

REPORT "A"

63.3036



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AN EXPLORATION PROGRAM
FOR THE PONTIAC TWP. PROPERTY
OF AMAX EXPLORATION, INC.

W. R. Ryall
Geologist
Timmins, Ontario
April, 1972

During the 1971 field season geological parties of Amax Exploration, Inc. uncovered occurrences of disseminated chalcopyrite mineralization near an andesite-rhyolite contact in the Pontiac Twp. property. An IP survey conducted along a 7 line-mile grid produced an anomaly with a strike length of near 2000 ft. and a mean width of 600 ft. Detailed geological mapping in the vicinity revealed several showings of weak, disseminated chalcopyrite mineralization in a rhyolitic host rock.

The IP target defined to date warrants diamond drill testing but the inaccessibility of the property make for expensive drilling. To minimize costs all potential targets should be defined before mobilizing a drill unit.

A program of geological reconnaissance, with rock and soil geochemistry support, is planned to define areas favourable for IP and detailed geological surveys. Drill targets so outlined will constitute a latter phase of the evaluation.

The proposed program is estimated to cost \$23,756.00.

Work is expected to commence by June and it is feasible that targets should be ready for drill testing by fall of this year.

Kirkland Lake Area

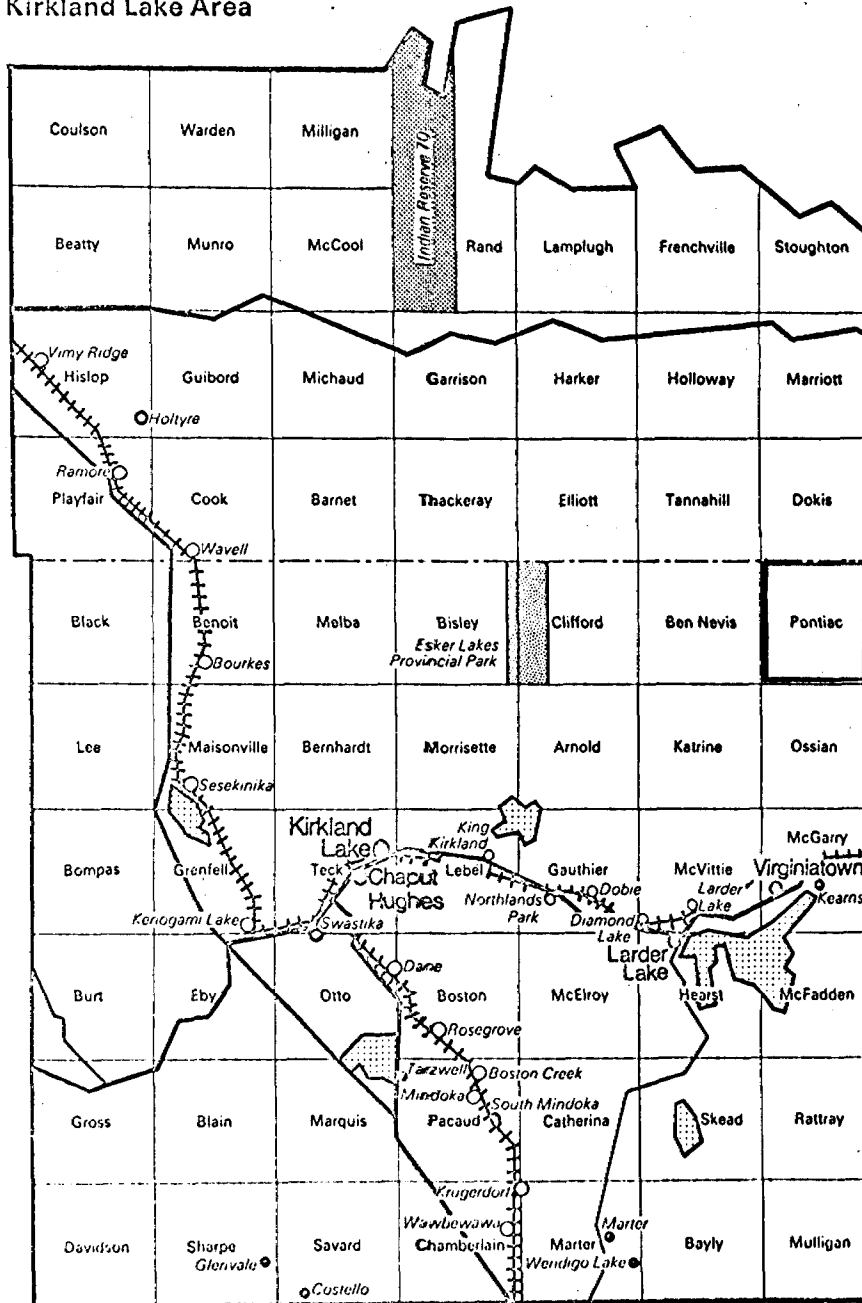
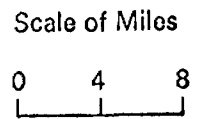


Figure 1. Location of Pontiac Township, Larder Lake Mining Division.



Pontiac Township is located some 20 miles NE of Kirkland Lake. The E township line forms part of the Ontario-Quebec interprovincial boundary (Fig. 1).

Vehicular access to Pontiac Township is poor, the only route available leads from the village of Kearns, via Cheminis station and Labyrinth Lake to Sunrise Lake, at the S boundary of the township. From this point a four-wheel drive track leads to Clarice Lake, but this is accessible only when dry.

The restricted distribution of lakes suitable for float-equipped aircraft renders much of the township difficult to enter.

III. AMAX PROPERTY POSITION

Despite the proximity to the Noranda base metal camp and the Kirkland Lake - Larder Lake gold camp the geology of Pontiac Township was very imperfectly known until the summer of 1970 when ODMNA field crews mapped the township. Recognition of extensive tracts of felsic metavolcanics led to field examination by Amax crews. The close similarity to the geology of the Noranda area and the occurrence of several sulphide zones within these horizons prompted staking 121 claims (Fig. 2) which effectively secured the contact of the felsic volcanics with overlying andesitic volcanics. Three claims have subsequently been relinquished, leaving 118 claims in the group.

IV. PREVIOUS EXPLORATION

Due to the inaccessibility of much of Pontiac Township most of the present property has never been explored on the ground. Evidence of long-past prospecting activity, so common in townships to the W and S, is remarkably sparse in this township.

In 1960 Peter Roche held a group of claims in the Death Lake area on which geological and magnetometer surveys were conducted. These are believed, however, to have resulted in little follow-up work. One drill hole has been located on this property but it apparently predates the surveys.

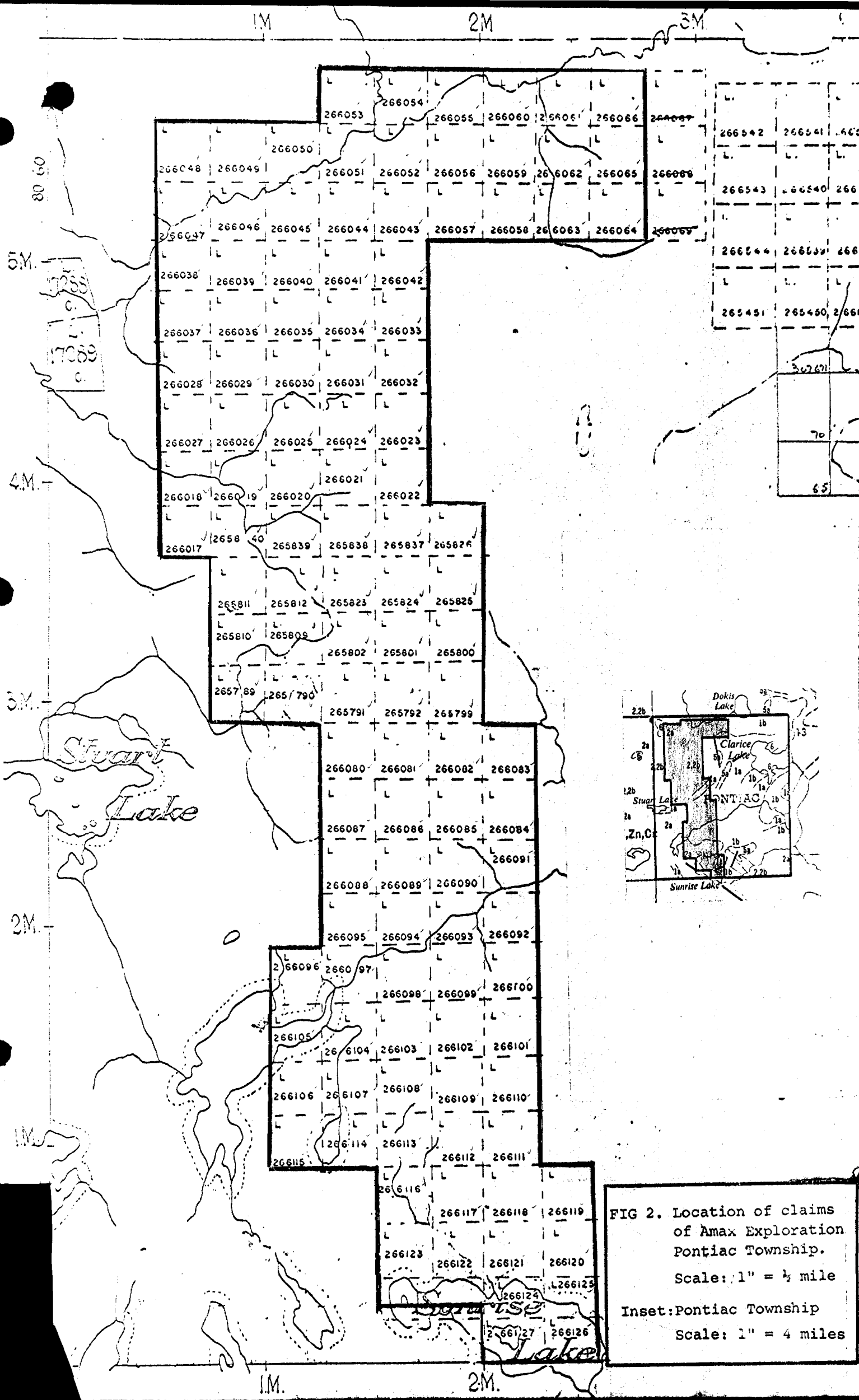


FIG 2. Location of claims of Amax Exploration Pontiac Township.
 Scale: 1" = 1/2 mile
 Inset: Pontiac Township
 Scale: 1" = 4 miles

The proximity of Pontiac Township to the Noranda base metal camp has made the area attractive to airborne geophysical assessment and several surveys are known to have been conducted in recent years. Little ground follow-up has evidently been attempted.

V. AMAX EXPLORATION PROGRAM 1971

Following securing of the claim group a helicopter-borne AEM-AM survey utilizing the high resolution Scintrex HEM 701 system was conducted in November 1970 with a view to detecting weak anomalies that could have been undetected by previous airborne surveys. No bedrock conductors were revealed by the survey and, in the portion recovered, little magnetic relief was evident. Details of part of this survey have been filed (June 7, 1971) for assessment credit.

Ground geological evaluation of the group was commenced in the summer of 1971 in two selected areas of favourable geology. In one area, on claim L265792, showings of previously undescribed disseminated chalcopyrite and pyrite mineralization were uncovered in a silicified felsic metavolcanic horizon located near the contact with overlying andesitic units.

Approximately 7 miles of grid were cut over the showing and IP and detailed geological surveys were conducted.

The IP survey employed the Scintrex battery-powered unit manned by in-house operators. The dipole-dipole configuration was employed using 200 foot spacing with 100 foot spacing used for detailing. An anomalous area of some 2000 feet in length by about 600 feet in mean width was detected. Within this area three zones showing markedly stronger chargeability can be outlined (Fig. 3).

The detailed geological survey of the area is summarized in Fig. 4. The IP anomaly appears to be restricted to the rhyolitic units. Weak, but persistent, disseminated chalcopyrite mineralization has been recorded at several locations within the area of the IP anomaly.

Near the main showing about 100 feet of x-ray drill core has been located. This evidently represents drilling performed before 1960. The core consists entirely of rhyolitic volcanics in which weak, but persistent, chalcopyrite mineralization is encountered. Heavier patches of massive pyrite carrying only very low Cu values are also present throughout the core. Better mineralized portions of the core return 0.6% Cu, 0.3% Zn. Composite samples representing some 5 feet of core average 0.23% Cu, 0.01% Zn, 0.03 oz/ton Ag. These values, whilst obviously not representing economic section, do, in view of their widespread occurrence in highly favourable host rocks, provide definite encouragement for further exploration of the andesite-rhyolite contact.

Diamond drilling is planned to test the cause of the IP anomaly but the inaccessibility of the target area and the resultant high expense of drilling necessitate defining all potential targets prior to mobilizing the drill unit.

VI. PROPOSED EXPLORATION PROGRAM 1972

The exploration program will be based on close geological reconnaissance supported by rock and soil geochemistry to define areas where detailed examination utilizing IP surveys will be conducted.

Due to the flatness of the magnetic response over the property, the entire aeromagnetic survey results were not recovered. However, it is now believed that the features of interest may be of small magnitude. Consequently, it is proposed to recover the additional data to provide a completed aeromagnetic appraisal of the property.

The program can be summarized:

Phase 1 Coverage of entire claim group

Geological reconnaissance

Rock geochemistry

Phase 2 Coverage of selected areas

Line cutting

IP survey

Detailed geological mapping

A third phase, entailing diamond drilling of targets defined by the above surveys together with those previously defined, will be proposed when the above program is completed.

VII. FINANCIALGeology

1 Geologist (part time 2 months)	1,000
1 Assistant (part time 2 months)	600
Material & supplies	<u>100</u>

1,700

Geochemistry

1 Geologist (part time 2 months)	1,000
1 Assistant (part time 2 months)	600
Analyses	500
Material & supplies	<u>100</u>

2,200

Line cutting

25 miles @ \$85 /mile

2,125

IP Survey

20 miles @ \$375 /mile

7,500



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DIAMOND DRILLING PROPOSAL
FOR TARGETS IN BEN NEVIS
AND PONTIAC TOWNSHIPS ON
CLAIMS PREVIOUSLY EXPLORED
UNDER EXPLORATION ASSISTANCE
AGREEMENT CONTRACT KL-22.

W.R. Ryall Ph.D.
Amax Exploration, Inc.
Timmins, Ontario



32055E0015 63.3036 PONTIAC

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TABLE C. CONTENTS

I. SUMMARY..... Page 1

II. LOCATION..... Page 2

III. AMAX PROPERTY POSITION..... Page 2

IV. PROPOSED DRILLING TARGETS

(a) Ben Nevis Township

(i) Amax Claims..... Page 2

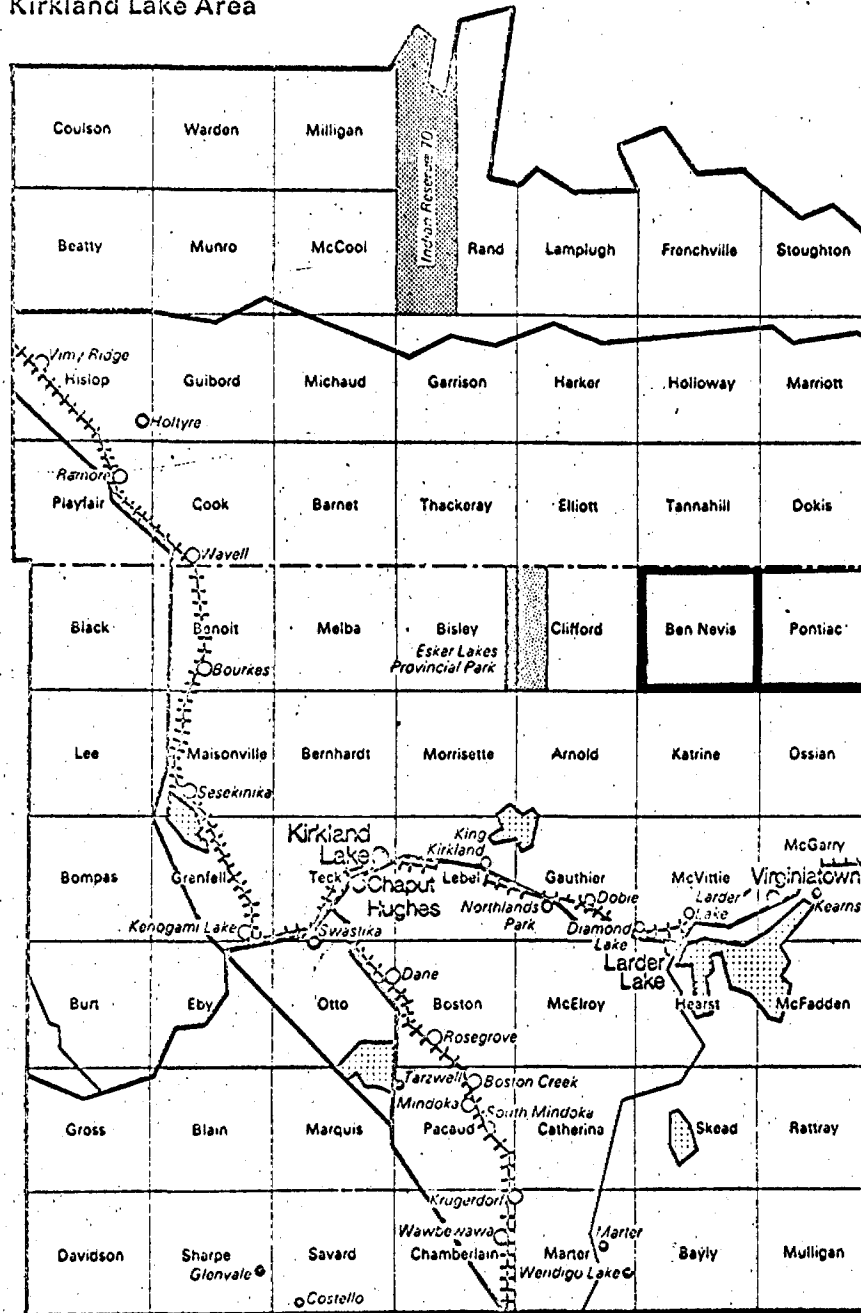
(ii) Canagau Option..... Page 3

(b) Pontiac Township..... Page 3

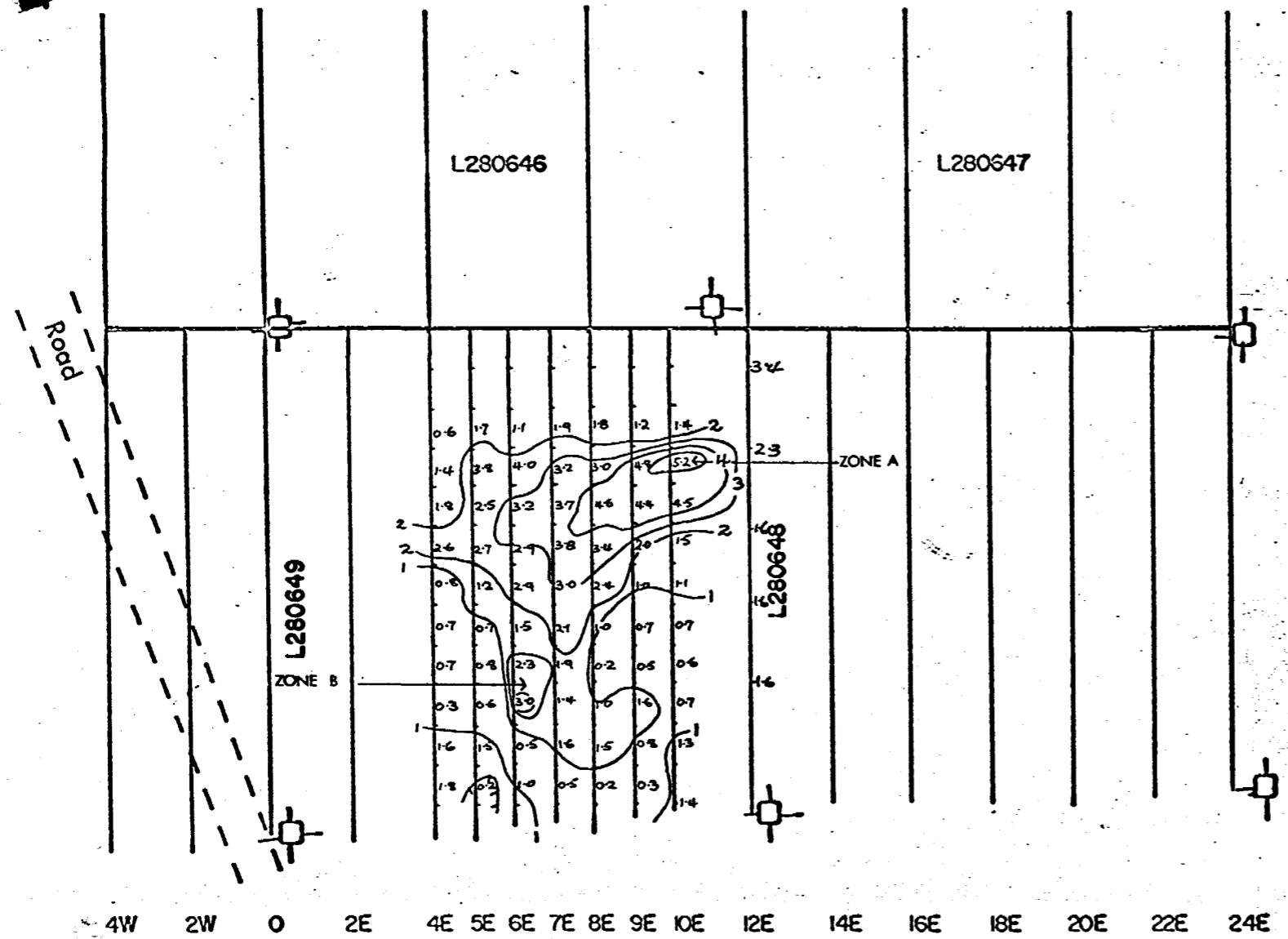
V. FINANCIAL..... Page 4

VI. APPENDIX I..... Page 5

Kirkland Lake Area



Location of Ben Nevis Twp
Larder Lake Mining Division



Percent Frequency Effect
Dipole - Dipole
n=1; a=100 ft.

IP SURVEY
BEN NEVIS TWP., ONTARIO
GRID 3 - DETAIL
SCALE: 1"=400'

NTS. NO. 320/5 PROJECT NO. 421-01
TO ACCOMPANY REPORT BY: *W. H. Lyall*
AMAX Potash Ltd., Timmins, Ontario DATE: *Mar 73*

Figure 4

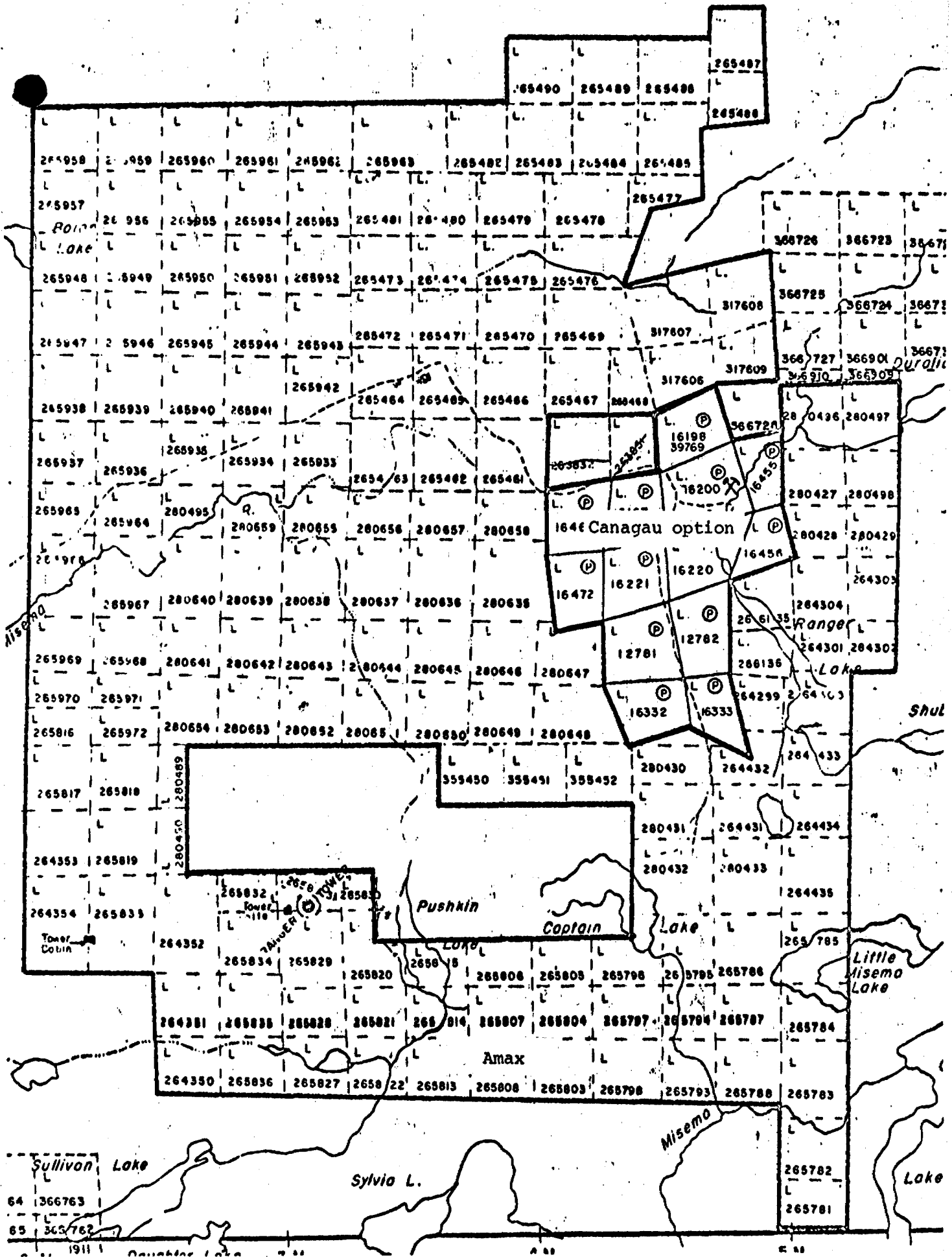


Figure 2. Ben Nevis Township property map.

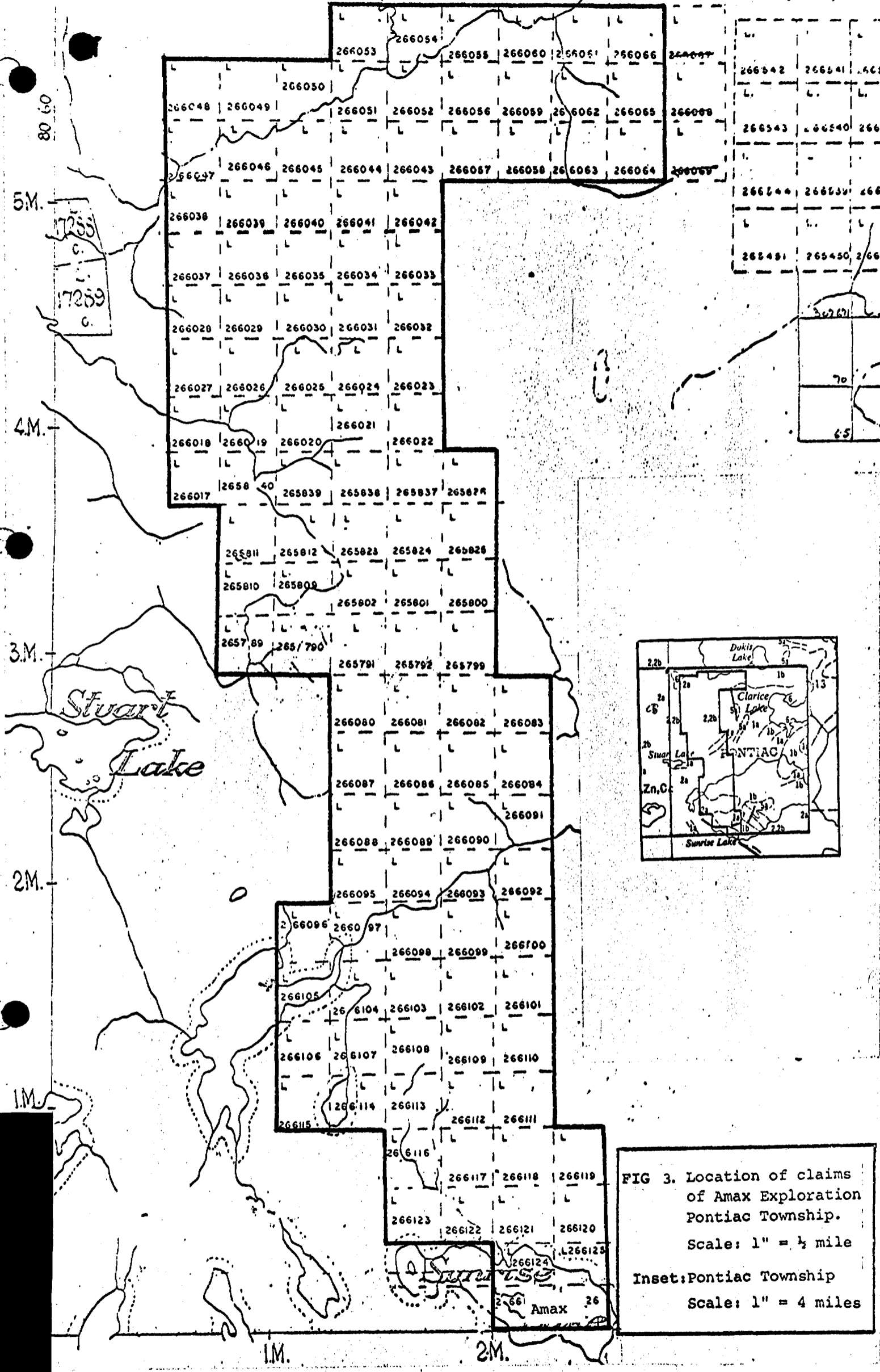


FIG 3. Location of claims of Amax Exploration Pontiac Township.
 Scale: 1" = 1/4 mile
 Inset: Pontiac Township
 Scale: 1" = 4 miles

TABLE OF FIGURES

Figure 1.	Location map.....	After Page 2
2.	Ben Nevis Twp. property map.....	After Page 2
3.	Pontiac Township property map.....	After Page 2
4.	Ben Nevis Twp. - Amax Property Proposed Drill Holes.....	After Page 2
5.	Ben Nevis Twp. - Canagau Option Proposed Drill Holes.....	In Pocket at Back
6.	Pontiac Twp. - Proposed Drill Holes.....	In Pocket at Back

(ii) Canagau Option

Four areas that showed up as significantly anomalous on the IP survey have been recommended for drill testing (Fig. 5). As has been pointed out in some detail in the summary report of work completed under Contract KL-22, each anomalous zone has known sulphide showings close by.

Zone A is adjacent to the abandoned mine workings of Interprovincial Mines in which sub-economic quantities of Pb-Zn-Ag are known to exist. Canagau Mines in 1964 drilled seven holes in the vicinity of the old shaft and eastwards, but none of these holes would have tested the sulphide concentration indicated by the present IP survey. The Canagau holes, to the writer's knowledge, were spotted to test geological theories and did not have the benefit of geophysical surveys. Clearly Zone A remains a first priority target.

Zones B, C and D have not previously been tested by drilling and, in view of the favourable geological environment and the encouragement gained from the geochemical survey, these are priority targets.

If encouraging results are obtained from the drilling recommended in this proposal additional holes would be planned and additional funds requested.

In addition, positive results would indicate that Zone E should also be tested in the second phase of drilling.

(b) Pontiac Township

The only first priority target in Pontiac Township remains the IP anomaly outlined by survey in 1971. It is proposed to test this feature before attempting to carry out IP surveys over rock geochemical anomalies defined by work performed under Contract KL-22 in 1972.

Details of the IP survey and the results obtained have been submitted to the Ministry of Natural Resources in April 1972 in a report "An exploration program for the Pontiac Township property of Amax Exploration, Inc." by W.R. Ryall.

The proposed holes are set out on Figure 6 which also shows the results of the IP survey.

V. FINANCIALDiamond DrillingBen Nevis TownshipAmax Property

3 holes 1200 ft @ \$8.50..... 10,200.00

Canagau Option

4 holes 2000 ft @ \$8.50..... 17,000.00

Pontiac Township

2 holes 900 ft. @ \$13.00..... 11,700.00

Field & Office Costs

Drilling supervision & core logging..... 1,800.00

Report preparation..... 750.00

Assay costs..... 500.00

Transportation, materials & supplies..... 1,000.00

Accommodation..... 500.00

Total direct costs.....\$43,450.00

Overhead @ 5% 2,172.50

TOTAL COST \$ 45,622.50

W.R. Ryall

 W.R. Ryall Ph.D.
 Amax Exploration, Inc.

VI. APPENDIX I.

Claims in Ben Nevis and Pontiac Townships.

Pontiac Township: 118 contiguous claims.

L 265789 - 265792 inclusive
L 265799 - 265802 inclusive
L 265809 - 265812 inclusive
L 265823 - 265826 inclusive
L 265837 - 265840 inclusive
L 266017 - 266066 inclusive
L 266080 - 266127 inclusive

Ben Nevis Township: 112 contiguous claims.

L 265461 - 265490 inclusive
L 264299 - 264304 inclusive
L 264431 - 264435 inclusive
L 265818 - 265819 inclusive
L 265933 - 265936 inclusive
L 265939 - 265946 inclusive
L 265949 - 265956 inclusive
L 265964
L 265967 - 265968 inclusive
L 265971 - 265972 inclusive
L 266135 - 266136 inclusive
L 280427 - 280433 inclusive
L 280489 - 280490 inclusive
L 280495 - 280498 inclusive
L 280635 - 280659 inclusive
L 317606 - 317609 inclusive

One group of 13 mining claims held under option, in Ben Nevis township.

L 12781 - 12782 inclusive
L 16197 - 16198 inclusive
L 16200
L 16220 - 16221 inclusive
L 16332 - 16333 inclusive
L 16455 - 16456 inclusive
L 16465
L 16472

I. INTRODUCTION

IP surveys and related geology and rock geochemistry surveys performed in Ben Nevis Township under the Ontario Government's Mineral Exploration Assistance Program - Contract KL-22 in the period June 1972 to February 1973 have revealed significant targets demanding diamond drill testing.

In Pontiac Township where rock geochemistry and geology surveys defined several interesting anomalous areas the only target deserving of immediate drill testing remains the IP anomaly outlined by a survey conducted in 1971.

If approval of the program outlined herein is granted it is anticipated that drilling could begin in May.

II. LOCATION

The targets proposed for diamond drill testing are located in the Townships of Ben Nevis and Pontiac which are located about 20 miles NE of Kirkland Lake as shown in Figure 1.

III. AMAX PROPERTY POSITION

The drill targets are located on claims previously explored under Exploration Assistance Contract KL-22 and are listed in Appendix I.

The claim groups are shown in Figures 2 and 3.

IV. PROPOSED DRILLING PROGRAM

Targets to be drill tested are IP anomalies located in favourable geological environments. Rock geochemical surveys indicate these targets to be located in extremely favourable conditions. In addition each zone displaying anomalous IP effects is located in close proximity to base metal showings.

The exploration program leading up to the selection of drill targets has been summarized in the report entitled "Report of Work Performed in Ben Nevis & Pontiac Townships Under Ontario Government Mineral Exploration Assistance Program, Contract KL-22, November 1972 - February 1973" submitted to the Ministry of Natural Resources in March 1973 and detail of the work may be found therein.

(a) Ben Nevis Township

(i) Amax claims

It is proposed to drill both Zone A and B (Figure 4). Three holes have been planned, two to test Zone A and the other for Zone B.

The proximity of both anomalous zones to a mineralized rhyolite agglomerate pipe gives these targets top priority.



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VOLUME I.

REPORT OF WORK PERFORMED
IN BEN NEVIS & PONTIAC TOWNSHIPS
UNDER ONTARIO GOVERNMENT
MINERAL EXPLORATION ASSISTANCE PROGRAM
CONTRACT KL-22

November 1972 - February 1973

W.R. Ryall Ph.D.
Amax Exploration, Inc.
Timmins, Ontario

- Copy 1. ✓ Ontario Ministry of Natural Resources
2. Ontario Ministry of Natural Resources
3. Amax Exploration, Inc., Toronto
4. Amax Exploration, Inc., New York
5. Amax Exploration, Inc., Timmins



32D055E0015 63.3036 PONTIAC

030C

TABLE OF CONTENTS

VOLUME I.

I. SUMMARY..... Page 1

II. INTRODUCTION..... Page 2

PART A

BEN NEVIS TOWNSHIP

III. LOCATION & ACCESS..... Page 3

IV. PROPERTY DESCRIPTION..... Page 3

V. WORK COMPLETED UNDER CONTRACT KL-22..... Page 3

 (i) Amax Claims..... Page 3

 (ii) Canagau Mines Option..... Page 4

 (a) IP Survey..... Page 4

 (b) Geological Survey..... Page 6

 (c) Rock Geochemical Survey..... Page 8

PART B

PONTIAC TOWNSHIP

VI. LOCATION & ACCESS..... Page 9

VII. PROPERTY DESCRIPTION..... Page 9

VIII. WORK COMPLETED UNDER CONTRACT KL-22..... Page 9

 (a) Geological Survey..... Page 10

 (b) Rock Geochemical Survey..... Page 13

IX. CONCLUSIONS & RECOMMENDATIONS..... Page 17

VOLUME II.

FIGURES & MAPS

TABLE OF FIGURES

Figure 1.	Location Map.....	After Page 3
2.	Ben Nevis Twp. property map.....	After Page 3
3.	Ben Nevis Twp. IP survey - first separation frequency effects.....	After Page 4
4.	Ben Nevis Twp. IP survey - second separation frequency effects.....	After Page 4
5.	Ben Nevis Twp. IP survey - third separation frequency effects.....	After Page 4
6.	Ben Nevis Twp. - Canagau Option IP survey - first separation frequency effects - a=200 ft.....	In Volume 2
7.	Ben Nevis Twp. - Canagau Option IP survey - second separation frequency effects - a=200 ft.....	In Volume 2
8.	Ben Nevis Twp. - Canagau Option IP survey - third separation frequency effects - a=200 ft.....	In Volume 2
9.	Ben Nevis Twp. - Canagau Option IP survey - first and second separation frequency effects - a=100 ft.....	In Volume 2
10.	Ben Nevis Twp. - Canagau Option Geology Map.....	In Volume 2
11.	Ben Nevis Twp. - Canagau Option Rock geochemistry map.....	In Volume 2
12.	Pontiac Twp. property map.....	After Page 9
a,b 13.	Pontiac Twp. geology map.....	In Volume 2
a,b 14.	Pontiac Twp. Cu in bedrock.....	In Volume 2
a,b 15.	Pontiac Twp. Zn in bedrock.....	In Volume 2
a,b 16.	Pontiac Twp. SiO ₂ in bedrock.....	In Volume 2

I. SUMMARY

I.P. surveys carried out in Ben Nevis Township have defined several significantly anomalous zones which, as a result of geological and geochemical surveys, are believed to be located in environments extremely favourable for hosting base metal deposits. Six targets have been recommended for diamond drill testing.

Geological and rock geochemical surveys carried out on Amax property in Pontiac Township have revealed several anomalous zones, the strongest of which is coincident with an I.P. anomaly defined by a previous survey. This zone covers an area in which many small chalcopyrite showings have been uncovered and constitutes an area recommended for diamond drill testing. Following analysis of the drilling results a decision will be made to test other geochemical anomalies in areas of favourable geology.

II. INTRODUCTION

In 1970-1 field parties uncovered zones of sulphide mineralization in favourable rock types on the Company's claim groups in Ben Nevis and Pontiac Townships. These discovery areas were evaluated by IP surveys and, in Ben Nevis Township, by diamond drilling. Drilling was not attempted in Pontiac Township as the remoteness of the target area from access roads makes drilling very expensive and necessitated defining all potential target areas prior to mobilizing a drill unit.

In Pontiac Township geological and rock geochemical surveys did not define additional target areas and the IP anomaly defined in the 1971 survey remains the only target to be drill tested on Amax property in Pontiac Township. Details of work performed on the Pontiac Township property before 1972 have been summarized in the report entitled "An exploration program for the Pontiac Township property of Amax Exploration, Inc." by W.R. Ryall, which was submitted in April 1972 to the Minister of Natural Resources as a request for participation under the Ontario Government's Mineral Exploration Assistance Program.

On Amax property in Ben Nevis Township additional IP survey defined an interesting target in the vicinity of an outcropping rhyolite agglomerate which is heavily mineralized with argentiferous pyrite.

Previous IP surveys conducted near the 13 Patented Mining Claims owned by Canagau Mines Limited indicated this property had interest. An option agreement permitted evaluation of this property with IP, geology and rock geochemical surveys being selected as the appropriate techniques. Several interesting anomalous areas have been defined and require drill testing.

Drilling costs were not included in Contract KL-22 and a request for participation under the Mineral Assistance Exploration Program will be submitted in an accompanying report.

Although Contract KL-22 covered work performed in both Ben Nevis and Pontiac Townships it is convenient to summarize the program in two parts. Part A will deal with work performed in Ben Nevis Township and Part B with that in Pontiac Township.

PART A

BEN NEVIS TOWNSHIP

III. LOCATION & ACCESS

Ben Nevis Township is located about 16 miles NE of Kirkland Lake and 25 miles west of Rouyn-Noranda (Fig 1.). Pontiac Township adjoins Ben Nevis to the east and its easterly boundary forms the Ontario-Quebec Provincial Border.

Aircraft access is restricted to Verna Lake, at the west boundary and Stuart Lake at the east.

A Forest Access Road from Larder Lake station now reaches some two miles northward from the Ben Nevis - Katrine Township line. Increasing logging activity in the south-central area of the township is providing additional vehicular access.

IV. PROPERTY POSITION

Wholly owned claims and the optioned Canagau Mines property are shown on Fig. 2.

V. WORK COMPLETED UNDER CONTRACT KL-22

Evaluation was conducted on both wholly owned claims and claims optioned from Canagau Mines Limited. The principal work involved detail IP survey on Amax claims in the vicinity of a previously discovered pyritiferous rhyolite agglomerate pipe and IP survey over the Canagau option. Geological mapping and limited rock geochemical surveys were also completed over the Canagau option with the explicit aim of assisting interpretation of the IP survey results.

(i) Amax claims

A 100 ft. grid was cut over an area of mineralized rhyolite agglomerate and an IP survey was conducted in November 1972 by Dennis F. Morrison using the McPhar P660 High Power IP unit which operates at 5 and 0.3 Hz. The dipole-dipole configuration was employed using a 100 ft. dipole and three separations were read.

Two anomalous zones were revealed by the survey - these are labeled Zones A and B on Figures 3, 4 and 5 which show, respectively, first, second and third separation percentage frequency effects. Background PFEs in this area are recorded less than 1% whilst Zone A is characterized by maximum PFEs of over 5% on each separation read indicating uniform mineralization to depth.

Zone B, on the other hand, appears to intensify at depth as the PFEs range from a maximum of 3.0% at the first separation to 4.9% at the third.

In view of the favourable geological setting, together with the proximity to mineralized zones, both Zone A and B require diamond drill evaluation.

(ii) Canagau option

As a result of the excellent mapping project completed by L.S. Jensen of the O.D.M. (Ben Nevis Township, Preliminary Map P693, ODM, 1971) the property of Canagau Mines was considered to offer potential for base metal exploration. The disseminated nature of Pb-Zn-Ag mineralization and the apparent failure of airborne geophysical surveys to locate conductive horizons on the property led to IP being selected as the appropriate geophysical method. Geological mapping and limited rock geochemical surveys were undertaken to aid in interpretation of the IP results.

(a) IP Survey

The initial survey was conducted on 400 ft. lines which totalled 12.89 miles. These lines were cut in October 1972 by Shield Geophysics, 26 Pine St. South, Timmins. The IP survey was conducted by Dennis F. Morrison, P.O. Box 418, Gravenhurst, Ontario and employed the McPhar P660 High Power IP unit which operates at 5 and 0.3 Hz. The dipole-dipole configuration was employed with a 200 ft. dipole. Where anomalous conditions were encountered and believed due to near-surface mineralization detailing with a 100 ft. dipole was undertaken.

The survey was completed in the period 7-18th November 1972 and interpretation of the results indicated several problem areas - particularly relating to continuity and strike of anomalous zones. Additional survey was indicated and 11.52 miles of fill-in lines, mostly at 200 ft. spacing were cut in January-February 1973 by Shield Geophysics.

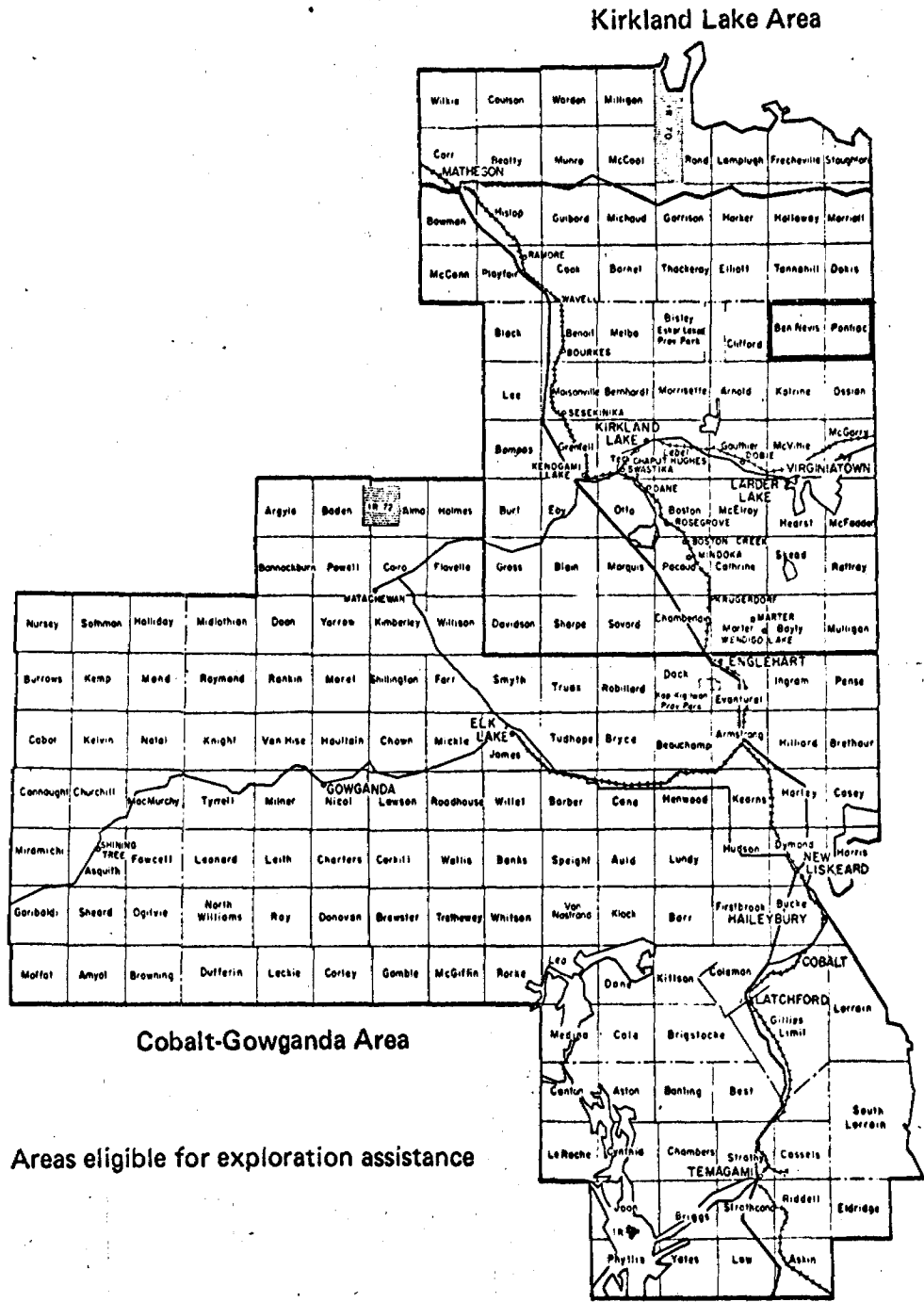


Figure 1. Location of claim groups in Pontiac and Ben Nevis Townships
...Amax Exploration, Inc...

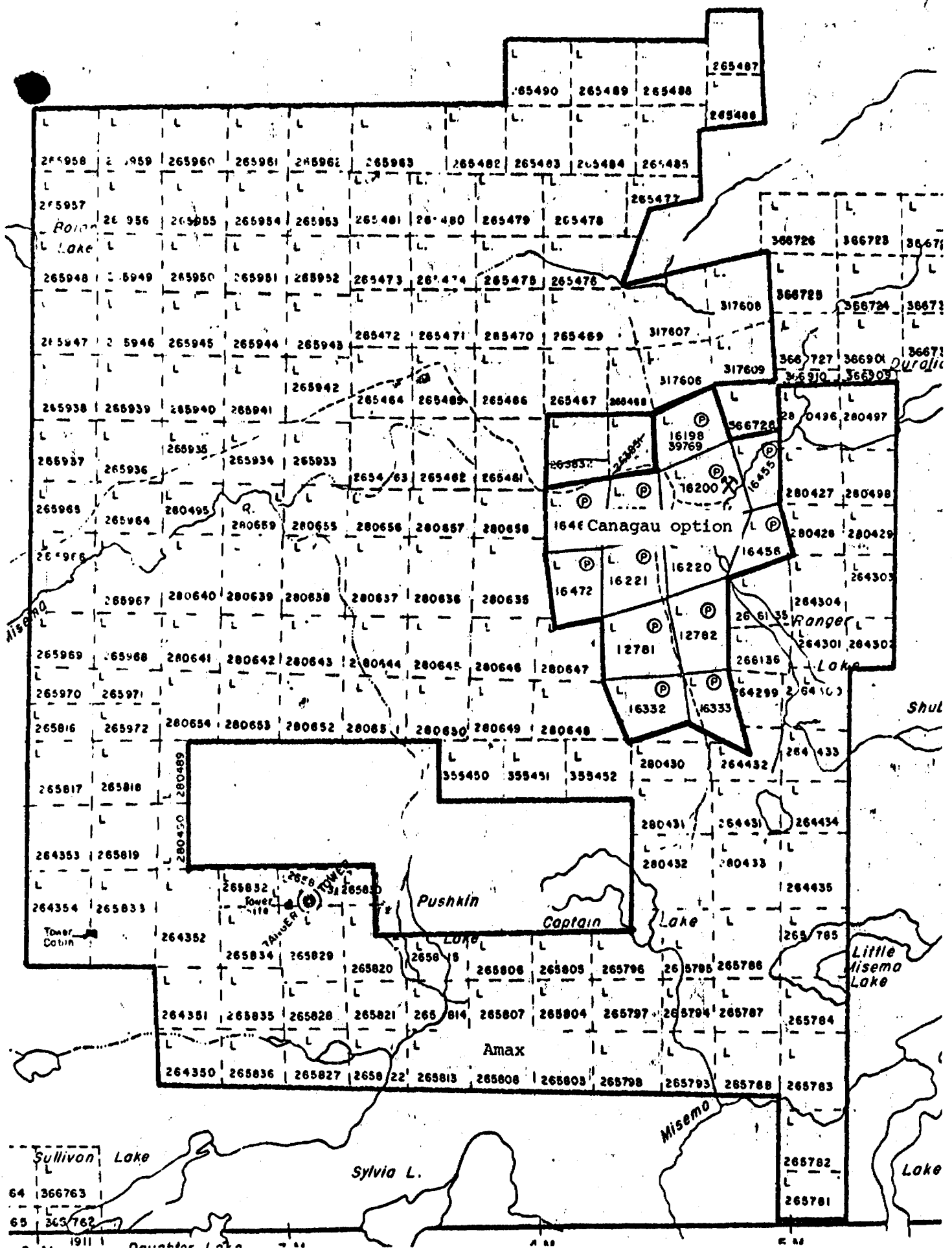


Figure 2. Ben Nevis Township property map.



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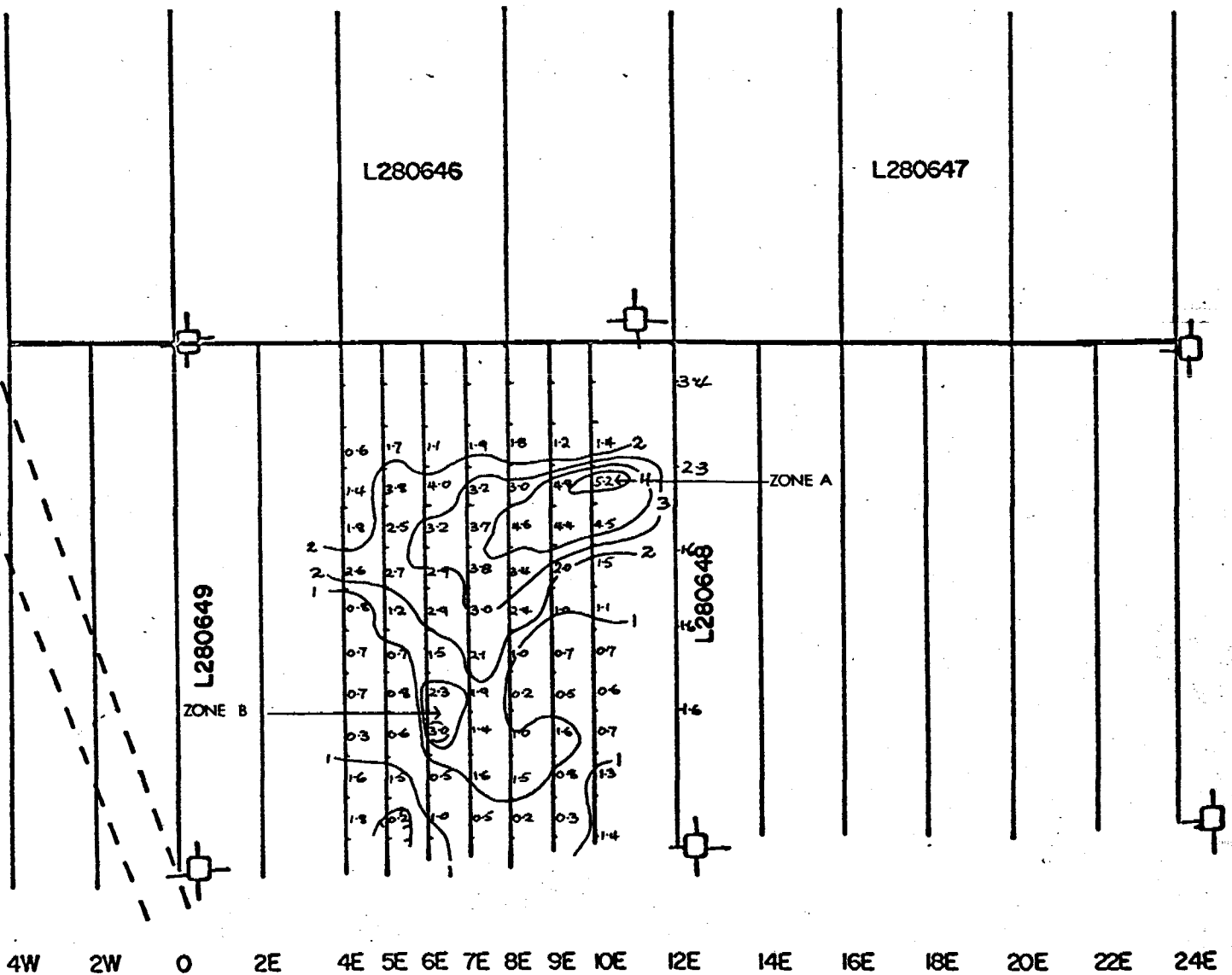
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L280649

L280648

Road

Percent Frequency Effect
Dipole - Dipole
 $n=1; a=100 \text{ ft.}$



IP SURVEY
BEN NEVIS TWP., ONTARIO
GRID 3 - DETAIL
SCALE: 1"=400'

NTS. NO. 32D/5 PROJECT NO. 421-01
TO ACCOMPANY REPORT BY: *W. H. Lyall*
AMAX Potash Ltd., Timmins, Ontario DATE: *Mar 73*

Figure 3.

IP survey again by Dennis F. Morrison employing the same equipment commenced 6 February and was completed 17 February 1973. For definition of zones a 100 ft. or 200 ft. dipole was variously used.

The results of the surveys are shown on Figures 6, 7, 8 and 9.

Surveys employing the 200 ft. dipole have defined five zones having significant frequency effects. Zones A, B and C appear on each separation $n = 1, 2$ and 3 and have peak PFEs of 9.1, 6.1, 7.7%, respectively, over a background of less than 1%. The background is probably in the order of less than 0.5% as measured on lines 12N, 8N and 4N where no mineralization has been found in outcrop. Elsewhere on the property disseminated sulphides are very common and in this respect almost the entire property could be considered anomalous.

Zone A is a strong narrow anomaly extending some 800 ft. SW from the old Canagau Mines workings. There is a suggestion that the anomalous zone extends SW through stations 9W, L12S, 13W, L16S into Zone D. This trend approximately parallels the anomalous continuity joining Zones B and C and could reflect a major structural feature which is controlling mineralization on the Canagau property.

Evidence of these features is lost on the second and third separations, however.

Detail over Zone A was provided with 100 ft. dipole readings at two separations. This detail, shown on Fig. 9, has resolved this area into a number of narrow zones, particularly on L4S where peak values greater than 8.0% are recorded at 1+50E and 3+50E. L6S reveals a narrow intense zone, on both separations, at 0+50W and 0+00. Near surface response is continuous to L8S as measured at 1+00E. L10S reveals no southward continuity of the near surface effects.

Zone B is a broad anomaly of modest amplitude with the peak lying between L24S and L28S on each of the three separations read with the 200 ft. dipole. Peak FE values are near 6.0% and detailing with the 100 ft. dipole on lines 22S and 26S did not significantly aid in interpretation of this zone as the source of mineralization is apparently greater than about 200 ft. deep.

Zone C has a well defined eastern boundary and appears to show some continuity with Zone D to the NW. Peak FEs are near 9% on the second and third separation indicating good continuity to depth. This zone is quite complex in structure and there appears to be at least three near-surface sulphide concentrations giving rise to the anomalous measurements near station 7W, L44S and stations 9W and 14W, L48S.

Zone D is not well defined on the first and second separations but appears as a discrete anomaly on the third where it appears as a broad zone with an average FE of 7.1 to 7.6%. This zone has a well defined easterly boundary and has not been closed to the west by the present survey although a previous survey indicates this anomaly to persist weakly westward.

100 ft. dipole detailing between 15W and 26W on L28S revealed a narrow zone near 22W with 6.0% peak FE on the second separation. This zone, however, appears to intensify at depth as the maximum PFEs are recorded on the third separation with the 200 ft. dipole.

Zone E was located on lines 44S and 48S and is obvious only on the third separation read with the 200 ft. dipole. The zone is not much larger than 400 ft. across with maximum FEs near 4.0%.

Diamond drill testing of Zones A, B, C and D is recommended for immediate follow-up. Encouraging results would enhance the potential for early drilling of Zone E.

(b) Geological Survey

The geological survey was conducted in the period 7-14th November 1972 by W.R. Ryall on the cut grid established for the geophysical surveys over the Canagau Mines option.

General Geology

The geology of Ben Nevis Township is well known following the mapping of L.S. Jensen (O.D.M. 1971). He has shown that all bedrock outcropping in the property is of Archean age with the north of the property being predominately felsic metavolcanics whilst the south and to the west intermediate metavolcanics are more abundant. The geology map is shown as Figure 10.

Felsic Metavolcanics

Within the option block the felsic rocks are mostly highly sheared, fine-grained pyroclastics that weather a buff colour in outcrop. All units are sericitized and some outcrops could be described as sericite schist, particularly on lines 0 to 12N incl. Elsewhere sericite and kaolinite are uniformly developed but do not obscure original texture.

In the vicinity of the old shaft area and extending to L12S heavy disseminated pyrite and sphalerite with weaker galena is common. In outcrop rocks of this area are frequently very rusty.

Intermediate Metavolcanics

These units are composed of massive and flow breccia units in the south and west parts of the option but to the east massive pillowed units are exposed.

There appears to be intertonguing of felsic and intermediate units especially on lines 44S and 48S near stations 4W to 8W.

Most of the rocks described in this classification appear best described as andesite to dacite.

Intermediate Intrusive Rocks

Rocks with a texture best described as dioritic intrude the felsic units NE of the mine shaft area. These rocks, exposed in several pits, carry up to 10% galena with minor sphalerite over short intervals. Elsewhere 5% pyrite is common.

A larger outcrop of diorite is seen at the North end of Parysek Lake, but outcrop is poor and its extent has not been traced.

Structural Geology

It has not been possible to define macrostructure with the mapping completed on the property but Jensen (1971) has proposed an antiformal axis situated approximately near the baseline and plunging south. Although the presence of this structure has not been proven by mapping confined to the property, its presence does seem very probably and would explain the outcrop distribution of the felsic and intermediate volcanics.

The most pronounced structural feature on the property is the intense E-W vertically dipping shearing which is strongest in the north but still observable on L32S. This is a regional phenomenon observed by the author at distances of a mile north and east of the Canagau property.

Many joint sets are developed, particularly in felsic rocks around the minesite.

(c) Rock Geochemical Survey

The rock geochemical survey was intended to be of limited extent and to aid in geological mapping and classification of rock types.

Rocks were crushed to -200# at Hollinger Mines Laboratory, Timmins, and analyzed for Cu, Ag, Zn, Pb and SiO₂ at Amax Geochemical Lab, Burnaby, British Columbia.

Cu, Ag, Zn and Pb were determined by atomic absorption techniques following dissolution in hot HClO₄-HNO₃. Si was determined by an atomic absorption method after fusion with lithium metaborate.

Not enough samples were collected to permit reliable contouring of data but the results, shown on Figure 11 clearly indicate a markedly anomalous area whose approximate bounds are indicated by the heavy dashed line.

Within this area Zn content ranges from 92 to 7200 ppm and Pb from 14 to 4000 ppm. Cu shows unclear correlations as does Ag, although the latter probably correlates with Pb.

Although in collecting samples an attempt is made to avoid mineralized outcrop, evidently free sulphide is present in some samples although this was not observed in the field.

PART B

PONTIAC TOWNSHIP

VI. LOCATION & ACCESS

Pontiac Township is located some 20 miles NE of Kirkland Lake. The west boundary of the township is common with Ben Nevis Township and the east boundary forms part of the Ontario-Quebec Provincial boundary as shown in Figure 1.

Vehicular access to the property is poor, the only route available leads from the village of Kearns to Sunrise Lake at the south boundary of the township. From this point a winter road leads to Clarice Lake.

Aircraft access may be gained to Stuart, Pontiac and Clarice Lakes.

VII. PROPERTY DESCRIPTION

The location of wholly owned claims is shown on Fig. 12.

VIII. WORK COMPLETED UNDER CONTRACT KL-22

Following the definition of an IP anomaly in the vicinity of a copper showing in silicified rhyolite it was decided to attempt to locate additional drill targets on the property before mobilizing a drill unit. The inaccessibility of the group makes for expensive drilling and the per foot drill cost would be proportionally reduced with an increase in drill targets.

It was proposed that geological and rock geochemical surveys would permit delimiting of areas within the group suitable for IP testing. The geological and rock geochemical surveys outlined areas of potential interest but not of sufficient intensity to warrant immediate IP follow-up.

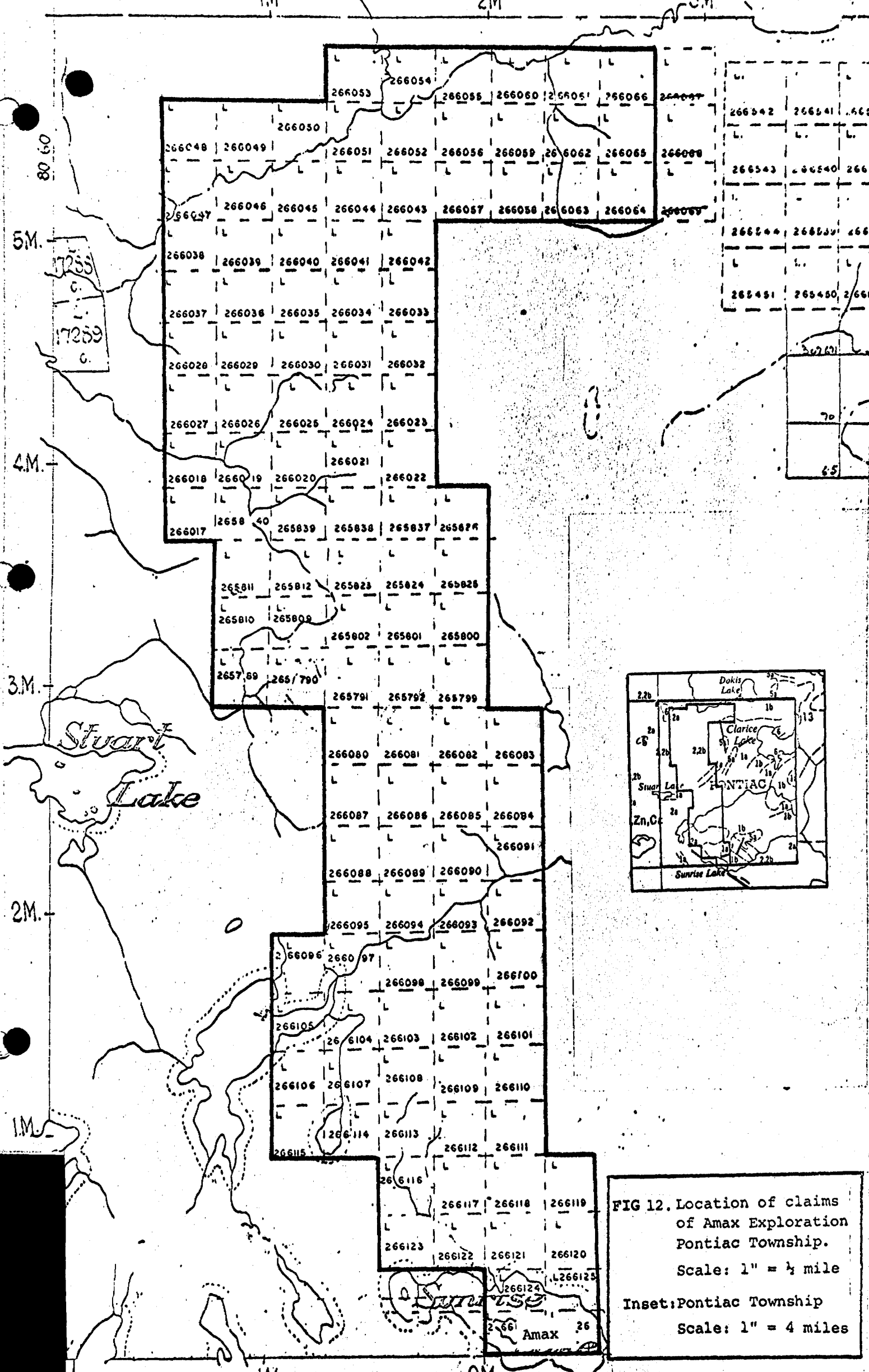


FIG 12. Location of claims
 of Amax Exploration
 Pontiac Township.
 Scale: 1" = 1/4 mile
 Inset: Pontiac Township
 Scale: 1" = 4 miles

(a) Geological SurveyField Methods

Mapping and rock sample collection was carried out mainly by D.R. Hawke (Amax Exploration, Timmins) with some by the author. Field assistants were Claude Britt and Mike Pickens. Work was supervised in the field and office by the author.

For control a north-south baseline was established from the No. 1 post of claim L265809 to Dokis Creek. In the south part of the group the baseline was offset in an easterly direction to post No. 1 of claim L265801. East-West lines were turned off the baseline at 400 ft. intervals. Cross lines were mapped and rock samples collected from most outcrops encountered. Selected rock samples were sent for analysis.

The aim of the survey was to define and sample the felsic-intermediate contact which hosts the chalcopyrite showing SE of Death Lake. Additional sampling of the felsic units, where encountered, was an important aspect of the project.

General Geology

The geology of Pontiac Township is well known following the careful mapping of L.S. Jensen (Pontiac Township - P.629, ODM 1971) who states "all bedrock is of Archean age. The bedrock consists of intermediate and felsic volcanic rocks intruded by stocks and sills of gabbro, diorite and granodiorite. Dikes of feldspar porphyry cut the volcanic rocks. Metamorphism occurs only at the contacts of intrusive rocks."

The present claim group covers a northerly-trending contact of intermediate metavolcanic units to the west and younger felsic metavolcanic units to the east. In the south portion of the map area the felsic metavolcanic units form a wedge with intermediate metavolcanic rocks on either side.

Both Intermediate and Felsic metavolcanic units are intruded by stocks and dikes of gabbro and diorite.

Metamorphism is restricted to lower greenschist facies but evidence of more intense contact metamorphic effects are observed near intrusive contacts. Strong effects are observed in the vicinity of shears and minor faults where abundant sericite has been produced in felsic units and chlorite in the mafic.

The contact between the felsic and mafic units, in the east, is quite sharp whereas the western contact, especially in the Pontiac Lake area, is characterized by narrow-intercalated units and is not clearly defined.

The geology of the group is shown on Figure 13 a,b.

Within the group the stratigraphy can be summarized as follows:

CENOZOIC

Pleistocene & Recent

Sand, gravel, clay.

UNCONFORMITY.

PRECAMBRIAN

Archean

Mafic intrusive rocks

Gabbro and diorite

INTRUSIVE CONTACT.

Intermediate metavolcanic rocks

Dacite and andesite flows and fragmentals

Felsic metavolcanic rocks

Rhyolite and rhyodacite flows and fragmentals.

Lithological Descriptions

Felsic Metavolcanics

In the south half of the map area felsic metavolcanic units form a very thick unit outcropping over some 3000-4000 feet across strike. To the north of the Pontiac Creek Fault (Jensen, 1971) the unit outcrop over about 2000 ft. strike width but here it appears to be intercalated with intermediate units and hosts numerous dioritic intrusive bodies.

The rocks of this unit are predominantly fragmental with tuffs, breccias and agglomerates being observed. Fragments are usually very angular and more siliceous than the matrix. These rocks are interstratified with porphyritic to aphanitic members which contain feldspar phenocrysts and/or quartz eyes.

Characteristically, the rocks weather to a light grey to buff colour and are only slightly metamorphosed in most places. Sericitic alteration is common especially in the vicinity of shears and faults. For example near the Pontiac Creek fault the rocks have been extensively sericitized, chloritized and carbonatized.

Intermediate metavolcanics

These rocks are predominately of andesitic-dacitic composition and consist of typical massive and pillowed flows in which flow breccias are fairly plentifully developed.

Grain size is very variable and sections of flows range from aphanitic to coarsely crystalline where they resemble intrusive diorite in texture.

Generally to the east, or stratigraphic base, the rocks are mainly massive pillowed flows whilst andesites to the west contain much more interstratified and fragmental material. Again fragments are usually more siliceous than the matrix.

In outcrop the rocks weather to a green or brown grey colour, whilst fresh surfaces show varying shades of grey.

Over much of the property the rocks have been chloritized and carbonatized.

Mafic intrusive rocks

Gabbro and diorite bodies intrude both the felsic and intermediate metabolcanic units. Diorite predominates over gabbro in outcrop area with significant bodies occurring south of Death Lake between lines 10S and 28S and north of Death Lake between lines 12N and 32N. Smaller bodies, frequently less than 400 ft. across, occur throughout the property where they are difficult to distinguish from coarser grained intermediate flow units. It is interesting to note that the mafic intrusives typically occur within the limits of the felsic outcrop or at or near the upper contact of the felsic-intermediate metavolcanics. The significance of the stratigraphic control over the emplacement of these bodies is not yet understood.

Structural Geology

It is difficult to define major structure from the work completed on the map area. Overall the main felsic-intermediate metavolcanic contact strikes approximately N-S with a broad flexure south of the Murdock Creek - Kennedy Lake fault as defined by Jensen (1971). However, due to poor outcrop in this area definition of structure was not possible.

Jensen has indicated several major faults striking approximately northeast which extend beyond the limits of Pontiac Township. Movement on these faults has been significant with strike slips being at least 1200-1800 ft. This displacement is best shown on the property by the offset of the felsic-intermediate metavolcanic contact by the Pontiac Creek fault.

Many small, localized shear zones have been noted throughout the map area and these commonly contain minor disseminated pyrite mineralization of no economic significance.

A broad shear zone occurs in the south part of the property extending from near the No. 1 post of L266104 to about the No. 1 post of L266121, a distance of about 6400 ft. The width of this zone varies from about 800 to 1600 ft.

The attitude of pillows in the intermediate volcanic units indicates facing to be to the west in the map area. This confirms findings of Jensen (1971).

(b) Rock Geochemistry Survey

Selected rock samples collected during the mapping project were crushed to -200# at Hollinger Mines Laboratory, Timmins and submitted to Amax Geochemical Laboratory for determination of Cu, Zn, Pb, Ni and SiO₂.

Cu, Zn, Pb and Ni were determined by standard atomic absorption methods following dissolution in hot HClO₄-HNO₃. Si was determined by an atomic absorption technique following lithium metaborate fusion.

Sampling density allowed preliminary contouring of the analytical results although a greater sample density would permit more accurate detail.

In order to take into account the change in trace element content with variations in the bulk chemistry of the rocks the volcanics have been classified as follows:

- < 56% SiO₂ mafic volcanics
- 56-64% SiO₂ intermediate volcanics
- > 64% SiO₂ felsic volcanics

SiO₂, Zn and Cu analytical results appeared to show systematic trends and it was believed additional trends may become more evident if these analyses were presented in contour form. These maps are included as Figures 14 a, b, 15 a, b and 16 a, b.

From comparison of Fig. 13 a & b with Fig. 16 a & b it is noted that there is, at best, only an overall correlation of the SiO₂ analyses with the geological units as mapped in the survey. The trend of SiO₂ contours cuts across the geological contacts as mapped. Probably the major factor contributing to the discrepancies noted is the sparse sample density. But certainly, some of the units mapped in the field on textural and structural bases as intermediate metavolcanics have abnormally high silica contents. Some of these outcrops were noted to have a flinty fracture and it is proposed that these have suffered silicification at some stage in their metamorphic history. It is obvious that SiO₂ content alone is not sufficient to classify rocks of the map area and textural and structural characteristics have been preferred in this project.

The mechanism or timing of the silicification is not understood but it could be related to late-stage alteration effects which produced sericitization and chloritization. It is expected that contoured plots of alkalis and magnesia would also exhibit irregularly defined patterns.

For example, in the area from Pontiac Creek to Sunrise Lake the greatest divergence between rock types mapped and silica analyses is evident. But within this area the rocks clearly have been more highly sheared, sericitized and chloritized compared with those in the north.

Copper analyses (Fig. 14a & b) follow lithology more closely but again defy simple interpretation. The southern sheet (Fig. 14b) is characterized by uniformly low values, ranging from 6 to 84 ppm Cu.

In the northern sheet (Fig. 14a) two markedly anomalous areas are evident with peak values of greater than 200 ppm over a background of about 20 ppm Cu. The more southerly anomaly is located some 1000 ft. N of the copper showing and IP anomaly defined by earlier surveys. No attempt has been made to determine the significance of either anomaly. This will be attempted following drilling of the IP anomaly.

The Zn maps (Figs 15a & b) clearly define eight anomalous areas with peak values greater than 200 ppm Zn over a background of about 35 ppm.

The mean metal contents for each class of rock has been summarized as follows:

	Mean content (ppm)			
	<u>Cu</u>	<u>Ni</u>	<u>Zn</u>	<u>Pb</u>
Felsic volcanics	23.0	23.8	69.8	12.2
Intermediate volcanics	36.1	55.2	63.1	14.3
Mafic volcanics	49.6	76.1	73.8	19.7

It is readily seen that Cu, Ni and Pb increase from felsic to mafic rocks as expected but the Zn trend is contrary to previous findings where it tends to be enriched in acid end members over more basic.

From inspection of the contoured analytical data it appears that at least two geochemical provinces exist within the map area. The area extending from Pontiac Creek to Dokis Creek is characterized by higher SiO₂, Cu and Zn values compared with the area south of Pontiac Creek. A northeasterly-trending fault forms the boundary of these areas and it can be that near this fault the contours on the geochemical maps are bent to an east-west trend indicating lack of correlation across this structure.

The three most significant locations indicated by the geochemical data appear to be south of Death Lake, near the showing area, a second in the vicinity of L52N between stations 4W and 24W which is defined most clearly by the Zn analyses. However plots of the Cu analyses are seen to form an anomalous zone flanking and partially overlapping the south edge of the Zn anomaly. The third zone is centered around L116S near station 16W and is defined by high Zn values but appears to lack a coincident Cu anomaly.

It is interesting to note that most of the anomalous areas defined in the survey straddle either a felsic-intermediate volcanic or a felsic volcanic-mafic intrusive contact.

Conclusions

The geological mapping program outlined a potentially interesting felsic-intermediate metavolcanic contact and rock geochemical surveys indicated several anomalous areas located near this contact.


The most significant geochemical anomaly occurs coincident with an IP anomaly defined in a previous survey over a mineralized showing. It has been decided to test this zone with diamond drilling before attempting evaluation of geochemical anomalous area that are without outcropping sulphide coincidence.

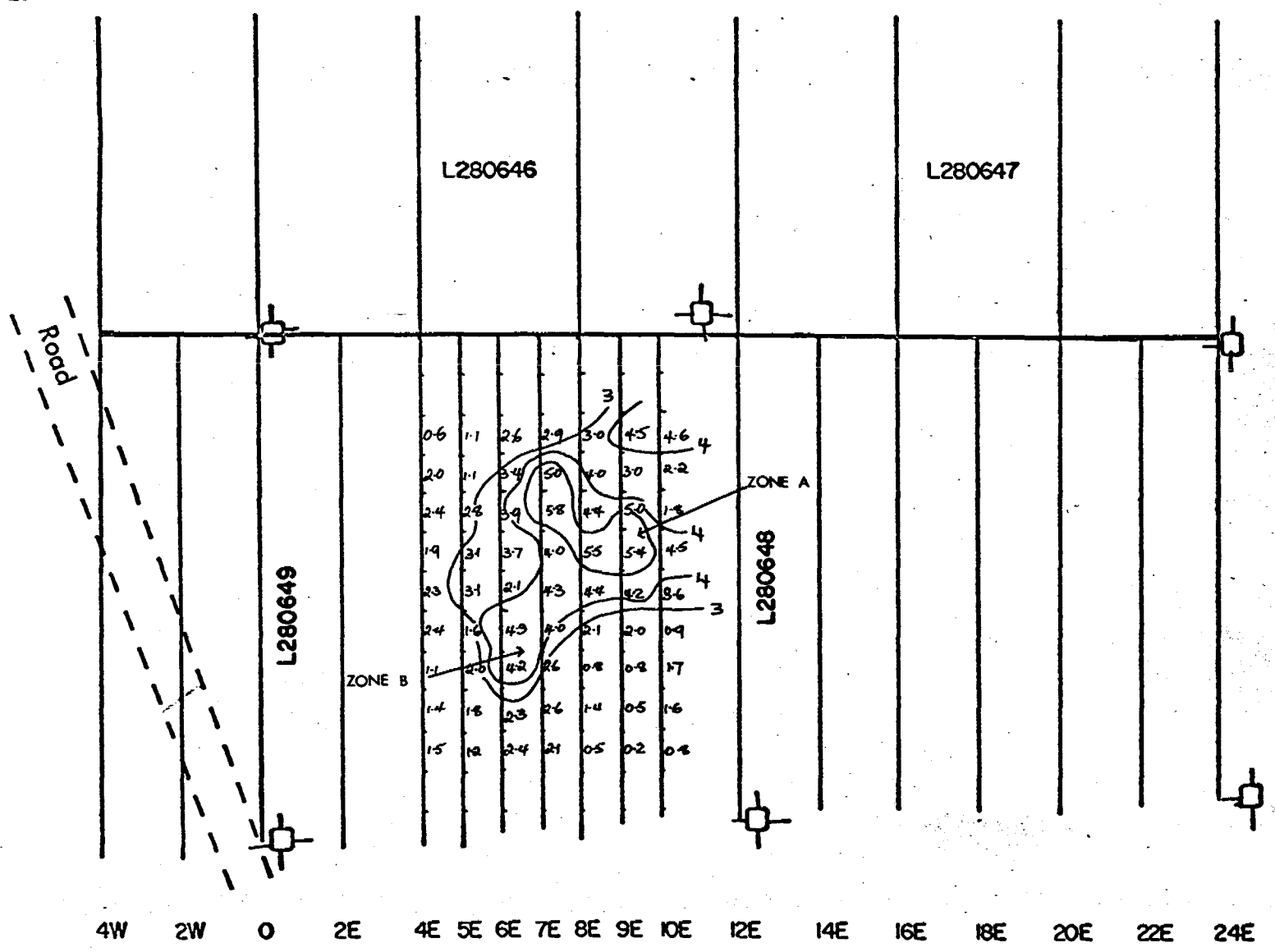
IX. CONCLUSIONS

The IP surveys carried out over Amax and Canagau Mines' claims in Ben Nevis Township have revealed several potential target areas. Geological and rock geochemical surveys performed in conjunction with the above surveys have considerably enhanced the significance of the IP zones and six areas have been recommended for diamond drill testing as targets of top priority.

Geological and rock geochemical surveys in Pontiac Township have outlined a number of anomalous areas but only one of these is recommended for immediate diamond drilling. This zone is coincident with an IP anomaly over a chalcopyrite showing that was outlined by a survey in 1971.

Evaluation of the IP and rock geochemical anomaly by drilling will permit assignment of priorities to other rock geochemical anomalies.


.....
William R. Ryall Ph.D.
Amax Exploration, Inc.
Timmins, Ontario.

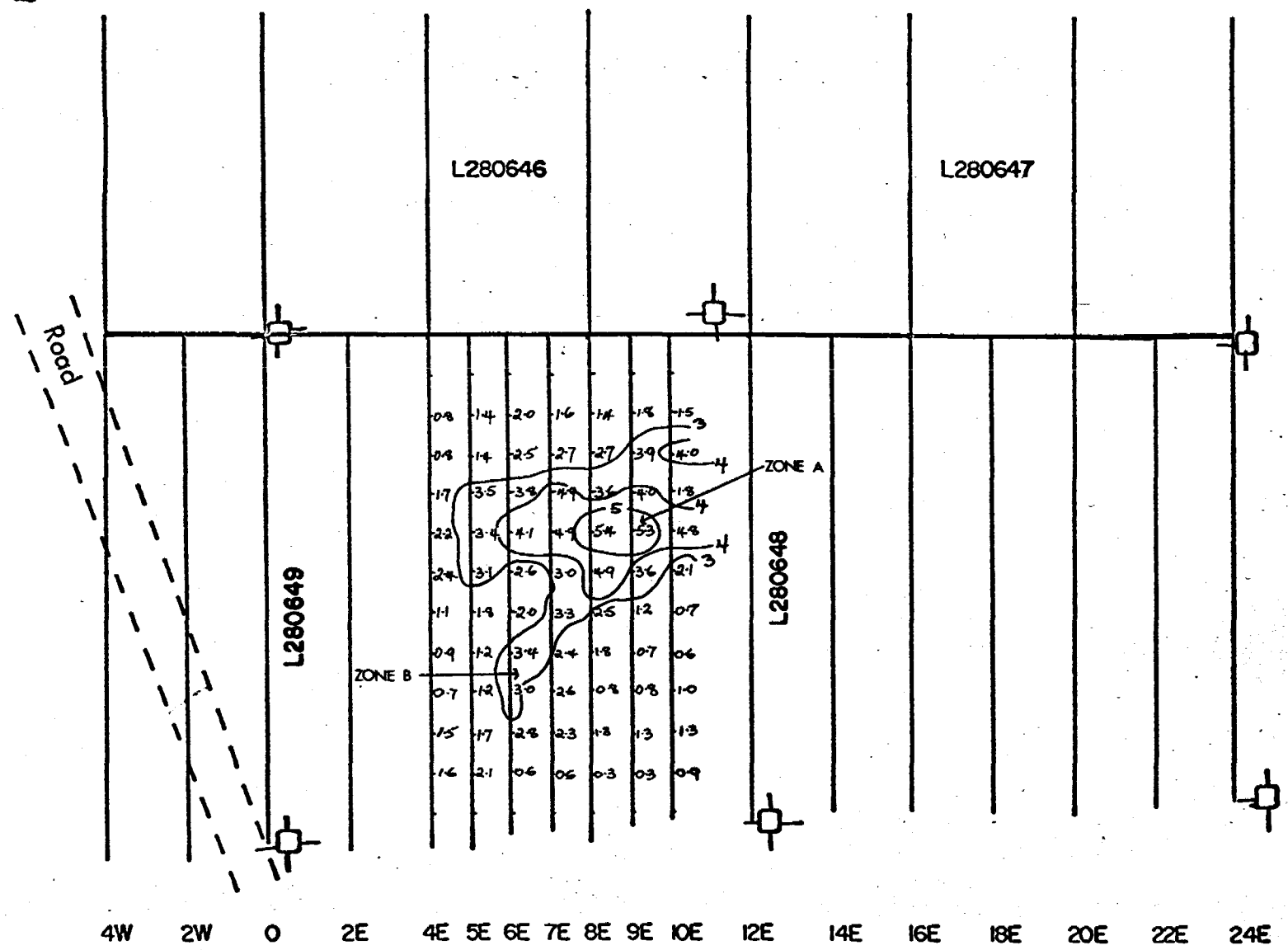


Percent Frequency Effect
Dipole - Dipole
n=3; a=100 ft.

IP SURVEY
BEN NEVIS TWP., ONTARIO
GRID 3 - DETAIL
SCALE: 1"=400'

NTS. NO. 32D/5 PROJECT NO. 421-01
TO ACCOMPANY REPORT BY *[Signature]*
AMAX Potash Ltd., Timmins, Ontario DATE *[Signature]* 73.

Figure 5.



Percent Frequency Effect
 Dipole - Dipole
 $n=2$; $a=100$ ft.

IP SURVEY
BEN NEVIS TWP., ONTARIO
GRID 3 - DETAIL
SCALE: 1"=400'

NTS. NO. 320/5 PROJECT NO. 421-01
 TO ACCOMPANY REPORT BY: *W. Ryall*
 AMAX Potash Ltd., Timmins, Ontario DATE: *Mar 73*

Figure 4.

AMAX EXPLORATION, INC.

PONTIAC TOWNSHIP, ONTARIO

BATTERY I.P. SURVEY

DIPOLE - DIPOLE ARRAY

A = 200' N = 200'

ISOCHARGEABILITY CONTOURS AT 5 MS. INTERVALS

LINEAR SCALE: 1" = 100'

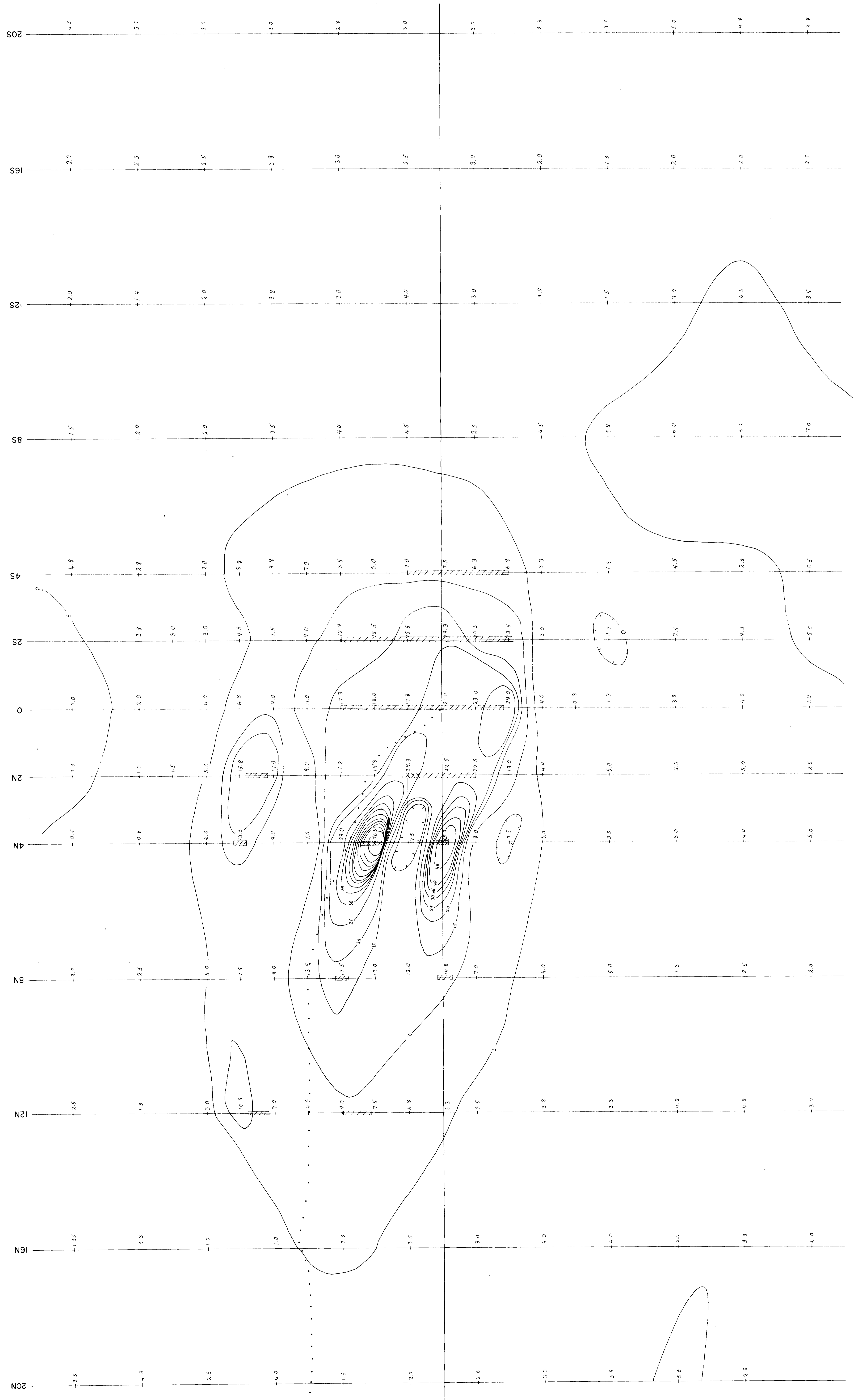
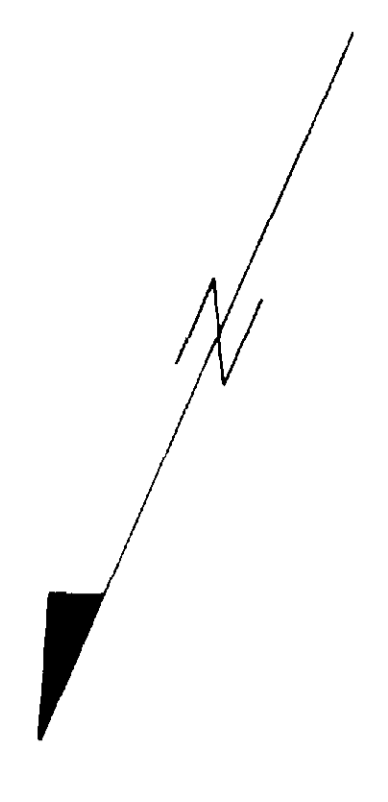
OPERATORS: L. KYDD, M. LATTINEN

DATE: AUGUST, 1971

63.3036

subyack 7/73

Figure 6



AMAX EXPLORATION, INC.

PONTIAC TOWNSHIP, (GRID NO. 1), ONTARIO

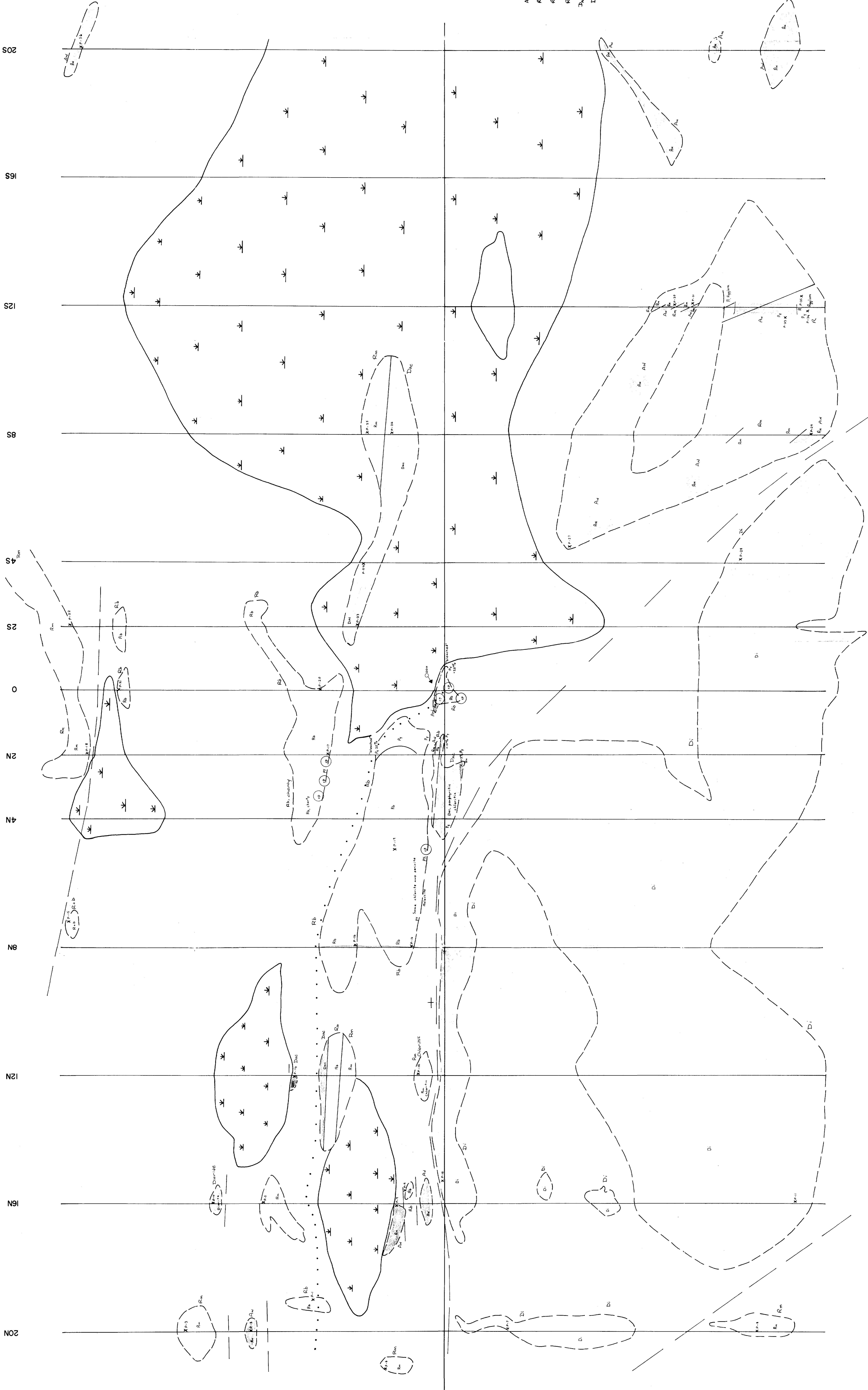
GEOLOGICAL SURVEY 63 3036 (REV) 10/9/71

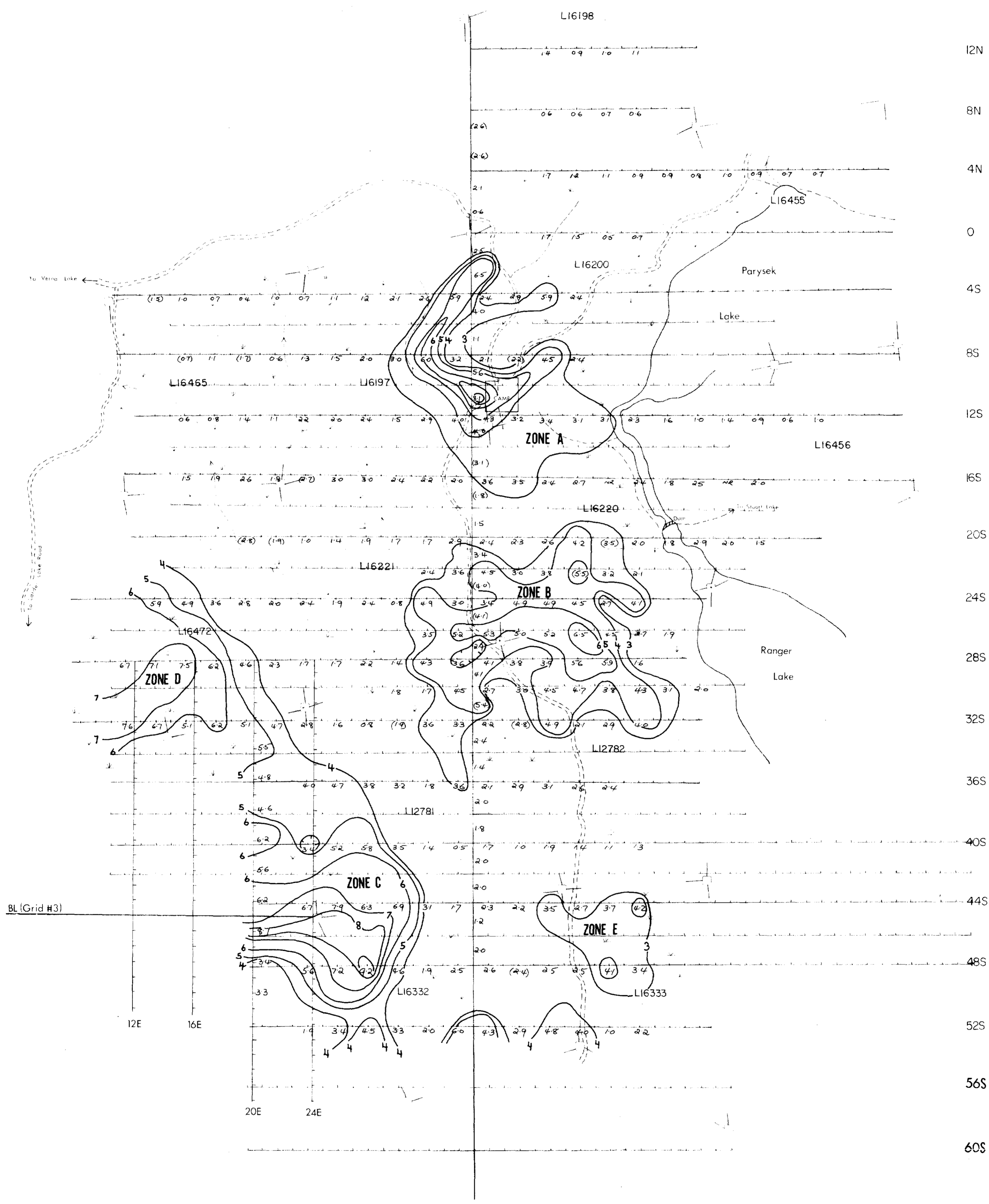
SCALE: 1" = 100'

DATE: AUGUST - SEPTEMBER, 1971

LEGEND:

- A₁ AN ANDESITE
- A₂ RM RHYOLITE, MASSIVE
- R₁ RB RHYOLITE BRECCIA
- R₂ RT RHYOLITE TUFF
- D₁ DC DACITE
- D₂ DR DORITE
- CONTACT, OBSERVED
- - - CONTACT, ASSUMED
- - - AREA OF OUTCROP
- SWAMP
- SAMPLE NO. AND LOCATION
- CP CHALCOPYRITE
- PY PYRITE
- DRH DRILL HOLE
- FOOT TRAIL





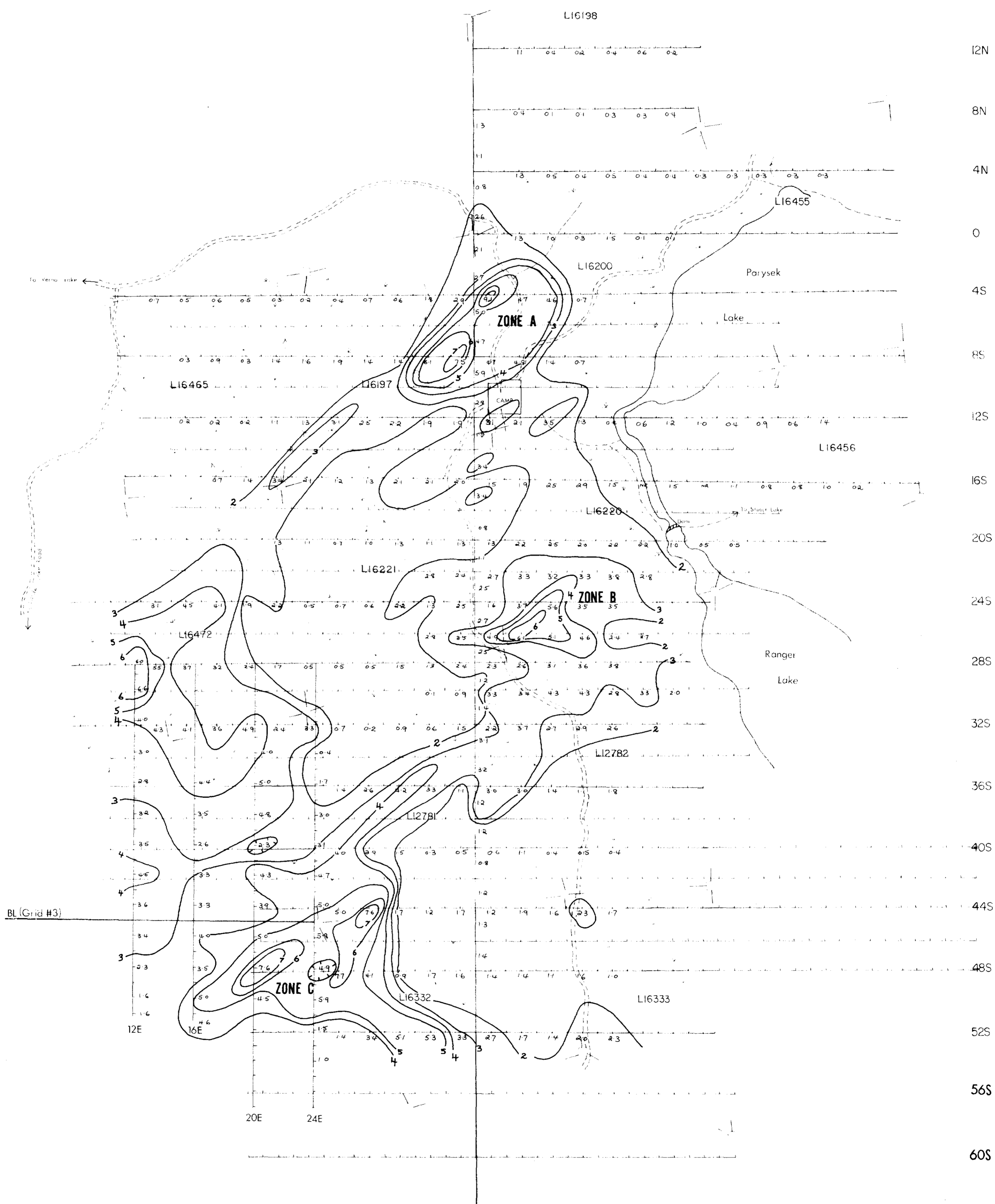
Percent Frequency Effect
 Dipole - Dipole
 n=3; a=200 ft.
 () Noisy Reading

IP SURVEY	
BEN NEVIS TOWNSHIP, ONTARIO	
Canagau Mines Option	
SCALE: 1"=400'	
N.P.S. NO. 32 D/5	PROJECT NO. 421 04
TO ACCOMPANY REPORT BY <i>w. d. dyall</i>	
AMAX Potash Co., Timmins, Ontario	DATE: 3/73

63-3076 "B"
 (17"x23")



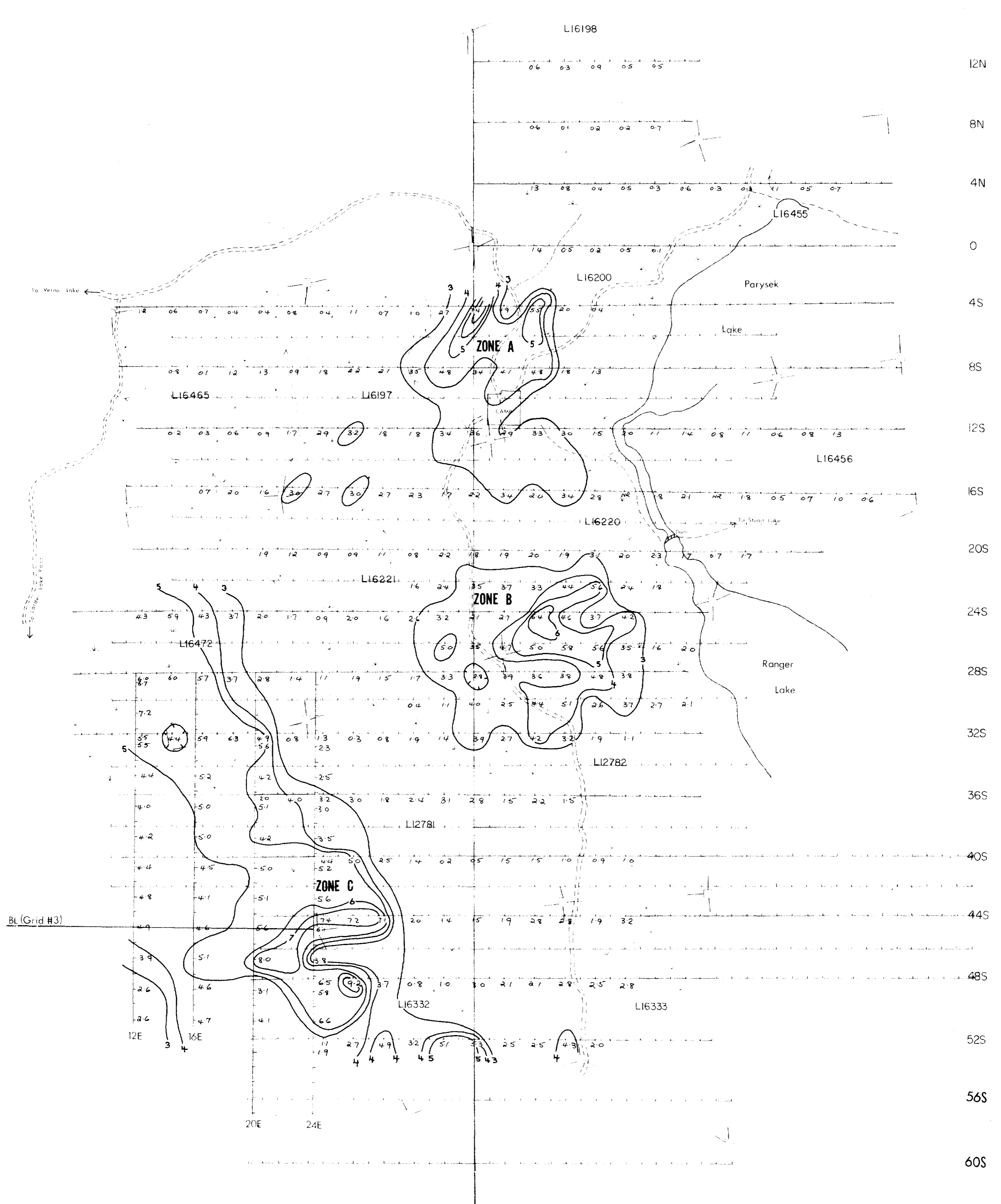
AL.



Percent Frequency Effect
 Dipole - Dipole
 n=1; a=200 ft.

IP SURVEY	
BEN NEVIS TOWNSHIP, ONTARIO	
Canagau Mines Option	
SCALE: 1"=400'	
NTS. NO. 46 375	PRE. EX. T. NO. 401 03
TO: AECOM-AMX REPORT BY: <i>W. J. Hall</i>	<i>March, 73</i>
AMX: FOTOS: LTD., Toronto, Ontario	



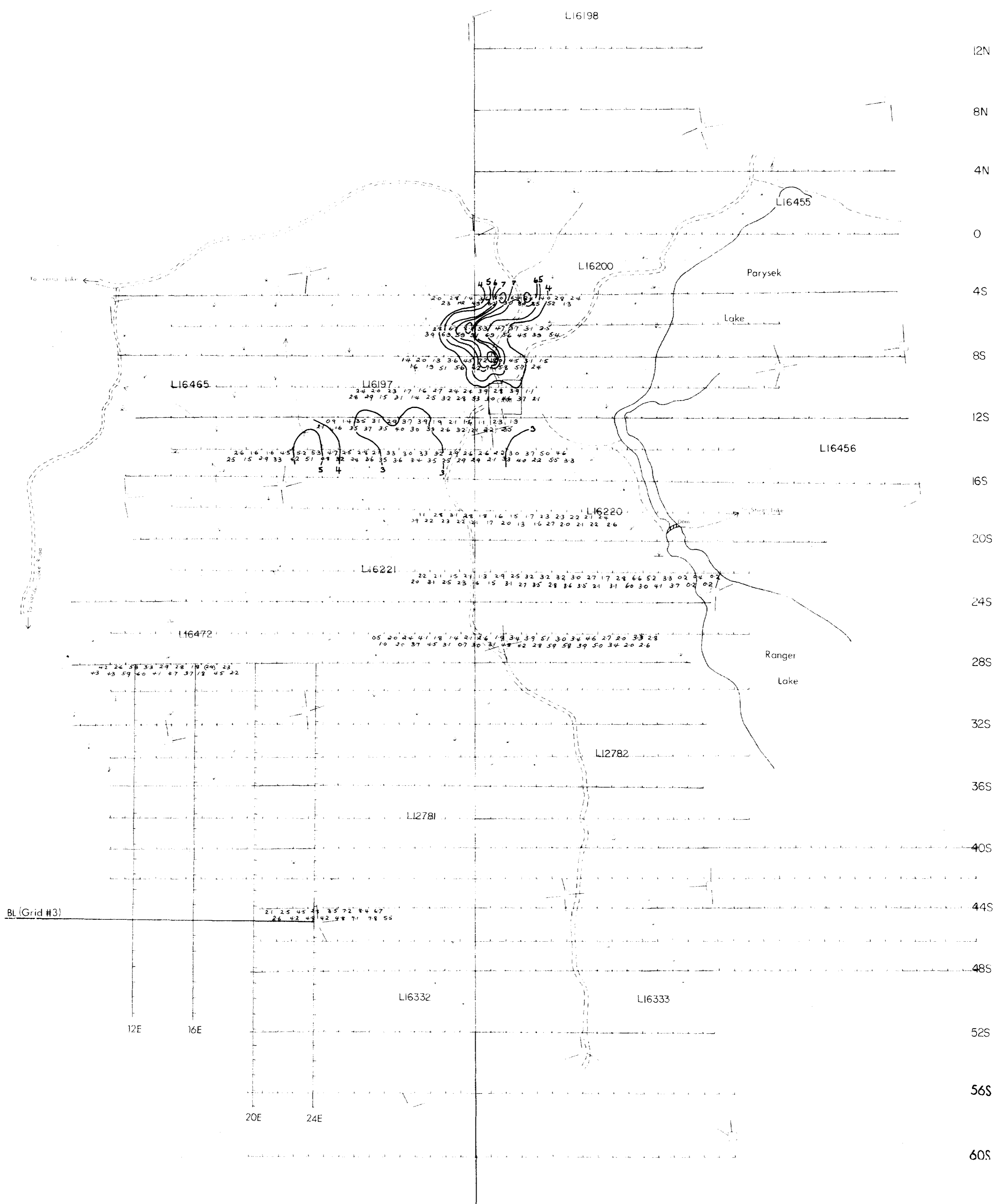


Percent Frequency Effect
 Dipole - Dipole
 $n=2; a=200 \text{ ft.}$

IP SURVEY
 BEN NEVIS TOWNSHIP, ONTARIO
 Canagau Mines Option
 SCALE: 1"=400'

NTS NO. 32 D/5 PROJECT NO. 421-01
 TO ACCOMPANY REPORT BY *w.d. dyall*
 AMAX Potash Ltd., Timmins, Ontario *March 73*

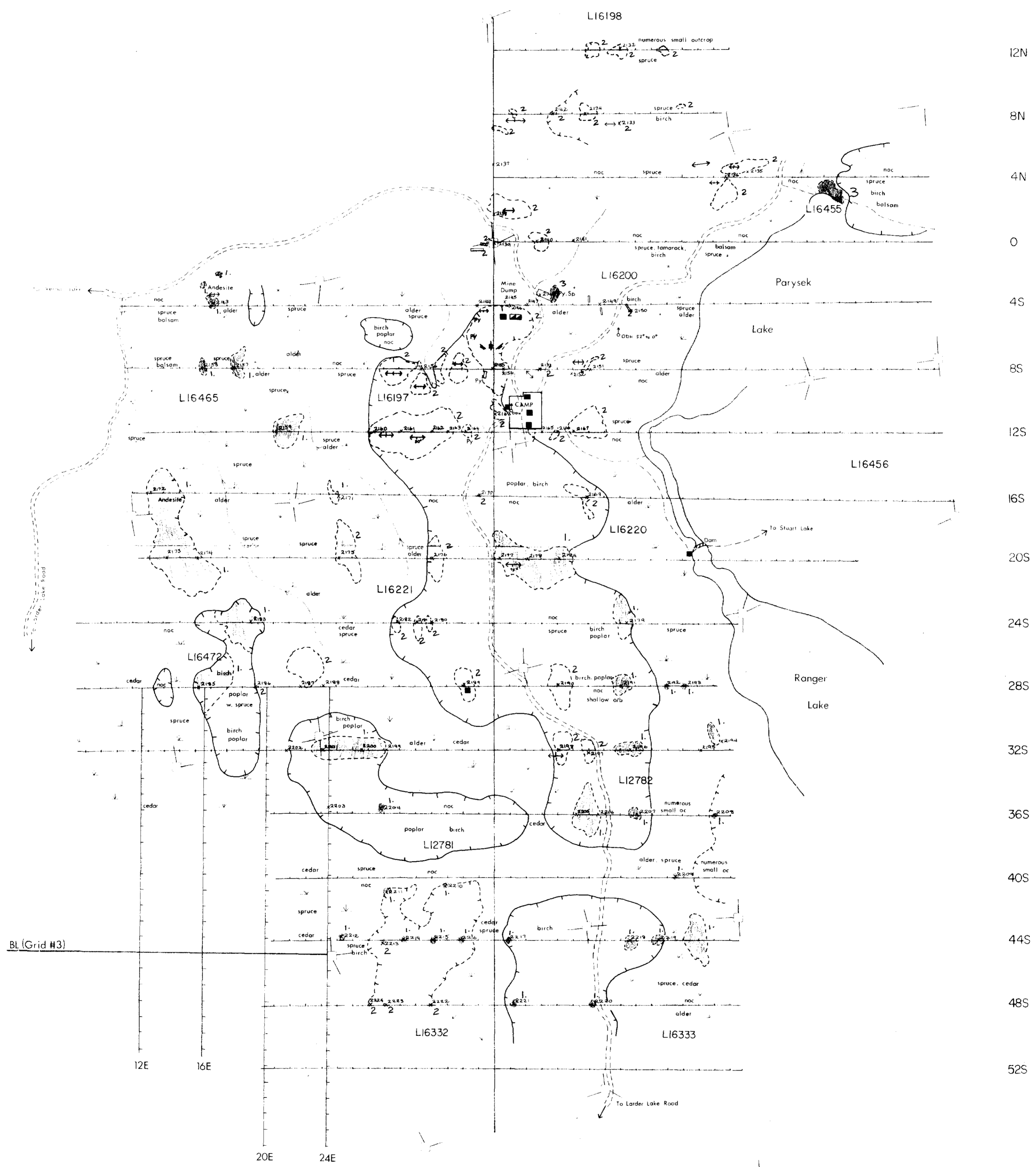




IP SURVEY
 BEN NEVIS TOWNSHIP, ONTARIO
 Canagau Mines Option
 SCALE: 1"=400'

NTS NO 52 075 PROJECT NO 421 01
 TO ACCOMPANY REPORT BY: *W. D. G. J. G. J.*
 AMAX PULTECH LTD., Timmins, Ontario DATE: *March 78*





LITHOLOGY

ARCHEAN

- 3 [shaded box] Intermediate intrusive rocks
- 2 [white box] Felsic metavolcanic rocks
- 1 [stippled box] Intermediate meta-volcanic rocks

LEGEND:

- [triangle] Pillow
- [line] Joint
- [arrow] Shear
- x 2204 Sample location and no.
- to ground hi ground
- noc No outcrop
- [swamp symbol] Swamp
- [stream symbol] Stream (with direction of flow)
- [square with dot] Claim post
- [solid square] Cabin
- [square with cross] Shaft
- [circle with dot] Pit
- [dashed line] Road
- [dotted line] Trail

GEOLOGICAL SURVEY
BEN NEVIS TOWNSHIP, ONTARIO
 Canagau Mines Option
 SCALE: 1"=400'

NTS NO. 32 D/5 PROJECT NO. 421-01
 TO ACCOMPANY REPORT BY *W.D. Hall*
 AMAX CONSULTING LTD., Toronto, Ontario DATE *March 73*





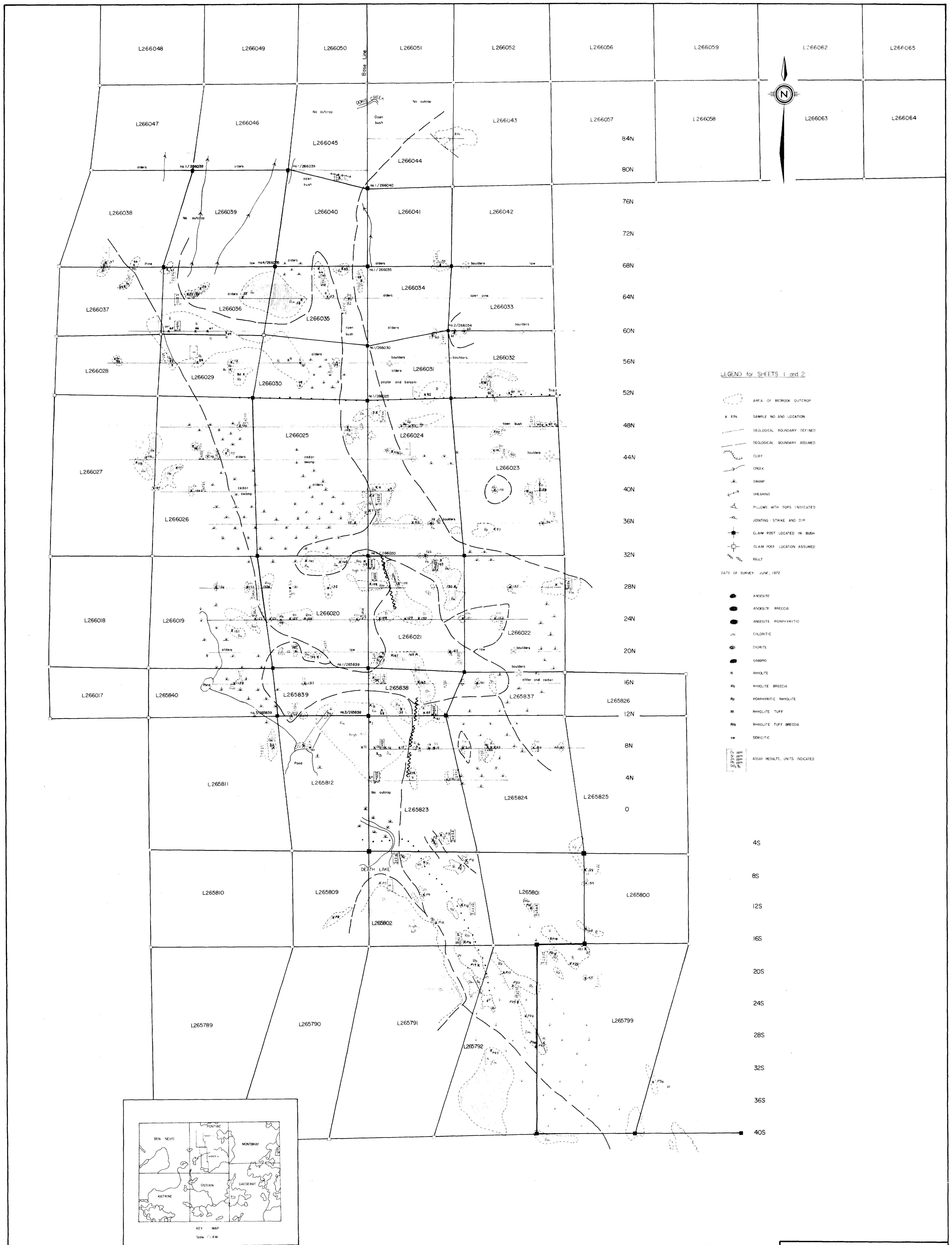
LEGEND:

Cu	Ag	Zn	Pb	SiO ₂
ppm	ppm	ppm	ppm	%

ROCK GEOCHEMICAL SURVEY
 BEN NEVIS TOWNSHIP, ONTARIO
 Canagau Mines Option
 SCALE: 1"=400'

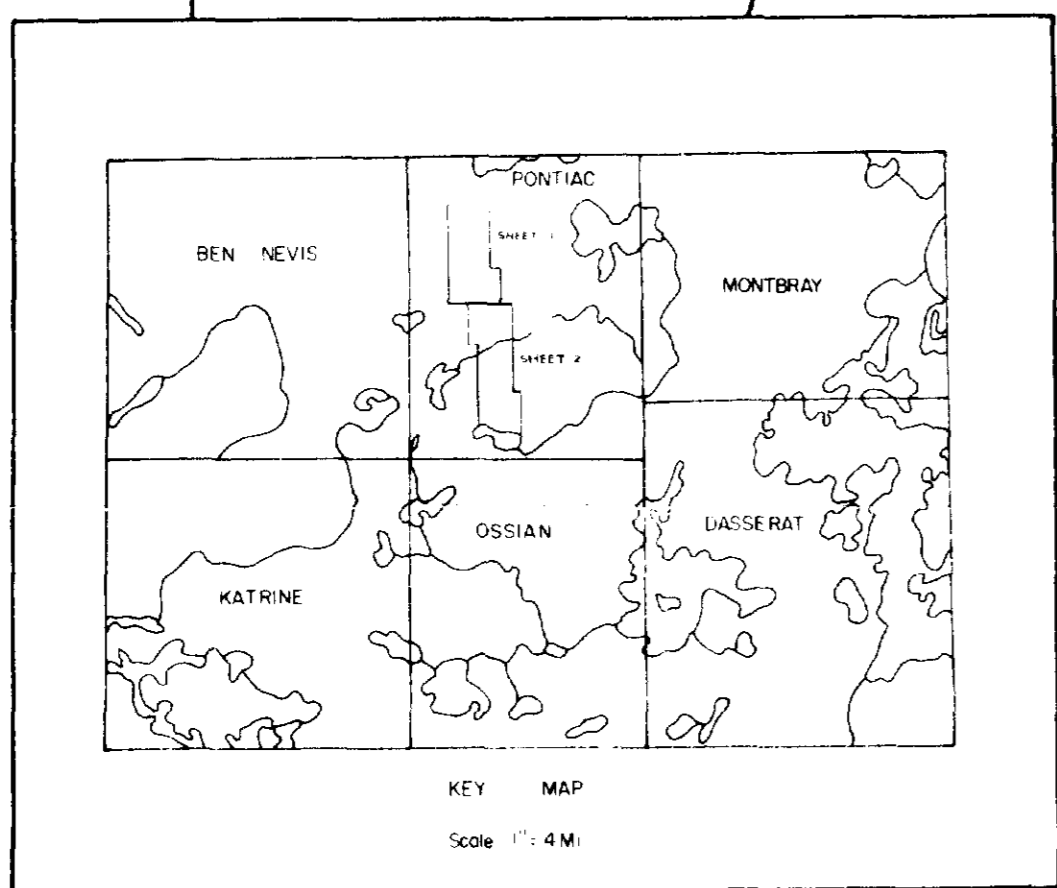
NIS NO. 32 D/5 PROJECT NO. 4111
 TO ACCOMPANY REPORT BY *wadgell*
 AMAX, P.O. Box 111, Timmins, Ontario DATE 3/73





LEGEND for SHEETS 1 and 2

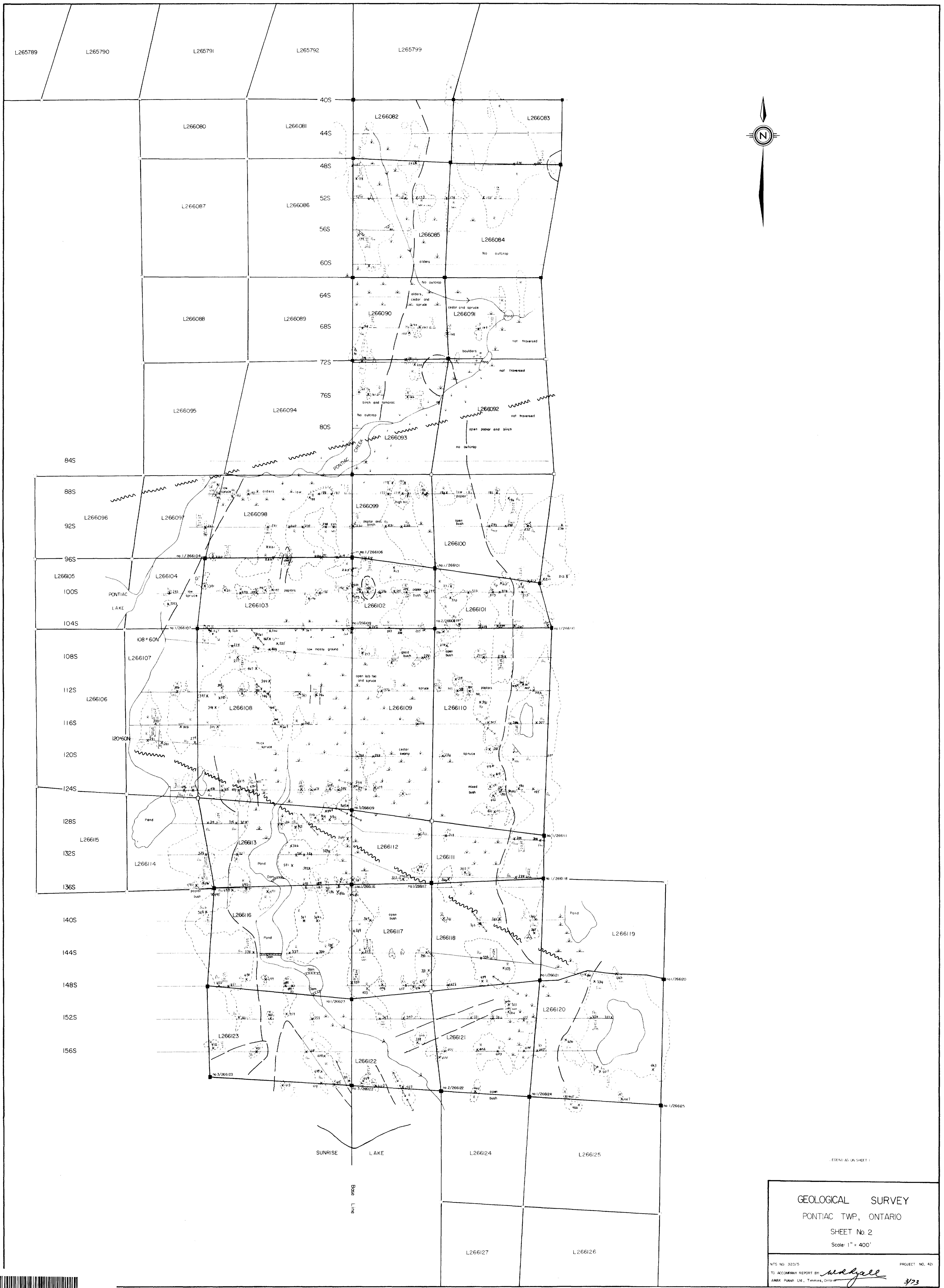
- AREA OF BEDROCK OUTCROP
 - SAMPLE NO AND LOCATION
 - GEOLOGICAL BOUNDARY DEFINED
 - GEOLOGICAL BOUNDARY ASSUMED
 - CLIFF
 - CREEK
 - SWAMP
 - DRAINAGE
 - PILLOWS WITH TOPS INDICATED
 - JOINTING - STRIKE AND DIP
 - CLAIM POST LOCATED IN BUSH
 - CLAIM POST LOCATION ASSUMED
 - FAULT
- DATE OF SURVEY: JUNE, 1972
- ANDESITE
 - ANDESITE BRECCIA
 - ANDESITE PORPHYRITIC
 - CHLORITIC
 - DIORITE
 - GABBRO
 - RHYOLITE
 - RHYOLITE BRECCIA
 - PORPHYRITIC RHYOLITE
 - RHYOLITE TUFF
 - RHYOLITE TUFF BRECCIA
 - SERICITIC
- ASSAY RESULTS, UNITS INDICATED
- 0.1 gm
 - 1 gm
 - 2 gm
 - 5 gm
 - 50 gm
 - 50 %



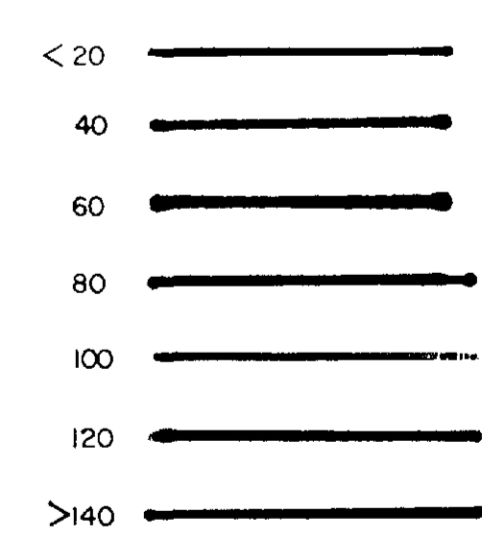
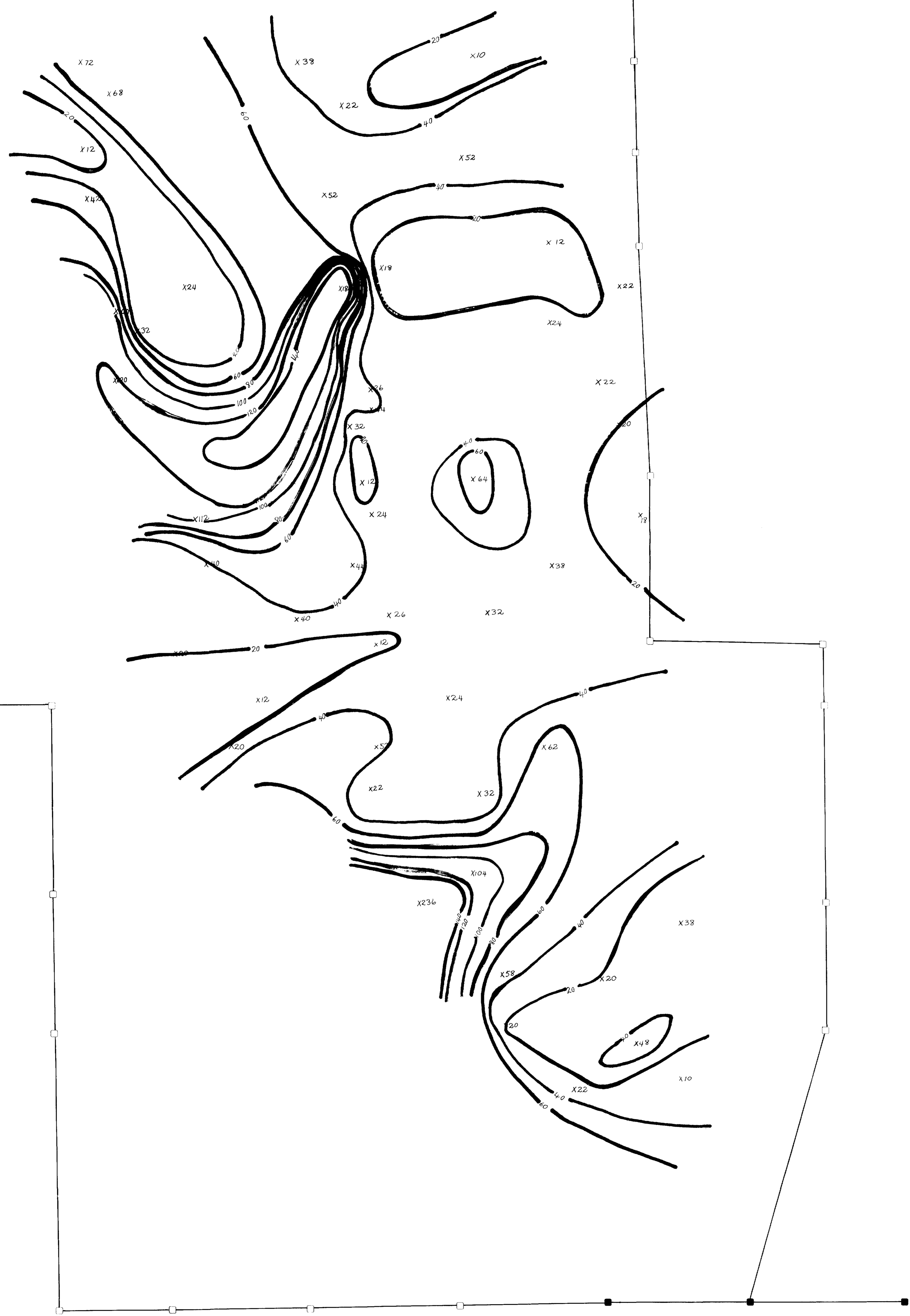
GEOLOGICAL SURVEY
 PONTIAC TWP, ONTARIO
 SHEET No. 1
 Scale: 1" = 400'

NTS NO 321/5 PROJECT NO. 421
 TO ACCOMPANY REPORT BY *J. J. G. J. G.*
 AMAX Potash Ltd., Toronto, Ontario *3/72*





0/0



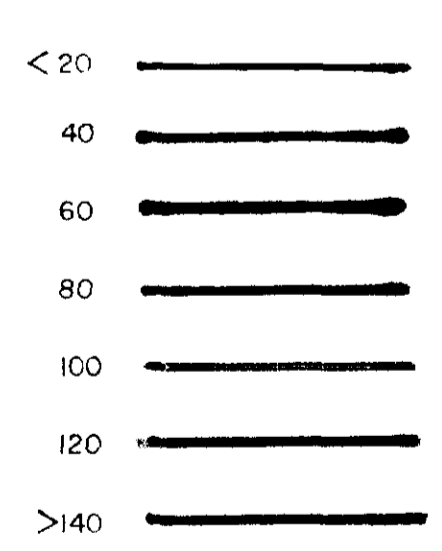
X50 SAMPLE SITE WITH METAL VALUE (ppm)
 CONTOUR INTERVAL 20 ppm

COPPER IN BEDROCK
 PONTIAC TWP., ONTARIO
 OVERLAY No. 2
 Scale: 1" = 400'

NTS. NO. 320/5 PROJECT NO. 42
 TO ACCOMPANY REPORT BY: *W. J. Hall*
 AMAX Pulp & Paper, Timmins, Ontario
 63-3036 "16"
 (24x32) 8 1/4 x 1/4
 3/73
 Figure 14a



300



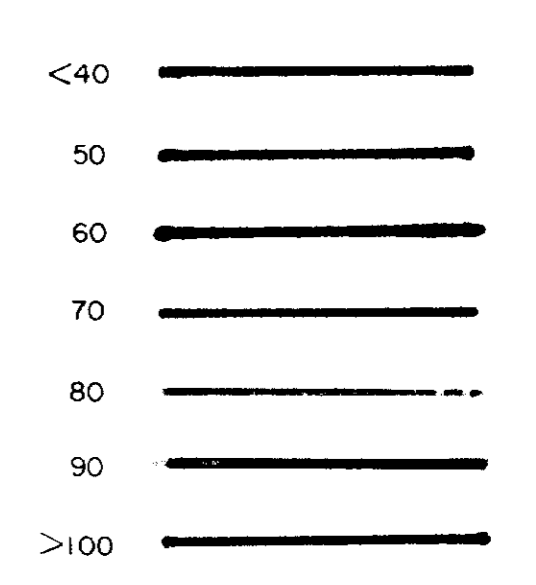
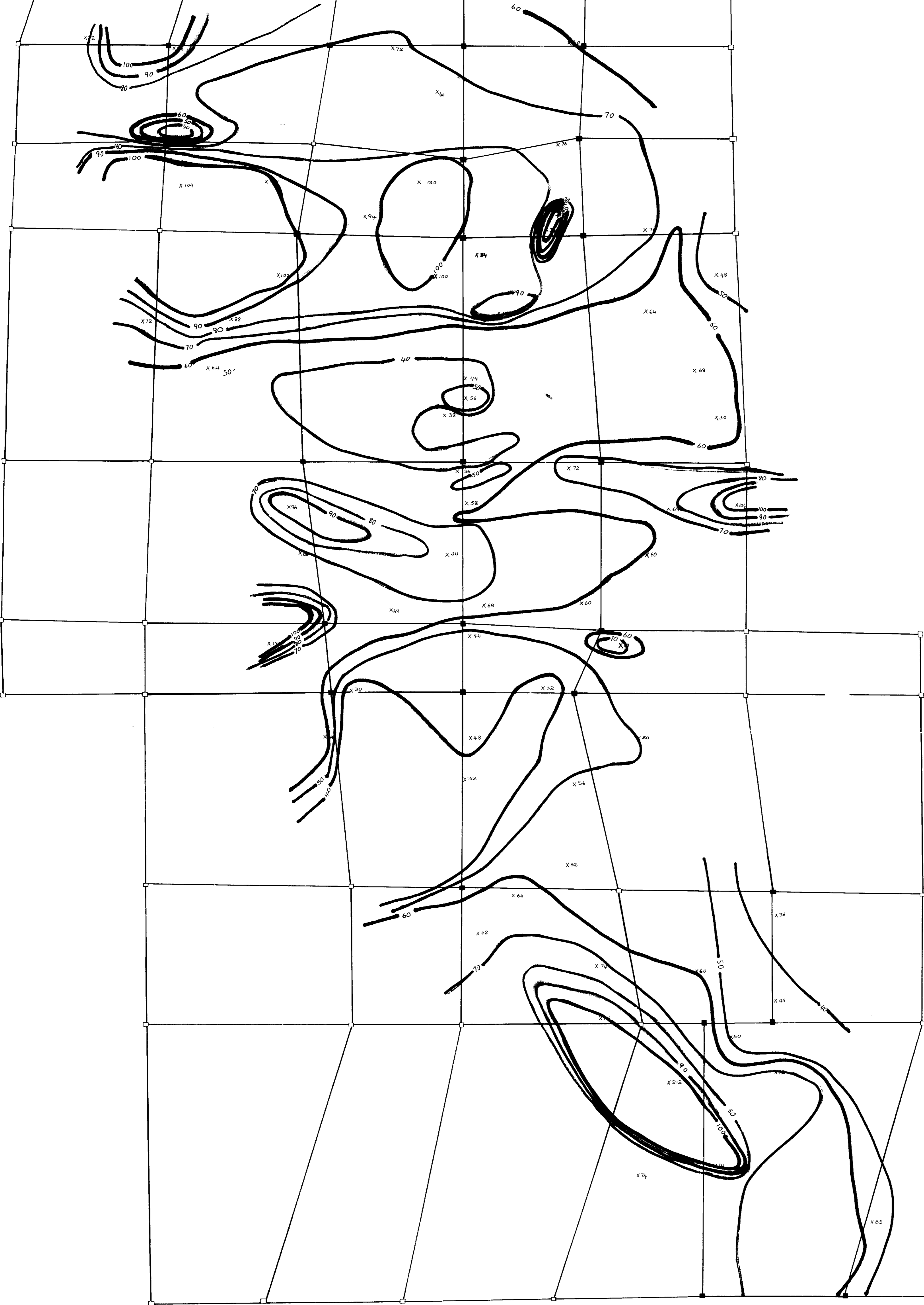
X 30 SAMPLE SITE WITH METAL VALUE (ppm)
CONTOUR INTERVAL 20 ppm

COPPER IN BEDROCK
PONTIAC TWP., ONTARIO
OVERLAY No. 2
Scale: 1" = 400'

INTS. NO. 375/75 PROJECT NO. 491
TO ACCOMPANY REPORT BY: *wedgell*
JAMES E. WEDGELL LTD., CONSULTING ENGINEERS
63 3036 "C"
(28,136) 894 57/4 3/23



1/10

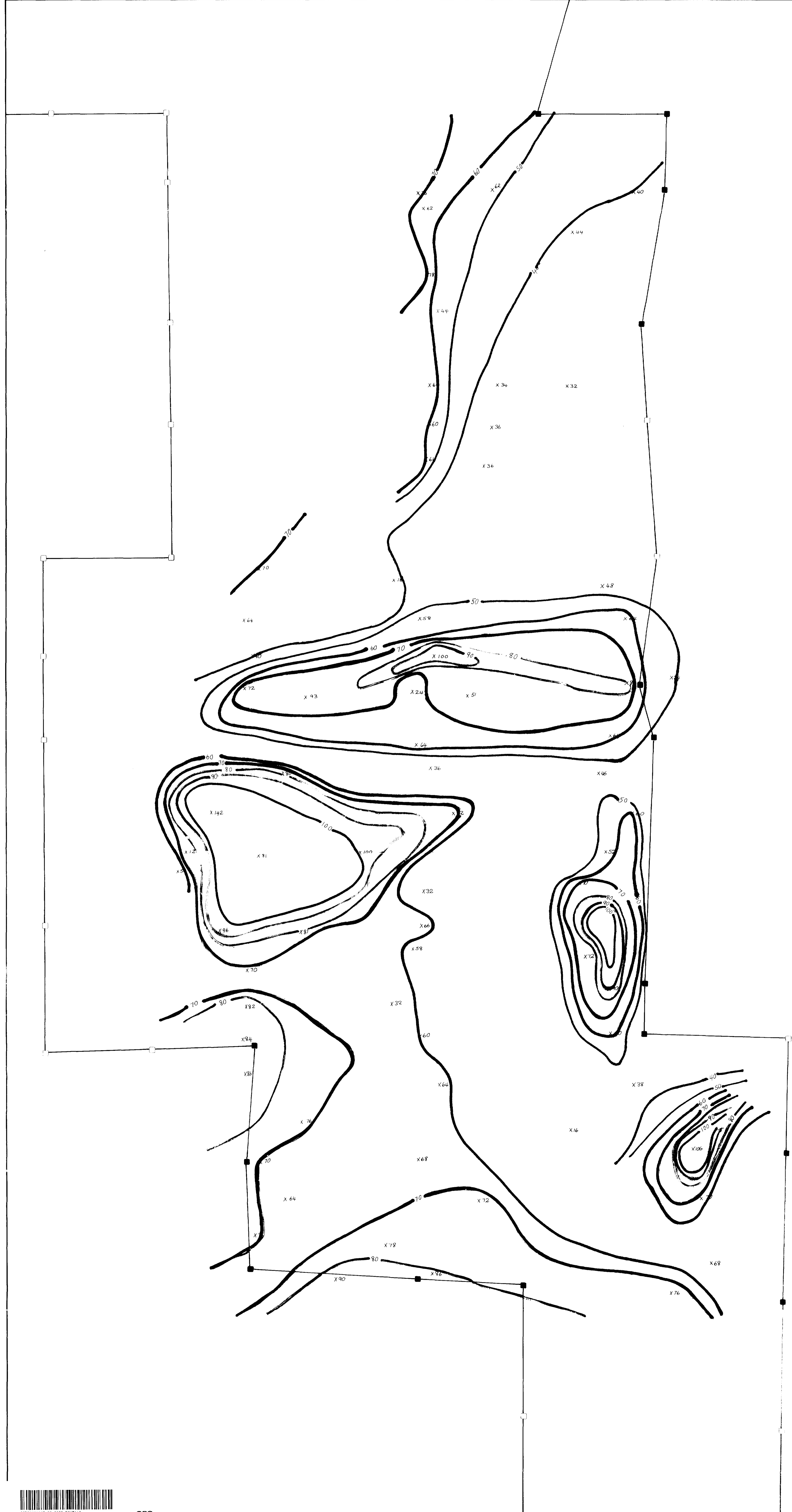


X100 SAMPLE SITE WITH METAL VALUE (ppm)
 CONTOUR INTERVAL 10 ppm

ZINC IN BEDROCK
 PONTIAC TWP., ONTARIO
 OVERLAY No. 1
 Scale: 1" = 400'

NTS. NO. 3210/5 PROJECT NO. 401
 BY: ATTORNEY GENERAL *W. J. G. G. G.*
 UNDER THE ENVIRONMENTAL PROTECTION ACT
 63-3036 "C"
 (2K x 3 1/2) 8 3/4 x 11 1/4
 3/73





<40
50
60
70
80
90
>100

X 100 SAMPLE SITE WITH METAL VALUE (ppm)
CONTOUR INTERVAL 10 ppm

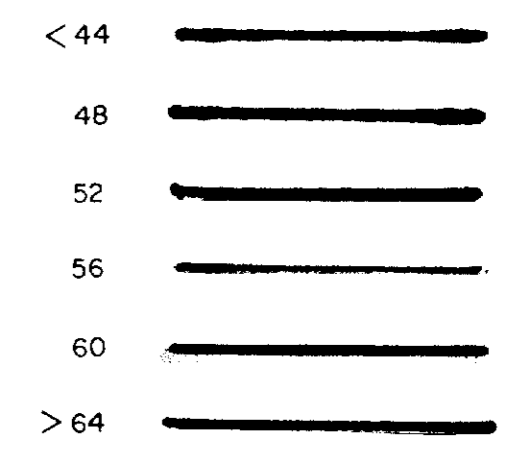
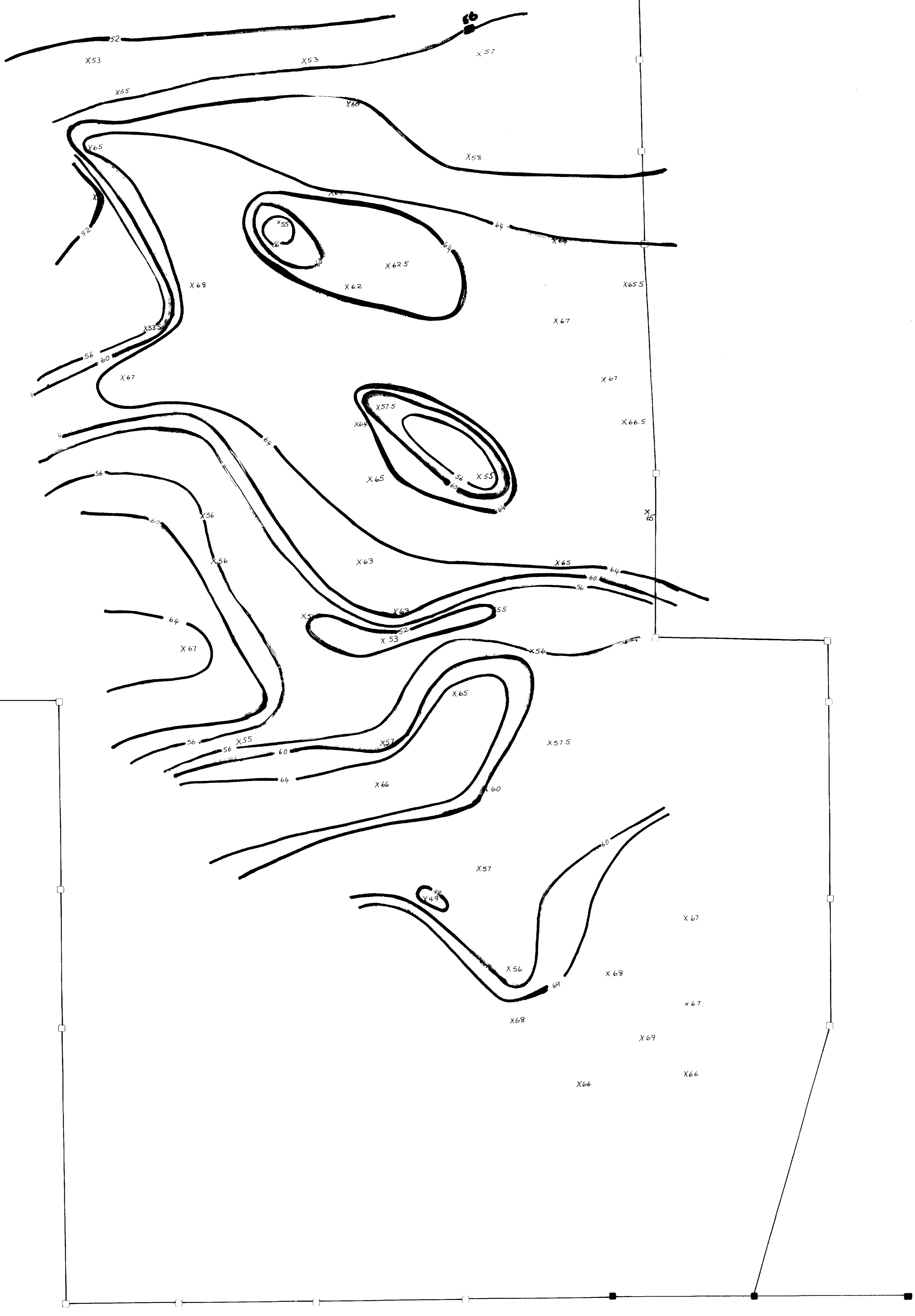
ZINC IN BEDROCK
PONTIAC TWP, ONTARIO
OVERLAY No. 1
Scale 1" = 400'



330

NO. 33036
TO ACCOMPANY REPORT BY *mdgall*
AMAX PUMP LTD., Toronto, Ontario
63-3036 1/2" (28x32) 8/31/94
PROJECT NO. 40
3/23
Figure 15b

110



X56 SAMPLE SITE WITH SILICA VALUE (ppm)
 CONTOUR INTERVAL 4 ppm

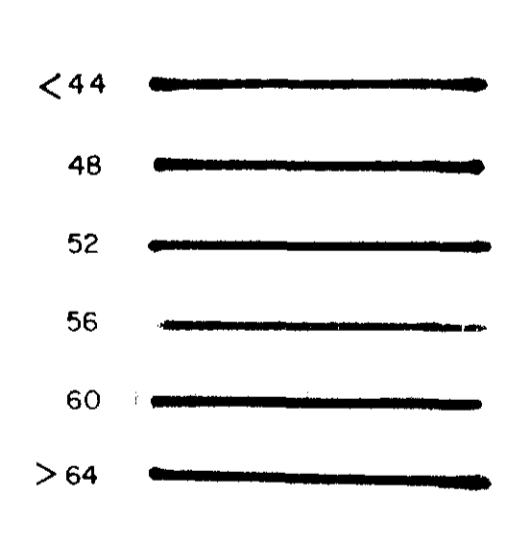
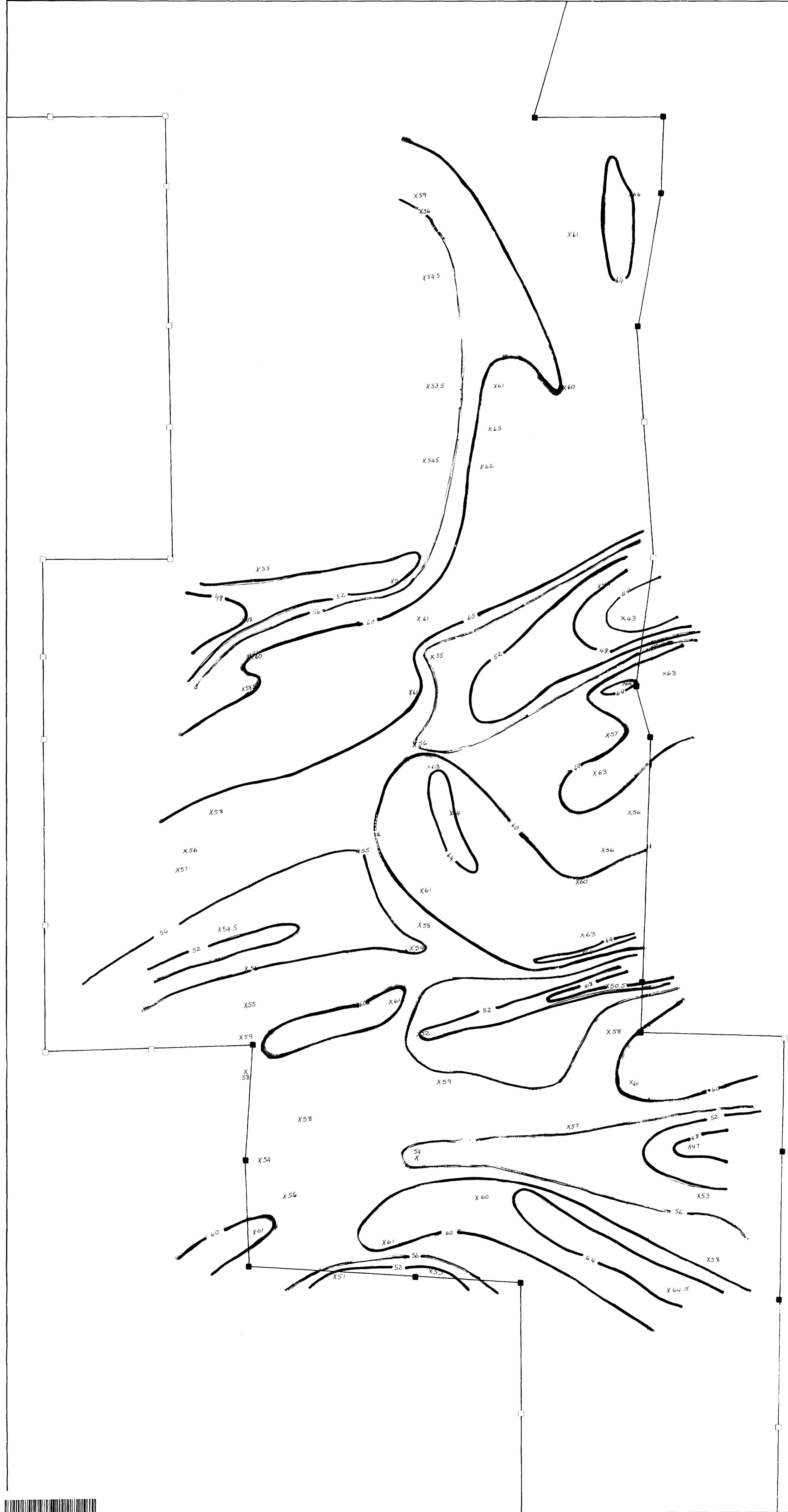
SILICA IN BEDROCK
 PONTIAC TWP., ONTARIO
 OVERLAY No. 3
 Scale: 1" = 400'

NTS. INCL. 32/27
 THE ACCOMPANYING REPORT BY *W. J. G. J. G. J.*
 AMAX, Potash Ltd., Timmins, Ontario
 03-3886 (REV.)
 (22 x 34) 8/4/94

PROJECT NO. 10
 3/73
 Figure 16a



N



X56 SAMPLE SITE WITH METAL VALUE (ppm)
CONTOUR INTERVAL 4 ppm

SILICA IN BEDROCK
PONTIAC TWP., ONTARIO
OVERLAY No. 3
Scale 1" = 400'

NTS. NO. 321/5 PROJECT NO. 491
TO ACCOMPANY REPORT BY: *wklyall*
AMAX Potash Ltd., Timmins, Ontario
63,3036 "C"
(21 x 34) 8749/A
3/23

