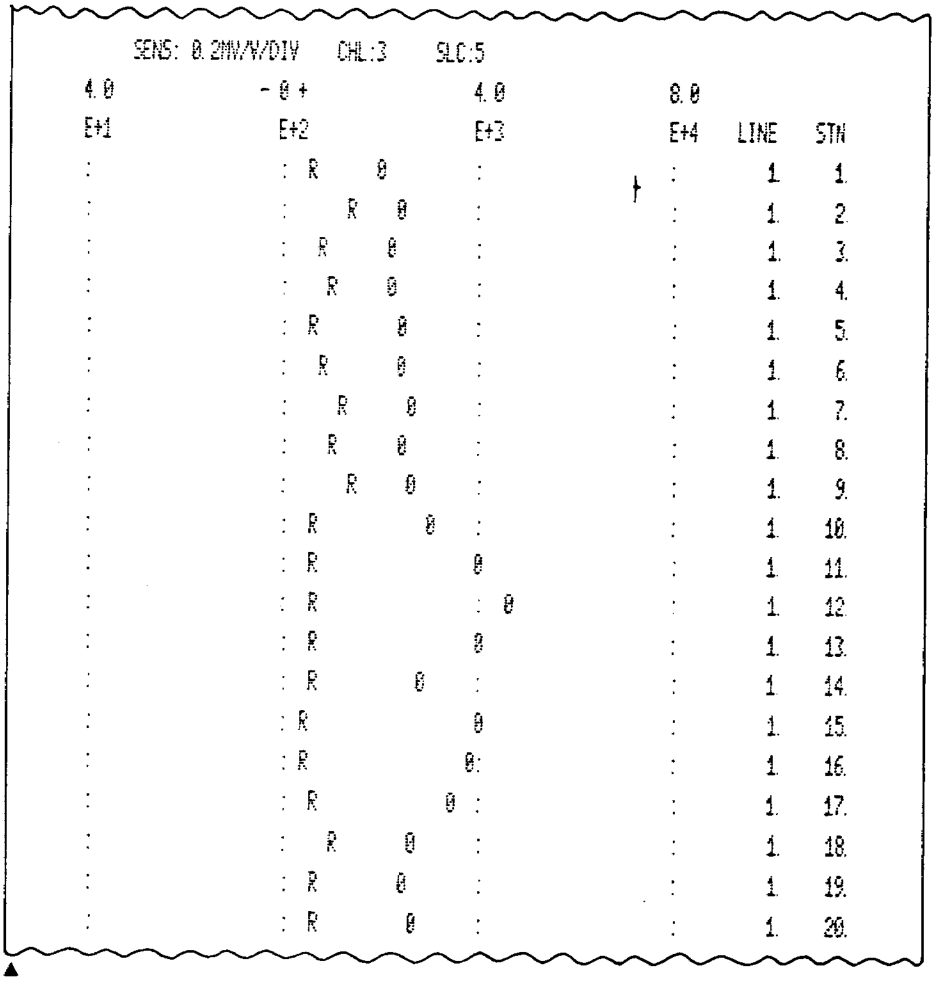


Time domain IP transmitted waveform



Pseudo-section printout on DP-4 Digital Printer. Chargeability data are shown for the sixth transient window (M_5) for the dipole-dipole array and six 'n' spacings. Line number and station number are also recorded. The contours have been hand drawn. Resistivity results can be plotted in a similar manner.

IPR-11 Broadband Time Domain IP Receiver



▲ *Profile printout on DP-4 Digital Printer. R is resistivity on a logarithmic scale while 0 is one transient window (M_5) on a linear scale.*

H:	1.	3.	80.	6282.	1883.	3773.	6283.	9423.	1324.	8292.
	14.									
1:	8.2	6.3	5.3	4.6	3.4	2.3	1.7	1.3	0.9	0.7
	728.2	-3.	5.71E+3							
2:	8.5	6.4	5.2	4.6	3.3	2.3	1.7	1.3	0.9	0.7
	201.6	0.	4.7E+3							
3:	7.9	6.0	5.0	4.4	3.3	2.2	1.7	1.2	0.9	0.7
	73.55	-4.	3.46E+3							
4:	7.7	5.9	4.9	4.3	3.2	2.2	1.7	1.3	0.9	0.7
	44.57	4.	3.49E+3							
5:	7.1	5.0	4.1	3.5	2.5	1.6	1.1	1.0	1.2	1.0
	22.43	-2.	2.64E+3							
6:	9.5	7.0	5.8	5.1	3.7	2.7	2.2	1.5	0.6	0.4
	13.46	0.	2.2E+3							

◀ *Data listing output on DP-4 Digital Printer. Header information is shown in the first two lines. In this case, data are for Line 1, Station 3. Transmitted current is 80 mA. Next are the resistivity K factors for the six dipoles. 8292 indicates that receive and transmit times are each 2 seconds. The last header item records that fact that 14 cycles were stacked. Following the header are the geophysical data for six dipoles which were measured simultaneously. For each dipole, the values for the 10 transient windows are shown on one line. The next line shows Vp and Sp in mV and resistivity. 5.71 E + 3 indicates that the calculated resistivity is 5.71 × 10^3 ohm-metres.*

Modem. Data in the IPR-11 memory can be output directly into a modem near the field operation and transmitted by telephone through a modem terminal in or near head office, where data can be output directly onto a digital printer or tape recorder. In this way a geophysicist in head office can receive regular transmissions of data to improve supervision and interpretation of the data from field projects and no output device other than the modem is required in the field.

External Circuit Check. Six analog meters on the IPR-11 are used to check the contact resistance of individual potential dipoles. Poor contact at any one electrode is immediately apparent. The continuity test uses an AC signal to avoid electrode polarization.

Self Check Program. Each time the instrument is turned on, a check sum verification of the program memory is automatically done. This verifies program integrity and if any discrepancy is discovered, an error signal appears on the digital display. Part of the self check program checks the LCD display by displaying eight ones followed sequentially by eight twos, eight fours and eight eights.

Manipulation Error Checks. Alarm codes appear on the digital display if any of the following ten errors occur: tape dump errors, illegal keypad entry, out of calibration or failed memory test, insufficient headers, header buffer full, previous station's data not filed, data memory full, incorrect signal amplitude or excessive noise, transmit pulse time incorrect and receiver measurement timing incorrect.

Internal Calibrator. By adjustment of the function switch, an internal signal generator is connected across the inputs to test the calibration of all six signal inputs for SP, Vp and all M windows simultaneously. Then the software checks all parameters. If there is an error in one or more parameters, an alarm code appears on the display. The operator can then push a key to scan all parameters of all input channels to determine where the error is.

Automatic SP Correction. The initial self potential buckout is entirely automatic - no adjustment need be made by the operator. Then, throughout the measurement, the IPR-11 slope correction software makes continual corrections, assuming linear SP drift during a transmitted cycle. There is no residual SP offset included in the chargeability measurement as in some previous time domain receivers.

Automatic Vp Self Ranging. There is no manual adjustment for Vp since the IPR-11 automatically adjusts the gain of its input amplifiers for any Vp signal in the range 100 microvolts to 6 volts.

Spheric Noise Rejection. A threshold, adjustable by keypad entry over a linear range of 0 to 99, is used to reject spheric pulses. If a spheric noise pulse above the set threshold occurs, then the IPR-11 rejects and does not average the current two cycles of information. An alarm code appears on the digital display. If the operator continues to see this alarm code, he can decide to set the threshold higher.

Powerline and Low Pass Filter. An internal switch is used to set the IPR-11 for either 50 or 60 Hz powerline areas. The notch filter is automatically switched out when the 0.2 second receive time is used since the filters would exclude EM signals.

RF Filter. An additional filter in the input circuits ensures that radio frequency interference is eliminated from the IPR-11 measurement.

Input Protection. If signals in excess of 6 V and up to 50 V are applied to any input circuit, zener diode protection ensures that no damage will occur to the input circuits.

Synchronization. In normal operation, the IPR-11 synchronizes itself on the received waveform, limiting triggering to within 2.5% of the current on time. However, for operation in locations where signal/noise ratios are poor, synchronization can be done either by running a cable from the transmitter or by using the Optional Crystal Clock which can be installed in the lid of the IPR-11.

Optional Statistical Analysis. As an option, the IPR-11 can be provided with software to do statistical analysis of some parameters. The relative standard error is calculated, displayed on the LCD display and may be recorded in data memory. The total dipole capacity of data memory will be reduced, depending on the extent of statistical data recorded. If the Optional Statistical Analysis Program is chosen, some thought should be given to purchasing one or more blocks of Data Memory Expansion.

Software for EM Coupling Removal. In transient measurements, the EM coupling component occurs closest to the current off time (i.e. it is primarily in the early windows). Thus, it is usually possible to obtain coupling-free IP data simply by using the later windows of the IPR-11 measurement program. If, however, full spectral information is desired, the data from the early windows must be corrected for the EM component. This can be done with confidence using a desk top of mainframe computer and the Scintrex SPECTRUM program.

Software for Spectral IP Parameters. Using the chargeability data from the ten quasi-logarithmically spaced IPR-11 windows, a desk top or mainframe computer and the Scintrex SPECTRUM program, spectral IP parameters can be calculated. The basis for this calculation as well as for the EM coupling removal calculation is discussed in a technical paper by H.O. Seigel, R. Ehrat and I. Brcic, given at the 1980 Society of Exploration Geophysicists Convention, entitled "Microprocessor Based Advances in Time Domain IP Data Collection and In-Field Processing".

Operation

In relation to the efficiency with which it can produce, memorize, calculate and plot data, the IPR-11 is quite simple to operate, using the following switches and keypad manipulations.

Power On-Off. Turned on to operate the instrument.

Reset. Resets the program to begin again in very poor signal/noise conditions.

Function Switch. Connects either the potential dipoles or the internal test generator to the input amplifiers or connects the external circuit resistance check circuitry to the potential dipoles.

Keypad. The ten digit and six function keys are used to: 1) operate the instrument, 2) enter information, 3) retrieve any stored data item for visual display, and 4) output data on to a digital printer, cassette tape deck or modem. Examples of some of these manipulations, most of which are accomplished by three key strokes, follow. E is the general entry key.

A concise card showing the keypad entry codes is attached inside the lid of the IPR-11

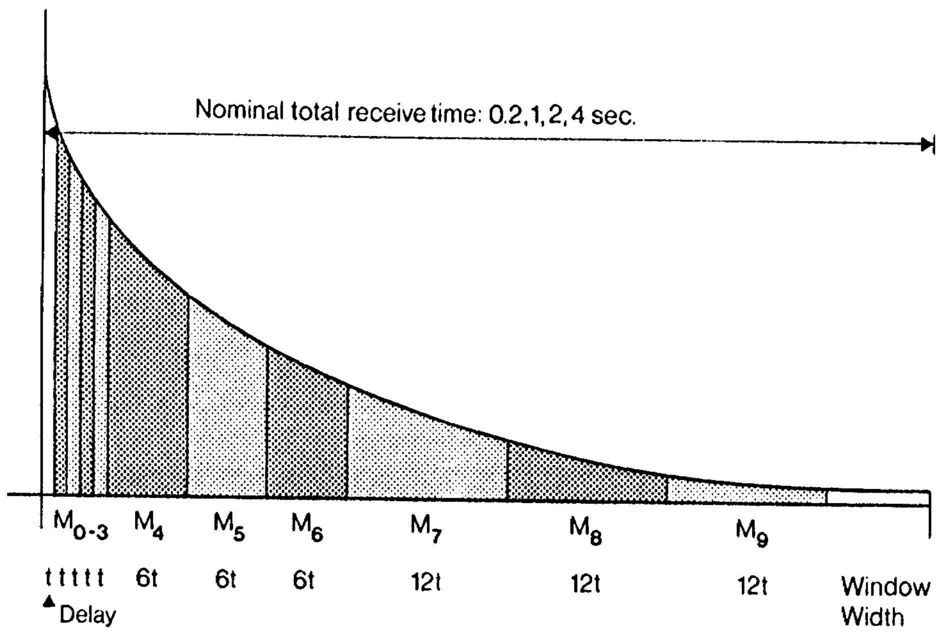
Example 1. Keying 99E commands the battery test. The result is shown on the digital display.

Example 2. Keying 90E tells the IPR-11 to use the 0.2 second receive time. 91, 92 and 94 correspond to the three other times.

Example 3. Keying 12M results in the display of the chargeability of the first dipole, window number 2, during the measurement. Similarly, 6SP or 4 Vp would result in the display of the SP value in the sixth dipole or Vp in the fourth dipole respectively.

Example 4. Keying NNNNH, where N is a variable digit, records an item of header information. Seventeen such items can be entered with each file of up to six dipoles of data.

Example 5. 73E, 74E or 75E are used to output the data from the memory to the digital printer or modem at 110, 300 or 1200 baud respectively.



IPR-11 transient windows

IPR-11 Broadband Time Domain IP Receiver

IPR-11 Options

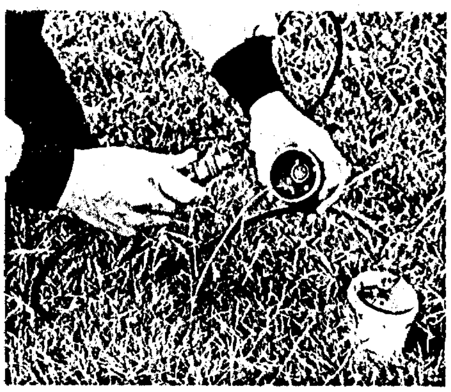
The following options are available for purchase with the IPR-11.

Multidipole Potential Cables. These cables are custom manufactured for each client, depending on electrode array and spacings which are to be used. They are manufactured in sections, with each section a dipole in length and terminated with connectors. For each observation, the operator need only walk one dipole length and connect a new section, in order to read a new six dipole spread. There is no need to move the whole spread. The connectors which join the cables are designed so that there is no possibility of connecting the wrong dipole to the wrong input amplifier. The outside jacket of these cables is flexible at low temperatures. About 5 percent extra length is added to each section to ensure that the cable reaches each station.

Data Memory Expansion Blocks. The standard data memory of the IPR-11 allows for data for up to 200 dipole measurements to be recorded, assuming a common header for six dipoles. Up to three additional memory blocks can be installed in the instrument, each of about 200 dipole capacity.

Statistical Analysis Program. Scintrex can provide, in EPROM, a statistical program to give real time calculations of relative standard error of the 10 IP windows in a selected dipole. If this option is chosen, one or more Data Memory Expansion Blocks may be warranted.

Crystal Clock. Scintrex can provide a high stability clock to synchronize the IPR-11 with a similar clock in the transmitter. This option is, however, only required for work in extremely noisy and/or low signal environments.



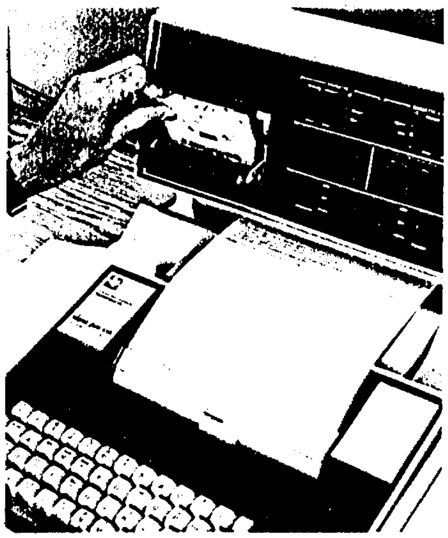
The takeouts of the Multidipole Potential Cables allow for connection to a porous pot or other electrode as well as for connection of the next section of cable, usually one dipole in length.

Software. Scintrex offers its SPECTRUM programs for EM coupling removal, calculation of EM induction factors and calculation of the same spectral IP parameters as are in common use in frequency domain IP measurements.

Digital Printer. The Scintrex DP-4 Digital Printer is a modified Centronics Microprinter with an RS-232C, 7 bit ASCII serial port. It is a self contained module, including 110/230 V power supply, control electronics and printing mechanism. It produces copy on aluminum coated paper by discharging low voltages through tungsten styli. Characters are formed from the appropriate dots of a 5 x 7 dot matrix. All 96 standard ASCII characters are available, the paper width is 120 mm and 80 characters can be printed per line at a rate of up to 150 lines per minute.

Cassette Tape Recorder. The MFE Model 2500 with read-after-write verification is recommended. It has an RS-232C, 7 bit ASCII serial interface with a recording format compatible with the Texas Instruments 'Silent 700' terminals.

Modem. A number of modem units are available on the market which are compatible with the IPR-11. Scintrex would be pleased to recommend or supply such equipment if required.

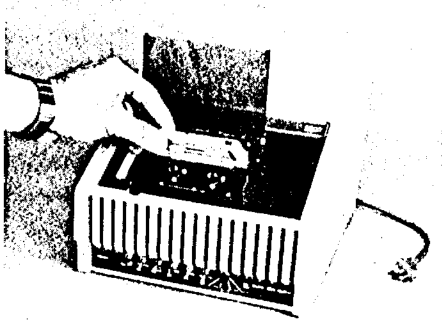


The cassette tape recording format of the IPR-11 is compatible with the Texas Instruments 'Silent 700' terminals which can be used for printing out, editing, copying tapes or transmitting data to a similar terminal using telephone lines.

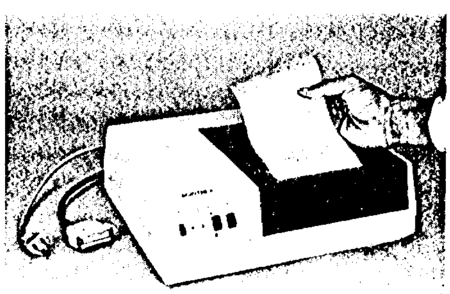
Data can be transferred directly from the IPR-11 into an inexpensive personal computer such as this Apple II model which can use the SPECTRUM Programme to calculate spectral IP parameters, carry out other calculations, display data graphically on a video display and plot data.

Technical Description of the IPR-11 Broadband Time Domain IP Receiver

Input Potential Dipoles	1 to 6 simultaneously
Input Impedance	4 megohms
Input Voltage (Vp) Range	100 microvolts to 6 volts for measurement. Zener diode protection up to 50 V
Automatic SP Bucking Range	±1.5 V
Chargeability (M) Range	0 to 300 mV/V (mils or 0/00)
Absolute Accuracy of Vp, SP and M	Vp; ±3% of reading for Vp > 100 microvolts SP; ±3% of SP bucking range M; ±3% of reading or minimum ±0.5m V/V
Resolution of Vp, SP and M	Vp; 1 m V above 100 m V approaching 1 microvolt at 100 microvolt SP; 1 m V M; 0.1 m V/V except for M_0 to M_3 in 0.2 second receive time where resolution is 0.4 m V/V.
IP Transient Program	Ten transient windows per input dipole. After a delay from current off of t, first four windows each have a width of t, next three windows each have a width of 6t and last three windows each have a width of 12t. The total measuring time is therefore 58t. t can be set at 3, 15, 30 or 60 milliseconds for nominal total receive times of 0.2, 1, 2 and 4 seconds.
Vp Integration Time	In 0.2 and 1 second receive time modes; 0.51 sec In 2 second mode; 1.02 sec In 4 second mode; 2.04 sec
Transmitter Timing	Equal on and off times with polarity change each half cycle. On/off times of 1, 2, 4 or 8 seconds with ±2.5% accuracy are required.
Header Capacity	Up to 17 four digit headers can be stored with each observation.
Data Memory Capacity	Depends on how many dipoles are recorded with each header. If four header items are used with 6 dipoles of SP, Vp and 10 M windows each, then about 200 dipole measurements can be stored. Up to three Optional Data Memory Expansion Blocks are available, each with a capacity of about 200 dipoles.
External Circuit Check	Checks up to six dipoles simultaneously using a 31 Hz square wave and readout on front panel meters, in range of 0 to 200 k ohms.
Filtering	RF filter, spheric spike removal; switchable 50 or 60 Hz notch filters, low pass filters which are automatically removed from the circuit in the 0.2 sec receive time.
Internal Calibrator	1000 mV of SP, 200 mV of Vp and 24.3 mV/V of M provided in 2 sec pulses.
Digital Display	Two, 4 digit LCD displays. One presents data, either measured or manually entered by the operator. The second display; 1) indicates codes identifying the data shown on the first display, and 2) shows alarm codes indicating errors.
Analog Meters	Six meters for; 1) checking external circuit resistance, and 2) monitoring input signals.
Digital Data Output	RS-232C compatible, 7 bit ASCII, no parity, serial data output for communication with a digital printer, tape recorder or modem.



Industry standard cassette recorders such as this MFE-2500 can be connected directly to the IPR-11.



DP-4 Digital Printer

Technical Description of the IPR-11 Broadband Time Domain IP Receiver

Standard Rechargeable Power Supply	Eight Eveready CH4 rechargeable NiCad D cells provide approximately 15 hours of continuous operation at 25°C. Supplied with a battery charger, suitable for 110/230 V, 50 to 400 Hz, 10 W.
Disposable Battery Power Supply	At 25°C, about 40 hours of continuous operation are obtained from 8 Eveready E95 or equivalent alkaline D cells. At 25°C, about 16 hours of continuous operation are obtained from 8 Eveready 1150 or equivalent carbon-zinc D cells.
Dimensions	345 mm x 250 mm x 300 mm, including lid.
Weight	10.5 kg, including batteries.
Operating Temperature Range	-20 to +55°C, limited by display.
Storage Temperature Range	-40 to +60°C.
Standard Items	Console with lid and set of rechargeable batteries, 2 copies of manual, battery charger.
Optional Items	Multidipole Potential Cables, Data Memory Expansion Blocks, Statistical Analysis Program, Crystal Clock, SPECTRUM Program, Digital Printer, Cassette Tape Recorder, Modem.
Shipping Weight	25 kg includes reusable wooden shipping case.

SCINTREX

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Telephone: (416) 669-2280
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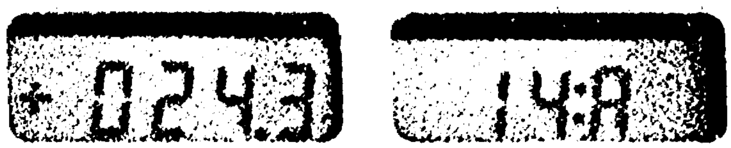
Telex: 06-964570

Geophysical and Geochemical
Instrumentation and Services

DATA　　INDEX ↕ VARIABLE



IPR-11 LCD displays, actual size

SCINTREX TSQ-3 3000 W

Time and Frequency Domain IP and Resistivity Transmitter

Function

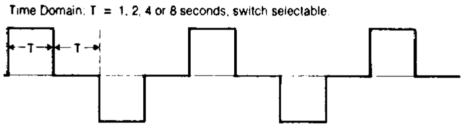
The TSQ-3 is a multi-frequency, square wave transmitter suitable for induced polarization and resistivity measurements in either the time or frequency domain. The unit is powered by a separate motor-generator.

The favourable power/weight ratio and compact design of this system make it portable and highly versatile for use with a wide variety of electrode arrays. The medium range power rating is sufficient for use under most geophysical conditions.

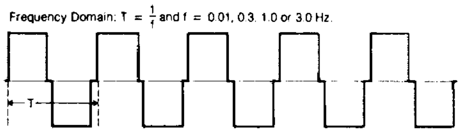
The TSQ-3 has been designed primarily for use with the Scintrex Time Domain and Frequency Domain Receivers, for combined induced polarization and resistivity measurements, although it is compatible with most standard time domain and frequency domain receivers. It is also compatible with the Scintrex Commutated DC Resistivity Receivers for resistivity surveying. The TSQ-3 may also be used as a very low frequency electromagnetic transmitter.

Basically the transmitter functions as follows. The motor turns the generator (alternator) which produces 800 Hz, three phase, 230 V AC. This energy is transformed upwards according to a front panel voltage setting by a large transformer housed in the TSQ-3. The resulting AC is then rectified in a rectifier bridge. Commutator switches then control the DC voltage output according to the waveform and frequency selected. Excellent output current stability is ensured by a unique, highly efficient technique based on control of the phase angle of the three phase input power.

Time Domain: T = 1, 2, 4 or 8 seconds, switch selectable.



Frequency Domain: $T = \frac{1}{f}$ and f = 0.01, 0.3, 1.0 or 3.0 Hz.



Waveforms output by the TSQ-3

Features

Current outputs up to 10 amperes, voltage outputs up to 1500 volts, maximum power 3000 VA.

Solid state design for both power switching and electronic timing control circuits.

Circuit boards are removable for easy servicing.

Switch selectable wave forms: square wave continuous for frequency domain and square wave interrupted with automatic polarity change for time domain.

Switch selectable frequencies and pulse times.

Overload, underload and thermal protection for maximum safety.

Digital readout of output current.

Programmer is crystal controlled for very high stability.

Low loss, solid state output current regulation over broad range of load and input voltage variations.

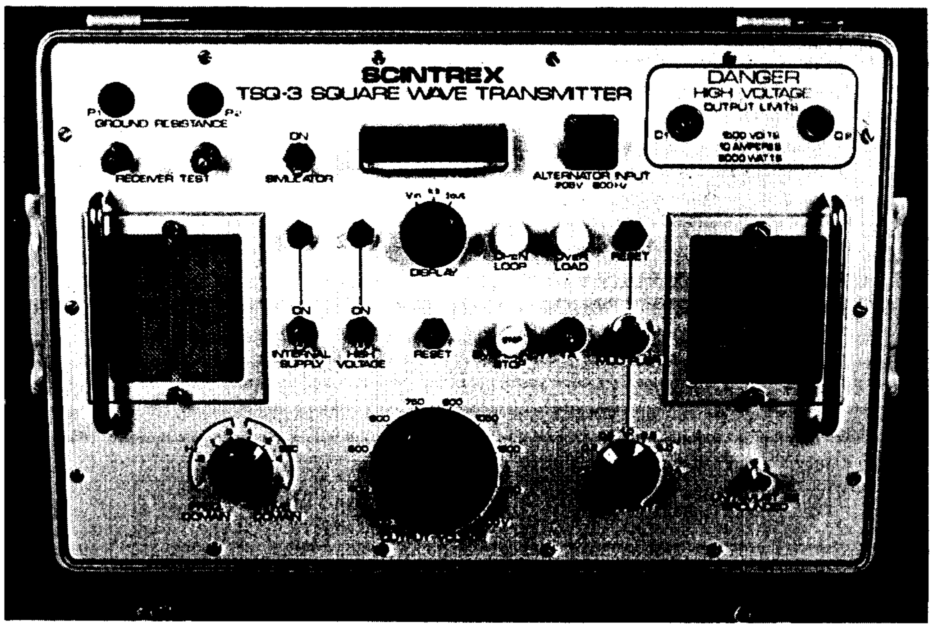
Rectifier circuit is protected against transients.

Excellent power/weight ratio and efficiency.

Designed for field portability; motor-generator is installed on a convenient frame and is easily man-portable. The transmitter is housed in an aluminum case.

The motor-generator consists of a reliable Briggs and Stratton four stroke engine coupled to a brushless permanent magnet alternator.

New motor-generator design eliminates need for time domain dummy load.



Technical Description of TSQ-3/3000W Time and Frequency Domain IP and Resistivity Transmitter

TSQ-3 transmitter with portable motor generator unit

Transmitter Console	
Output Power	3000 VA maximum
Output Voltages	300, 400, 500, 600, 750, 900, 1050, 1200, 1350 and 1500 volts, switch selectable
Output Current	10 amperes maximum
Output Current Stability	Automatically controlled to within ±0.1% for up to 20% external load variation or up to ±10% input voltage variation
Digital Display	Light emitting diodes permit display up to 1999 with variable decimal point; switch selectable to read input voltage, output current, external circuit resistance. Dual current range, switch selectable
Absolute Accuracy	±3% of full range
Current Reading Resolution	10 mA on coarse range (0-10A) 1 mA on fine range (0-2A)
Frequency Domain Waveform	Square wave, continuous with approximately 6% off time at polarity change
Frequency Domain Frequencies	Standard: 0.1, 0.3, 1.0 and 3.0 Hz, switch selectable Optional: any number of frequencies in range 0 to 5 Hz.
Time Domain Cycle Timing	t:t:t:t;on:off:on:off;automatic
Time Domain Polarity Change	each 2t; automatic
Time Domain Pulse Durations	Standard: t = 1, 2, 4 or 8 seconds Optional: any other timings
Time and Frequency Stability	Crystal controlled to better than .01%
Efficiency	.78
Operating Temperature Range	−30°C to +50°C
Overload Protection	Automatic shut-off at 3300 VA
Underload Protection	Automatic shut-off at current below 75mA
Thermal Protection	Automatic shut-off at internal temperature of +85°C
Dimensions	350 mm x 530 mm x 320 mm
Weight	25.0 kg.
Power Source	
Type	Motor flexibly coupled to alternator and installed on a frame with carrying handles.
Motor	Briggs and Stratton, four stroke, 8 H.P.
Alternator	Permanent magnet type, 800 Hz, three phase 230 V AC
Output Power	3500 VA maximum
Dimensions	520 mm x 715 mm x 560 mm
Weight	72.5 kg
Total System	
Shipping Weight	150 kg includes transmitter console, motor generator, connecting cables and re-usable wooden crates

SCINTREX

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Telex: 06-964570

Geophysical and Geochemical Instrumentation and Services

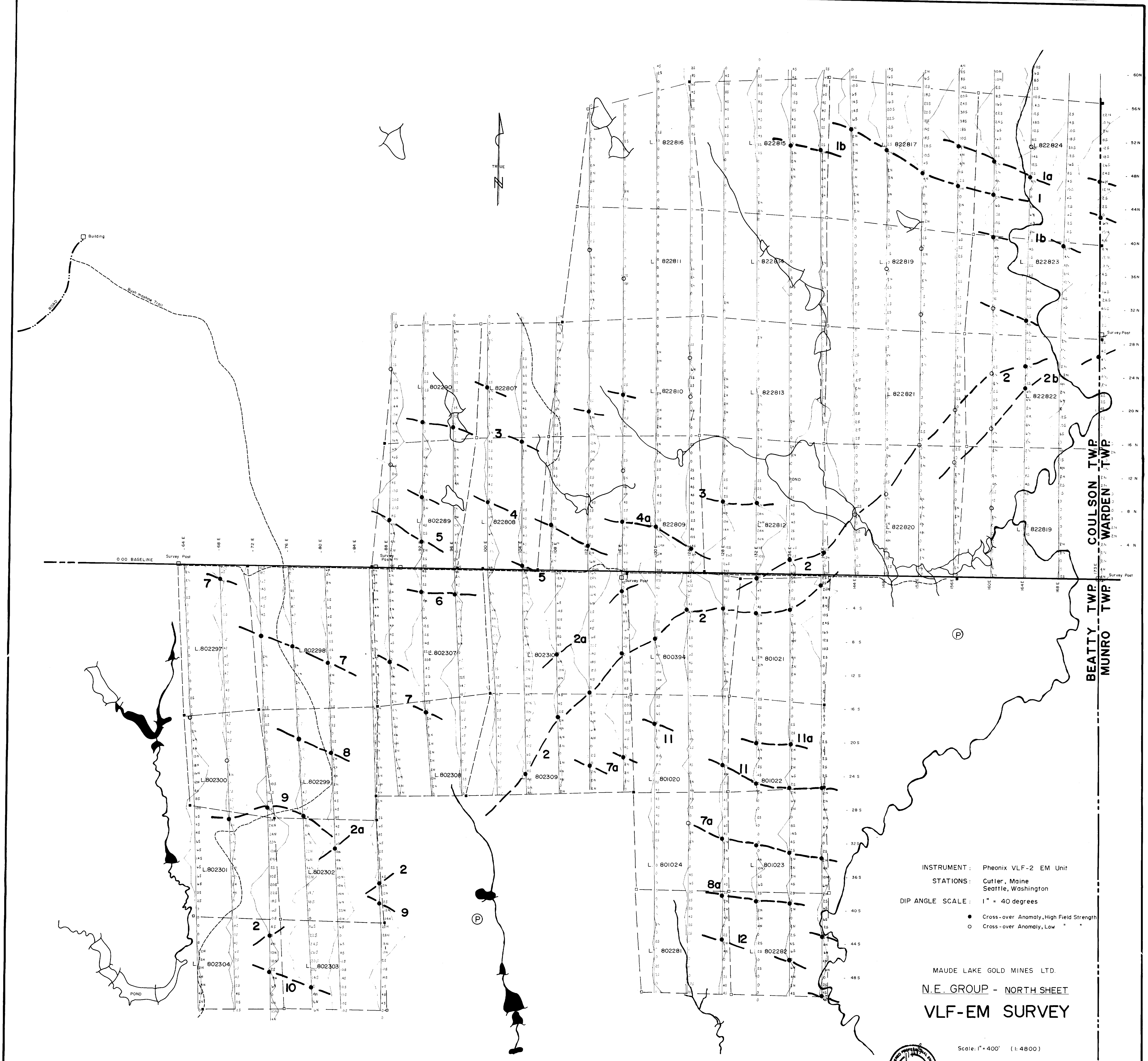
OM86-6-P-117

THIS SUBMITTAL CONSISTED OF VARIOUS REPORTS, SOME OF WHICH HAVE BEEN CULLED FROM THIS FILE. THE CULLED MATERIAL HAD BEEN PREVIOUSLY SUBMITTED UNDER THE FOLLOWING RECORD SERIES (THE DOCUMENTS CAN BE VIEWED IN THESE SERIES):

1. Diamond drill log → see Toronto file
   hole # S86-1 diamond drilling # 34
   Maude Lk. Gold Mines Beatty Tp.
   Dec/86 R.O.W. # 17 for 1987

2. Diamond drill log → see Toronto file
   hole # S86-3 diamond drilling # 35
   Maude Lk. Gold Mines Beatty Tp.
   Dec/86 R.O.W. # 66 for 1987

3. *Please note:*
   some material contained in Part A of this file is a duplication of material found in Toronto file # 2.9832. This material however has not been culled out to protect the integrity of the file.



INSTRUMENT: Pheonix VLF-2 EM Unit

STATIONS: Cutler, Maine
Seattle, Washington

DIP ANGLE SCALE: 1" = 40 degrees

● Cross-over Anomaly, High Field Strength

○ Cross-over Anomaly, Low " "

MAUDE LAKE GOLD MINES LTD.

N.E. GROUP - NORTH SHEET

VLF-EM SURVEY

Scale: 1" = 400' (1: 4800)

R. A. BENNETT
REGISTERED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

JAN 1987

OM86-6-P-177

63.4988


MAUDE LAKE GOLD MINES LTD.
N.E. GROUP - SOUTH SHEET
VLF-EM SURVEY
Scale: 1" = 400' (1:4800)
JAN 1987
INSTRUMENT: Pheonix VLF-2 EM Unit
STATIONS: Cutler, Maine
Seattle, Washington
DIP ANGLE SCALE: 1" = 40 degrees
● Cross-over Anomaly, High Field Strength
○ " " Low "
R. A. BENNETT
PROVINCE OF ONTARIO
BEATTY TWP.
MUNRO TWP.
CONC IV
CONC III
SALVE LAKE
Shallow River
POND
BUSH MASHINE TRAIL
0+00 BASELINE
TRUE
L.550883
L.598906
L.550884
L.737497
L.787094
L.787099
L.802303
L.802306
L.787093
L.796676
L.796677
L.796680
L.787144
L.796678
L.79668
L.796682
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L.787125
210
0M86-6-P-177
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LEGEND

CHARGEABILITY CONTOUR

0.3 mV/V

0.5, 1, 1.5, 2, 4, 6 mV/V

DEPRESSION

IP ANOMALY ZONE — C-10

POLE-DIPOLE ANOMALIES

STRONG | WEAK

M-IP(mV/V) -128

MEDIUM | VERY WEAK

CHARGEABILITY ANOMALY | RESISTIVITY ANOMALY

GRADIENT ARRAY

GRADIENT ANOMALY

10 mV/V 0

COMPILATION MAP

63.4988

MAUDE LAKE GOLD MINES LTD.

SALVE LAKE GRID, MAIN CLAIM GROUP
MATHESON AREA, NORTHEASTERN ONTARIO

CHARGEABILITY (M7) CONTOUR MAP
POLE-DIPOLE ELECTRODE ARRAY
N=3, A=200FT
SCINTREX IPR-11 RECEIVER
SCINTREX IPC-7 2.5 KW TRANSMITTER

SCALE: 1" = 200

SURVEY BY JVX LTD. DECEMBER, 1986

PLATE 3

OM86-6-P-177

LEGEND

CHARGEABILITY CONTOUR
0,3 mV/V
0.5, 1, 1.5, 2, 4, 6 mV/V
DEPRESSION

63.4988

MAUDE LAKE GOLD MINES LTD.

SALVE LAKE GRID, MAIN CLAIM GROUP

MATHESON AREA, NORTHEASTERN ONTARIO

CHARGEABILITY (M7) CONTOUR MAP

POLE-DIPOLE ELECTRODE ARRAY

N=3, A=200FT

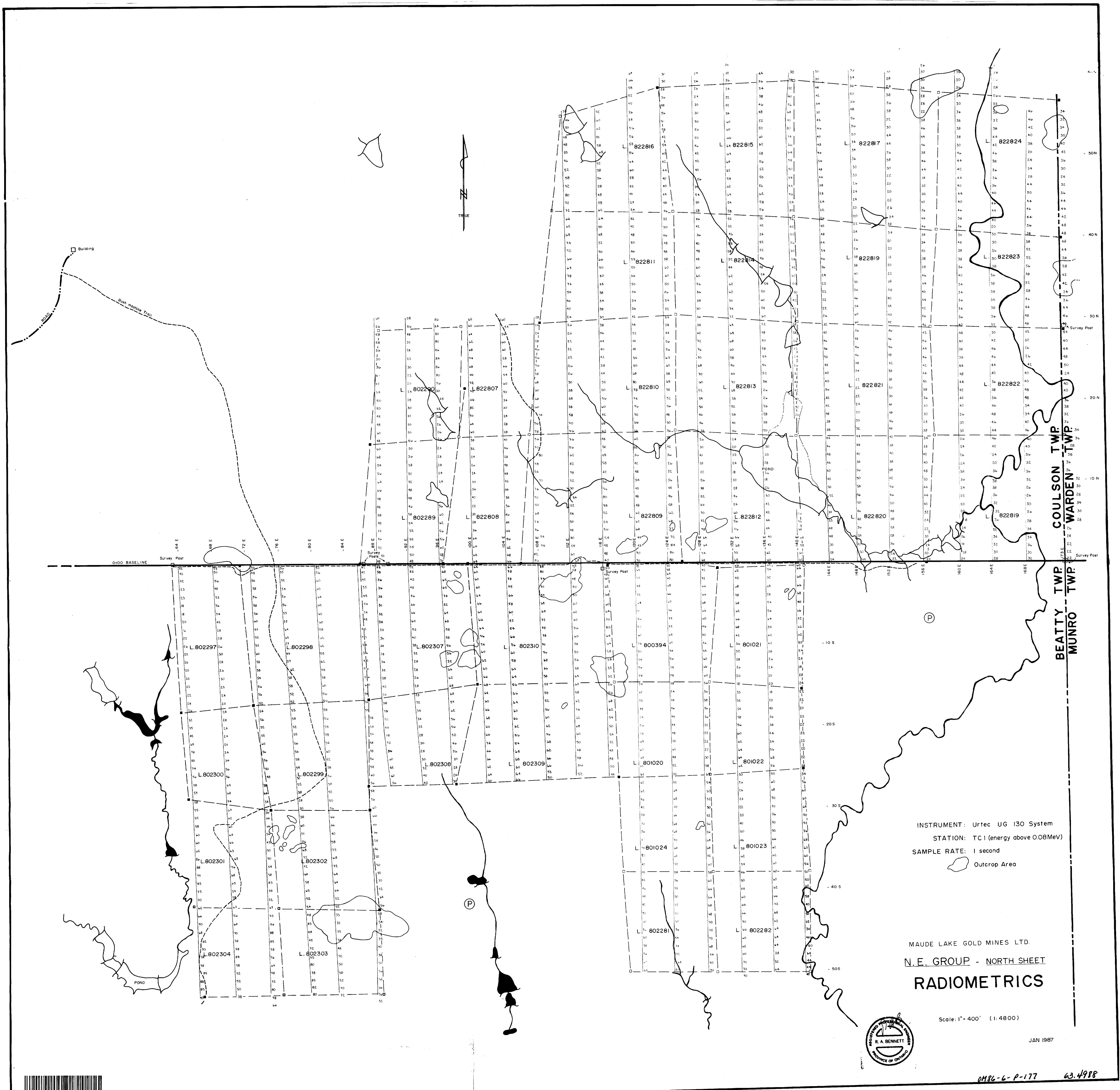
SCINTREX IPR-11 RECEIVER

SCINTREX TSQ-3 3.0 KW TRANSMITTER

SCALE: 1" = 200

SURVEY BY VX LTD. DECEMBER, 1986		PLATE 1

OM 86-6-P-177


TRUE
Building
Bush machine Trail
ROAD
0+00 BASELINE
Survey Post
Survey Posts
POND
COULSON TWP.
WARDEN TWP.
BEATTY TWP.
MUNRO TWP.
64 E
68 E
72 E
76 E
80 E
84 E
88 E
92 E
96 E
100 E
104 E
108 E
112 E
116 E
120 E
124 E
128 E
132 E
136 E
140 E
144 E
148 E
152 E
156 E
160 E
164 E
168 E
173 E
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L. 802298
L. 802307
L. 802310
L. 800394
L. 801021
L. 802300
L. 802299
L. 802308
L. 802309
L. 801020
L. 801022
L. 802301
L. 802302
L. 801024
L. 801023
L. 802304
L. 802303
L. 802281
L. 802282
INSTRUMENT: Urtec UG 130 System
STATION: TC I (energy above 0.08MeV)
SAMPLE RATE: I second
Outcrop Area
MAUDE LAKE GOLD MINES LTD.
N.E. GROUP - NORTH SHEET
RADIOMETRICS
Scale: I" = 400' (I: 4800)
JAN 1987
REGISTERED PROFESSIONAL ENGINEER
R. A. BENNETT
PROVINCE OF ONTARIO
OM86-6-P-177
63.4988

240

MAUDE LAKE GOLD MINES LTD.
N.E. GROUP - SOUTH SHEET
RADIOMETRIC SURVEY
Scale: 1" = 400' (1:4800)
FEB 1987
INSTRUMENT: Urtec UG 130 system
STATION: TC1 (energy above 0.08 Mev)
SAMPLE RATE: 1 second
Outcrop Area
R. A. BENNETT
BEATTY TWP
MUNRO TWP
000 BASELINE
SALVE LAKE
Shallow River
BUSH MACHINE TRAIL
POND
CONC IV
CONC III
OM86-6-P-177
63.4988
250

63.4988

MAUDE LAKE GOLD MINES LTD.

SALVE LAKE GRID, MAIN CLAIM GROUP
MATHESON AREA, NORTHEASTERN ONTARIO

RESISTIVITY CONTOUR MAP
POLE-DIPOLE ELECTRODE ARRAY
N=3, A=200FT
SCINTREX IPR-11 RECEIVER
SCINTREX TSQ-3 3.0 KW TRANSMITTER

SCALE: 1" = 200

SURVEY BY
JVX LTD.
DECEMBER, 1986

PLATE 2

LEGEND

RESISTIVITY CONTOUR INTERVAL
2.5 ohm-m
1.5 ohm-m
DEPRESSION

OM86-6-P-177

42A09NW0118 63.4988 WILKIE

260

0486-6-P-177

63.4988

270