63.1763

SUMMARY

The present magnetic and electromagnetic surveys have located two major conducting zones, consisting of a large number of individual conductors, in the northern portion of the surveyed area. None of the conductors shows direct magnetic correlation.

A program of 15 diamond drill holes to sample the different conducting zones has been recommended.

- map T, not enclosed

HAROLD O. SEIGEL & ASSOCIATES, LIMITED
GEOPHYSICAL CONTRACTORS AND CONSULTANTS

79 MARTIN ROSS AVE.
DOWNSVIEW, ONTARIO

CABLE:
"SEIGEO", TORONTO

TELEPHONE
633-2450

REPORT ON A MAGNETIC AND ELECTROMAGNETIC SURVEY CUNNINGHAM TOWNSHIP, ONTARIO ON BEHALF OF SHUNSBY MINES, LIMITED

INTRODUCTION

During July and August 1965 a combined magnetic and electromagnetic survey was carried out on a property in Cunningham Township, Sudbury Mining Division, Ontario, on behalf of Shunsby Mines, Limited. The surveyed area comprised the following claims: 57536-57544 incl., 57585, 34944-34947 incl., 43946-43948 incl., 61828-61830 incl., 90411-90415 incl., 114398-114412 incl., 115333-115370 incl.

The property is located approximately 35 miles east of Chapleau and access is by aircraft from this town, or by bush road from Sultan.

Traverse lines for the geophysical surveys were oriented approximately east-west and located at 400' nominal centres. They were picketed at 100' intervals.

A Sharpe MF-1 fluxgate magnetometer was employed on the magnetic survey. Appropriate corrections were made for diurnal variations by going back at intervals to base stations previously established. Stations were occupied at 100' intervals, with intermediate stations in areas of considerable magnetic relief.

On the electromagnetic survey solid state Turam equipment was employed with a primary frequency of 400 c.p.s. A description of the Turam method is found in Appendix "T".

GEOLOGY

The geology of the general area is described in O.D.M. Vol. 51, p.7 (1942) "Geology of the Cunningham-Garnet area".

A detailed geological map on a scale of 1" = 400' (1962) was made available to us by Shunsby Mines, Limited.

The area is, for the greater part, underlain by basic volcanics, mostly consisting of andesites. Diorite intrusions are found throughout the area. Ultrabasic rocks (peridotite) occur in the east part of the grid, and some iron formation has been mapped in the NW corner.

Topographic relief is moderately strong in some parts of the grid.

DISCUSSION OF RESULTS

The geophysical results are presented on six plates, numbered M1 - M3 and T1 - T3, on a scale of 1" = 200'. The magnetometer results are shown as contours with a 1000 gamma interval, on plates M1 - M3. The Turam electromagnetic results are shown on plates T1 - T3 in profile form, on the scales of 1" = 40% for the field strength ratio and 1" = 20^{o} for the relative phase angles. Each survey is discussed, in turn, below.

A -- Magnetometer Survey

Plate M1 covers the northern part of the grid, plates M2 and M3 the southern part. Two areas in the southern grid, marked grid "A" and grid "B", were surveyed in 1964.

The area shows, in general, relatively strong magnetic relief of a localized and rather inconsistent pattern. The magnetic bodies are apparently shallow and of small dimensions, often smaller than the line separation. As a result the contours give in some cases a misleading picture of the structures, suggesting continuity where, in fact, it does not exist, and is at variance with the geological strike.

Most magnetic anomalies occur in the basic volcanics. East of Hiram Lake (Plate M1) they coincide mainly with the cherty formations; on the west side of the north grid they seem to be mostly due to iron formation. Further south the anomalies generally coincide with andesites or peridotite.

The magnetic anomalies indicate, with few exceptions, shallow bodies of short strike length. The pattern often suggests sub-horizontal attitudes. The depth of burial of the source of the various anomalies appears to be less than 50' in most instances.

B -- Electromagnetic Survey

The results of the Turam survey are shown on plates T1, T2 and T3 in the form of field strength ratio and phase difference curves.

Strong geo-electrical distortion occurs in the north part of the area; the remainder is virtually undisturbed.

Two major conducting zones can be observed in the north grid (Plate T1) - one forming a NNW to N striking group of conductors extending from the southeast corner as far north as Conchita Lake, the second forming a group of strongly conducting bands near the western boundary. In general the anomalies indicate conductors of high conductivity (r/d values less than 5 ohmcm/m) under thin cover.

A most remarkable feature is the number of anomalies displaying fully or partially reversed polarity. Such anomalies indicate the presence of flat lying conductors, tight folding or warping, and banding. Certain types of reversed polarity may arise from high permeability bodies, but in the present case direct correlation between electric and magnetic anomalies is lacking.

Eleven conductor systems, marked A - K, can be distinguished.

Zone A

Zone A extends, almost without discontinuity, over a distance of at least 3500' near the west boundary. It appears to be closely related to the iron formation. Depth of the current axis is very shallow and the conductivity is high ($1 < r/d < 5$ ohmcm/m). A few short magnetic bodies occur in the general zone. They do not correlate directly with the conductors. The character of Zone A suggests a mineralized shearzone or graphitic horizon.

Zone B

Zone B, consisting of two parallel and related conductors of shorter strike length, the eastern one reversed, appears to be more interesting. Conductivity is good in the central part. The zone has no magnetic expression. The pattern suggests a flat dip on the north side.

Zone C

Zone C consists of two parallel reversed anomalies indicating good conductivity which may be due to two conducting horizons with a relatively flat east dip. Depth to the current axis is approximately 70'. The zone shows no magnetic relief.

Zone D

Zone D compreses several smaller conductors which appear aligned, but are not necessarily related. The northern pair (D1) showing good conductivity ($r/d \approx 3$ ohmcm/m) and a current depth of approximately 100', suggest a flat east dip on line 16N. They accur in a zone of quartz felspar porphyry. The two smaller conductors further southward are normal, show high conductivity and seem related to the same rock type. Without showing direct correlation, these conductors appear to be related to a relatively strong magnetic zone.

Zone E

Zone E includes, like D, several smaller conductors. The northern part shows the same flat dip on line 16N, but less good conductivity. Both north and south conductors appear to be in andesites.

Zone F

Zone F represents a major geo-electrical feature, consisting of a number of parallel conductors, of which only the stronger ones are shown, mostly giving rise to reversed anomalies. Conductivity varies from moderate to high, the depth from approximately 30' (outcropping conductor) to over 100'. The anomalous pattern suggests a highly complicated conductor structure. Very likely the formations are tightly folded or contorted and contain several conducting horizons or lenses. Magnetic lenses occur at various places in this zone, but they do not correlate directly with the conductors.

Zone G

Zone G consists of two parallel reversed anomalies of good conductivity suggesting the presence of a sub-horizontal conductor of approximately 800' strike length with the current axis at 80 - 100' depth. The zone has no magnetic expression.

Zone H

Zone H is a relatively strong conductor of about 4000' strike length. The depth varies from 50' to approximately 100' and the conductivity is good throughout. It strongly suggests a mineralized fault or graphitic zone.

Zone I

Zone I comprises a long conductor, extending, with large interruptions, over nearly a mile and following apparently a diorite-andesite contact. The conductor shows moderate to good conductivity, a depth varying between 80 and 120' and mostly reversed polarity. Neither Zone H nor I appear to have a related magnetic relief.

Zones J and K

Zones J and K are short, relatively weak conductors of moderate to good conductivity in an area without magnetic relief, mapped as andesites.

CONCLUSIONS AND RECOMMENDATIONS

Eleven conductor systems, several of which appear to be related with magnetic formations, but none showing direct correlation between conductive and magnetic properties, have been located. Of the conductors found during the 1964 survey (grids A and B) none appear to extend into the presently investigated area.

All of the previously discussed conducting zones represent, on the basis of their geo-electrical properties, targets for further exploration. Some have been intersected by previous drilling, but of these only a few in a strong part of the conductor.

To examine the different conductors the following drill holes are recommended.

	Collar	Orientation	Dip	Length
Zone A DDH #1	L16N 43+60W	Due West	45°	300'
DDH #2	L4N 45+10W	"	"	"
Zone B DDH #3	L16N 36+00W	"	"	400'
Zone C DDH #4	L28N 24+00W	N70°W	"	450'
Zone D DDH #5	L16N 14+70W	Due East	"	400'
DDH #6	L0+00 21+00W	"	"	300'
Zone E DDH #7	L16N 9+00W	"	"	"
Zone F DDH #8	L28N 3+00W	"	"	"
DDH #9	L28N Base Line	"	"	"
DDH #10	L12N 0+50W	"	"	"
Zone G (+H) DDH #11	L00 (N grid) 4+80E	"	"	600'

	Collar	Orientation	Dip	Length
Zone H DDH #12	L16S (N grid) 14+00E	Due East	45°	300'
Zone I DDH #13	L8S (N grid) 16+00E	"	"	"
Zone J DDH #14	L44N 6+20W	Due West	"	"
Zone K DDH #15	L52N 6+20W	"	"	"

The recommended drilling program is primarily intended to sample each of the main conductor systems in what appears to be their most favourable sections, based strictly on the geophysical data. Consideration of the information obtained during the exploration work which preceded the present survey could render modification of this program advisable.

Respectfully submitted,

Robbert A. Bosschart, Ph.D., P.Eng.

Toronto, Ontario.
September 16th, 1965.

HAROLD O. SEIGEL & ASSOCIATES, LIMITED
GEOPHYSICAL CONTRACTORS AND CONSULTANTS

79 MARTIN ROSS AVE.
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633-2450

A P P E N D I X "T"

BRIEF DESCRIPTION OF THE TURAM ELECTROMAGNETIC METHOD

GENERAL

The Turam method can be classified as a fixed source compensation method. The primary or source field consists of a large energizing layout in the form of a long wire or a large loop laid out on the terrain, to which an audio frequency alternating current is fed by means of a motor generator. The resulting current pattern is investigated inductively, with two identical receiving coils connected to a bridge compensator which compares the signal received in each coil in relative phase and amplitude. When grounded cable is used, the energization is both galvanic and inductive; when the primary layout consists of a closed loop, the energization is purely inductive. Under most conditions the presence of galvanic current is undesirable and inductive energization is, as a rule, preferred.

Although the system allows the comparison of any two components of the resultant field, it is standard procedure in systematic surveys to measure the gradient of the vertical component.

The pattern for a typical Turam survey is shown in Fig. 1. A large rectangular loop is used as primary layout and the field gradients are measured with horizontal receiving coils along profiles perpendicular to a long side of the transmitting loop.

DATA REDUCTION

The relative strength of the undisturbed primary field is dependent on the loop dimensions and the location of the observation points, and can be determined by calculation. The measured field strength ratios are normalized through division by these calculated free space ratios.

The primary field causes eddy currents to flow in subsurface conductors. As a result the resultant field will be distorted in both amplitude and phase. The presence of conductors will thus be indicated by abnormal field strength ratios and phase differences.

PRESENTATION

The measuring results are usually presented in profile form, as (reduced) field strength ratio and phase difference curves, with the observed values plotted at the midpoint between coil positions.

Occasionally one of the two parameters is presented in contour form, but contour plans are generally inadequate to express the full significance of the data.

INTERPRETATION

Where field distortion occurs the curves indicate the location and the depth of burial of the main current flow. The "current axis" are well defined when the current is concentrated as, for instance, in thin, steeply dipping conductors. In wide, banded conductors, or in horizontal conductors such as, for instance, overburden, the current is usually more dispersed and the anomalies will yield less positive information.

As a rule the current axis is located right below the maximum field strength ratio deflection or the maximum negative phase shift. Its depth under the traverse is indicated by the shape of the anomaly.

The relative amplitudes of field strength and phase distortions are a measure of the conductivity of the conducting bodies, i.e. good conductors are characterized by field strength distortion combined with relatively little phase shifting, whereas poor conductors affect the phase, rather than the strength of the resultant field.

For an accurate grading the resistivity thickness (r/d) ratio of the individual conductors can be derived from the calculated in-phase and out-of-phase components, taking further

/3

into consideration the exciting frequency and the strike length of the conductor. The relations are shown in Fig. 2 and Fig. 3. The obtained r/d values are marked on the upper right side of the anomalies, in units of ohmcm/m. On the lower left side the depth of the current axis (ft.) is marked. It is normally located 30 - 40 ft. within the body and the indicated depth should be regarded as the maximum depth to the upper surface of the conductor.

To obtain the projection of the current pattern, the anomalies are connected between lines, whereby depth and r/d values, as well as other characteristics of the curves are used as criteria. The strike of the formations, if known, is also taken into consideration.

Fig. 4 and Fig. 5 show a plan and section of a typical Turam survey and interpretation.

References:

1937	Hedstrom, E.H.	Phase Measurements in Electrical Prospecting. A.I.M.E. Techn. Publ. 827.
1964	Bosschart, R.A.	Analytical Interpretation of Fixed Source Electromagnetic Prospecting Data. Delft.

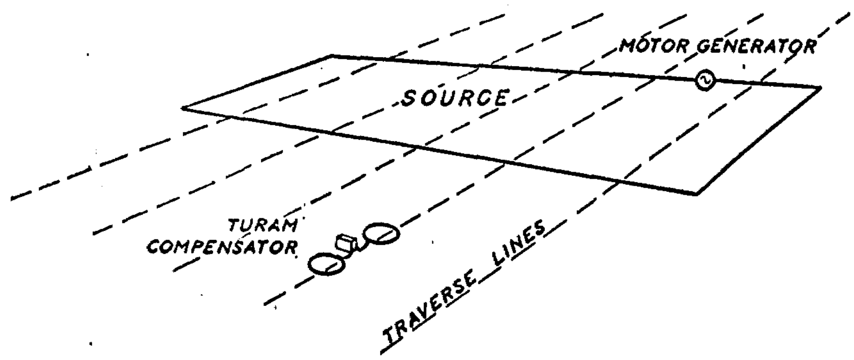

Fig. 1 The Turam method. General layout

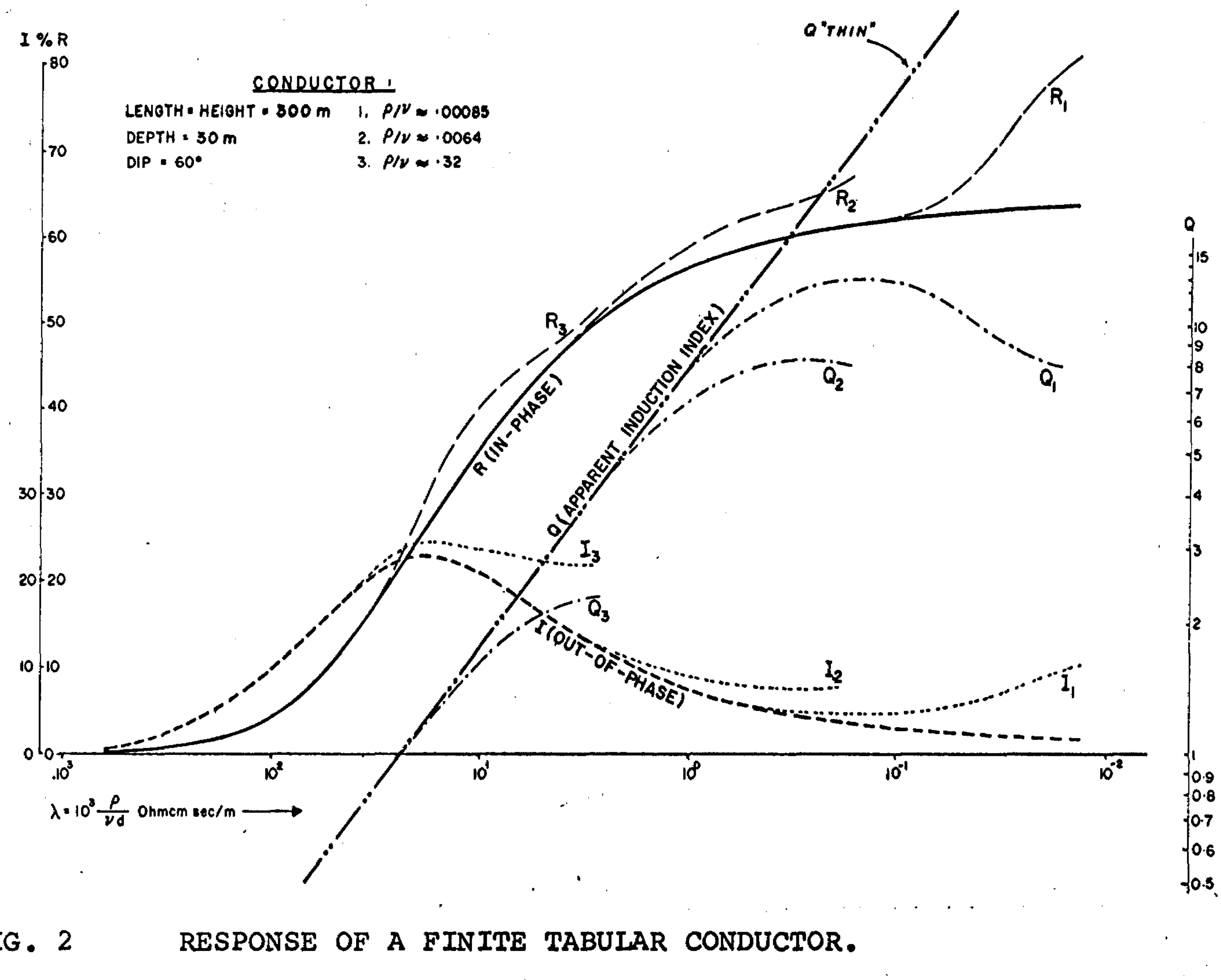

FIG. 2 RESPONSE OF A FINITE TABULAR CONDUCTOR.

(R.A. Bosschart 1964)

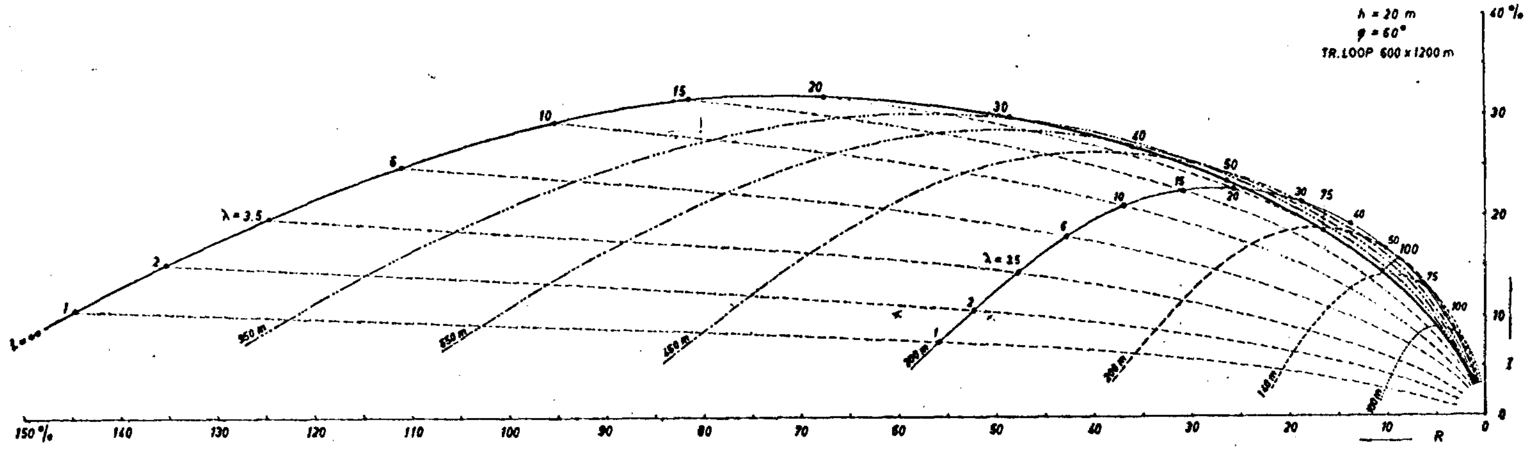

FIG. 3 RESPONSE DIAGRAM FOR CONDUCTORS OF VARYING STRIKE LENGTHS.

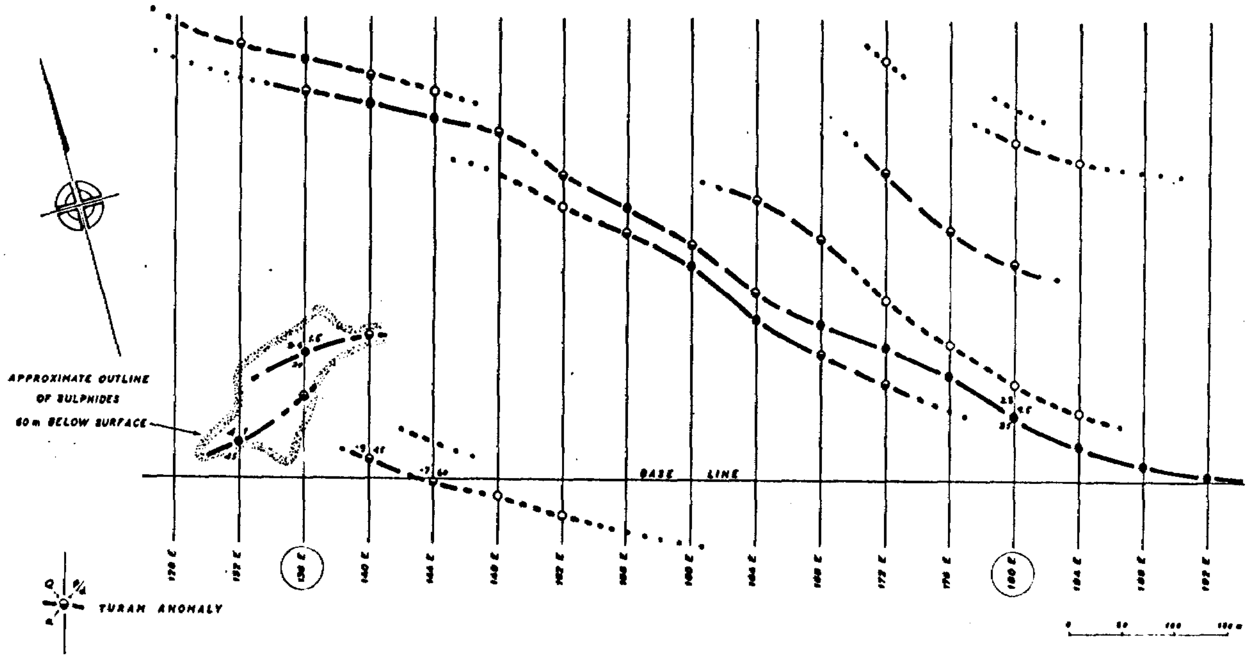

FIG. 4 TURAM SURVEY ON THE MURRAY GROUP, NEW-BRUNSWICK.

(R.A. Bosschart 1964)

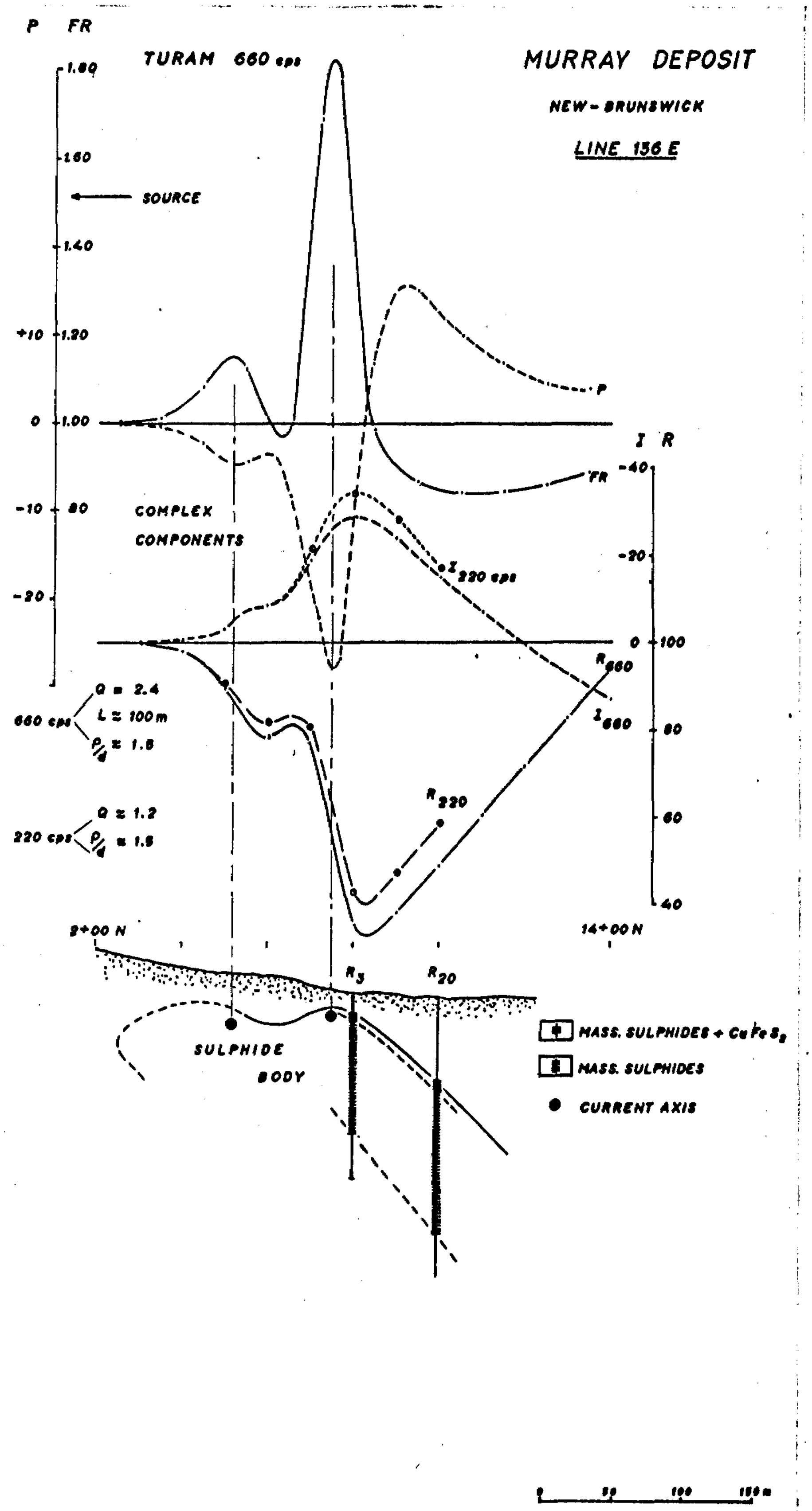

FIG. 5 TURAM SURVEY ON THE MURRAY GROUP, NEW BRUNSWICK. INTERPRETATION OF A TYPICAL SECTION.

(R.A. Bosschart 1964)

OFFICE OF MINING RECORDER

41010NE0057 63.1763 CUNNINGHAM

900

ONTARIO

DEPARTMENT OF MINES

Nov. 5/62

Mr. R.V.Scott,
Chief, Mining Lands Branch,
Parliament Buildings,
TORONTO, Ont.

Dear Mr.Scott:

Enclosed herewith are two reports received in this office, from Shunsby Mines Limited, in connection with Geological work reports filed this date.

You may already have received copies of this report directly from the Company.

Also enclosed is a copy letter of advice to Shunsby Mines concerning the number of days credit filed.

Yours very truly,

K.M.Hallock

K.M.Halbck,
Mining Recorder.

/r
encl.

V 6 1962

These are copies

OFFICE OF MINING RECORDER

ONTARIO
DEPARTMENT OF MINES

SUDBURY MINING DIVISION
SUDBURY, ONTARIO

Nov. 5/62

SHUNSBY MINES LIMITED,
906-357 Bay St.,
TORONTO 1, Ont.

Dear Sirs:

Attention: Mr. K.T.Hurley

This is to advise that we have today placed on the records of the following claims, assessment work credits, by reason of Geological survey, of forty days per claim:-

S.114398 to 114412 inclusive; S.115333

to 115349 inclusive; 115350 to 370 incl.

Yours very truly,

K.M.Hallock,
Mining Recorder.

/r

cc- R.V.Scott,
Chief,MiningLands Branch,
Parliament Bldgs,
TORONTO, Ont.

Shunsby Mines Limited

Cunningham Twp., Ont. - Time spent on Line Cutting and Geological Survey summer of 1962.

Line-cutting.

C. Brobeck	Mar. 29 to Aug. 31/62.	100 days
John Byce	May 16 to Aug. 15	88
A. Armstrong	May 21	1
" "	June t to July 22	41
J. L. Jowsey	Mar. 29 to Apr. 20	23
		253 - twelve hour days,

which are eqqal to 379 eight hour days.

Credit allowance - 379 x 4 - 1,516 days.

Geological Survey

Field work

C. Brobeck	May 15 to June 22	39	Surveying in outcrops
J. L. Jowsey	" "	39	
C. W. Archibald	Aug. 14 to 31st.	17	
John Archibald	" 14 to 31st.	17	
C. Brobeck	" 14 to 31st.	17	
J. L. Jowsey	" 14 to 22nd.	9	
		138 - twelve hour days,	

which are equal to 207 eight hour days. - - - - 207

Office work

C. W. Archibald & J. L. Jowsey 64

271 days

Credit allowance - 271 x 4 - 1,084 days.

2,600 days

J. L. Jowsey

8 King East
Suite 1910
xxxxxxxxxxxxxxxx

October 11, 1962

The President
Shunsby Mines Limited

AFFIDAVIT

Dear Sir:

I am submitting a brief report and geological map covering the Shunsby Mines Limited claims in Cunningham Township, Ontario.

The claims on which the geological survey was carried out are as follows:

Numbers 115333 to 115370 inclusive or 38 claims
Numbers 114398 to 114412 inclusive or 15 claims

Total	53 claims

In connection with this report, I hereby certify:

1. That I am a Mining Engineer and reside at 418 Glencairn Avenue, Toronto, Ontario.

2. That I am a graduate of Toronto University in Mining Engineering.

3. That I am a member of the Professional Engineers of Ontario.

4. That the accompanying map and report are based on work in the field on the above mentioned claims with the geology for the remaining Shunsby Mines Limited claims to the north added to the map from geological reports by geologists R. Mudford and [illegible]. Moorehouse.

Work done on the claims for purposes of this map and report is as follows:

Field Work:

Surveying outcrops		
C. Brobeck, J.L. Jowsey	15 May - June 1962	117 man days
Mapping geology in field		
J.L. Jowsey, C. Brobeck, J. Archibald, C.W. Archibald	August 1962	90 man days
Office work, plotting, interpretation		
J.L. Jowsey, C.W. Archibald	September-October 1962	60 man days
Typing		4 man days
Total Man Days		271 man days

Dated this 11 day of October, 1962

Toronto Ontario

C.W. Archibald/nc

Shunsby Mines Limited

Cunningham Twp., Ont. - Time spent on Line Cutting and Geological Survey summer of 1962.

Line-cutting.

C. Brobeck	Mar. 29 to Aug. 31/62.	100 days
John Byce	May 16 to Aug. 15	88
A. Armstrong	May 21	1
" "	June t to July 22	41
J. L. Jowsey	Mar. 29 to Apr. 20	23
		253 - twelve hour days,

which are eqqal to 379 eight hour days.

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Geological Survey

Field work

C. Brobeck	May 15 to June 22	39)
J. L. Jowsey	" "	39) Surveying in outcrops
C. W. Archibald	Aug. 14 to 31st.	17
John Archibald	" 14 to 31st.	17
C. Brobeck	" 14 to 31st.	17
J. L. Jowsey	" 14 to 22nd.	9
		138 - twelve hour days,

which are equal to 207 eight hour days. - - - - 207

Office work

C. W. Archibald & J. L. Jowsey 64

271 days

Credit allowance - 271 x 4 - 1,084 days.

2,600 days

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xxxxxxxxxxxxxxxxx

October 11, 1962

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	Total		53	claims

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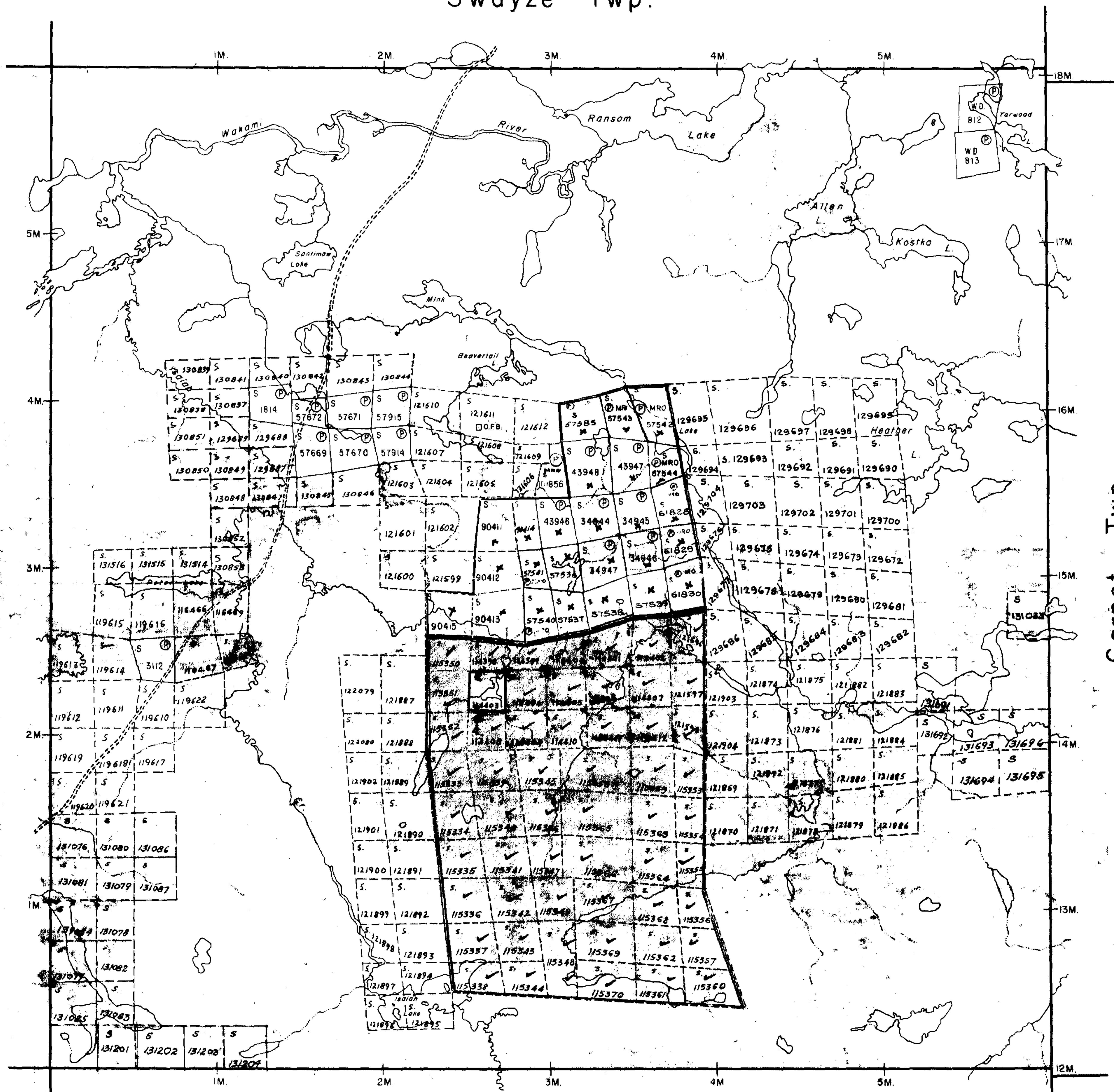
Office work, plotting, interpretation J.L. Jowsey C.W. Archibald	September-October 1962	60 man days
Typing		4 man days
Total Man Days		271 man days

Dated this 11 day of October, 1962

Toronto Ontario

C.W. Archibald/ns

TRIM LINE



OUTLINED IN BLUE :- X
25 PATENTED CLAIMS OVER WHICH REST OF SURVEY WAS CONDUCTED

SHADED IN RED :- ✓
55 UNPATENTED CLAIMS COVERED BY MAGNETOMETER & ELECTROMAGNETIC SURVEYS CONDUCTED BY H.O. SEIGEL & ASSOCIATES, TORONTO, ONTARIO

THE TOWNSHIP OF CUNNINGHAM

DISTRICT OF SUDBURY

SUDBURY MINING DIVISION

SCALE: 1-INCH=40 CHAINS

LEGEND

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

NOTES

TO ACCOMPANY REPORT ON MAGNETIC & ELECTROMAGNETIC SURVEYS MADE ON PROPERTY OF CONSOLIDATED SHUNSBY MINES LIMITED, BY ROBBERT A. BOSSCHART, PH.D., P. ENG., OF HAROLD O. SEIGEL & ASSOCIATES

DATE OF ISSUE
SEP 28 1965
ONTARIO DEPT. OF MINES

KEY MAP

PLAN NO.- M.744

DEPARTMENT OF MINES
— ONTARIO —

63.1763

41010NE0057 63.1763 CUNNINGHAM

200 TRIM LINE


FORLORN LAKE
ISAIAH LAKE
32 S
36 S
40 S
48 S
52 S
56 S
60 S
64 S
68 S
72 S
76 S
80 S
84 S
88 S
92 S
96 S
100 S
104 S
108 S
S 115352
S114408
S114409
S 114410
S 115333
S115339
S115345
S115340
S115334
S115346
S115335
S115341
S115347
S115349
S115336
S 115342
S115337
S115343
S115348
S115344
S115338
BASE LINE NO 2
N
LEGEND:
3660 Mag. Values in Gammas
Contour interval 1000 Gammas
Mag. Depression
PLATE M-3
SHUNSBY MINES, LTD.
CUNNINGHAM TWP. - ONTARIO
MAGNETOMETER SURVEY
SOUTH GRID
SCALE: 1" = 200'
SURVEY BY H. O. SEIGEL & ASSOCIATES, LTD.
SEPT. 1965
63.1763

210

PLATE M-2

SHUNSBY MINES, LTD.

CUNNINGHAM TWP. - ONTARIO

MAGNETOMETER SURVEY

SOUTH GRID

SCALE : 1" = 200'

SURVEY BY HAROLD O. SEIGEL & ASSOCIATES, LTD.

SEPT. 1965.

63.1763

220

PLATE T-2

SHUNSBY MINES, LTD
CUNNINGHAM TWP. - ONTARIO

TURAM ELECTROMAGNETIC SURVEY
SOUTH GRID
SCALE : 1" = 200'

SURVEY BY HAROLD O. SEIGEL & ASSOCIATES, LTD.
SEPT. 1965

63.1763

230

240

S114410
S114411
S114412
S121598
S113545
S115358
S115359
S115353
GRID "A" (1964)
S115346
S115363
S115354
S115365
S115355
S115347
S115366
S115364
NO. 2
LINE
BASE
10E
20E
30E
40E
115349
S115367
S115368
S115356
S115348
S115357
S115369
S115362
S115360
S115361
S115370

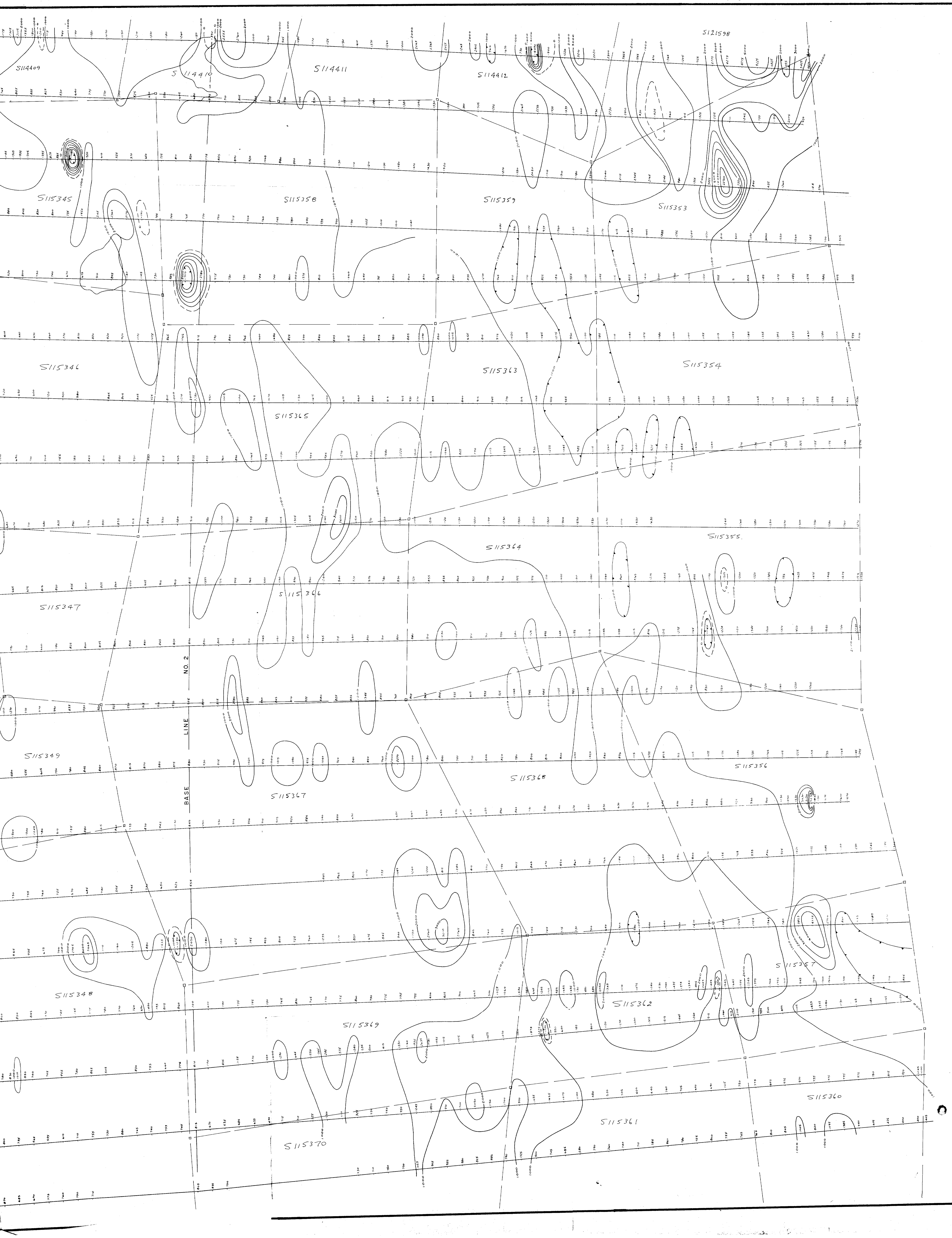

S114409
S114410
S114411
S114412
S121598
S115345
S115358
S115359
S115353
S115346
S115363
S115354
S115365
S115364
S115355
S115347
S115366
S115349
S115368
S115356
S115367
S115357
S115348
S115362
S115369
S115360
S115361
S115370
BASE LINE NO. 2

PLATE T-3
SHUNSBY MINES, LTD.
CUNNINGHAM TWP. – ONTARIO
TURAM ELECTROMAGNETIC SURVEY
SOUTH GRID
SCALE : 1" = 200'
SURVEY BY HAROLD O. SEIGEL & ASSOCIATES
SEPT 1965
LEGEND :
0·60 1·00 1·40 RATIO
-20° 0° +20° PHASE
COIL SEPARATION 100'
N
FORLORN LAKE
ISAIAH LAKE
GRID "A" (1964)
BASE LINE NO. 2
32S
36S
40S
44S
48S
52S
56S
60S
64S
68S
72S
76S
80S
84S
88S
92S
96S
100S
104S
108S
40W
30W
20W
10W
10E
S115352
S114408
S114409
S114410
S115333
S115339
S113545
S115358
S115334
S115340
S115346
S115365
S115335
S115341
S115347
S1153·66
S115349
S115367
S115336
S115342
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MINING
A. BOSSCHART
PROVINCE OF ONTARIO
63.1763