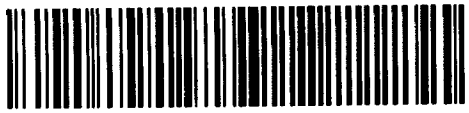
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NOV - 5 1980
MINING LANDS SECTION

42-A-1

Kirkland Lake Claims, Ontario
Otto Township
VLF and Magnetometer Surveys

H. Beckmann September 1980

42-A-1

Kirkland Lake Claims, Ontario

Otto Township

VLF and Magnetometer Survey

Introduction

Following the release and publication of airborne survey data of the Kirkland Lake Area by the Ministry of Natural Resources of Ontario, two isolated anomalies in central Otto Township were selected for further investigation.

Subsequently, four mineral claims were staked and recorded on October 1, 1979 on behalf of Rio Tinto Canadian Exploration Limited. Designated L531558, L531562, L545903 and L545904 they occupy the south ½ Range IV, Lot 7 in Otto Township, Larder Lake Mining Division.

During June and July 1980, linecutting was carried out on contract but all other work including VLF and magnetometer surveys were carried out by and under the active supervision of G. Smith, a member of the Riocanex geological staff.

All other members of the field crew were temporarily employed by Riocanex at the time of the survey.

Upon completion of the field operations the data was forwarded to Toronto for draughting, profiling and contouring with the finished maps being interpreted by in-house geophysical personnel.

Location and Access

The property consists of four mineral claims covering the south ½ Range IV, Lot 7 in Otto Township.

The claims are presently held by Rio Tinto Canadian Exploration Limited and although work was performed on portions of all claims it appears that sufficient coverage is available for claim L531562 only.

Access is via boat or ski-doo along the Blanche River and a tributary creek running from west to east that bisects the property as shown on Location Map Dwg. L 2821.

General Geology

The area is covered by a highly variable thickness of overburden consisting of semi-conductive clay and marshland to more resistive sandy soil.

The north half of the property is dominated by a topographical high of up to 100 feet with eighty percent rock exposure.

The O.D.M. Geology Map (2239) for the Eby-Otto Area at a scale of 1 inch = $\frac{1}{2}$ mile shows the area to be underlain by syenitic rocks of the alkalic intrusive Otto Stock.

On a local scale, numerous outcrops of coarse-grained syenite, syenite porphyry, pegmatite, syenite contaminated by country rocks and rare lamprophyre dykes were mapped. A fault striking azimuth 100° and dipping 65° to the south was located.

Aeromagnetic coverage of the area is provided by the Ontario Geological Survey preliminary Map P 2264 as well as by the O.D.M. G.S.C. Aeromagnetic Map 47G, 289G.

Previous Work

Very little previous exploration work is known except perhaps the normal geological mapping. No trace of any earlier staking or linecutting was detected.

Survey Procedure

Linecutting: An east-west baseline was established starting at the central sets of claim posts, that is claim post 1 of claim L 545903 and extended 100 metres west of this location and 300 metres east.

Five north-south survey lines were cut perpendicular to the baseline at intervals of 100 metres with survey station pickets chained and placed every 25 metres on all lines. The lines extend to 400 metres north and south of the baseline although the southern portion is not shown on the included drawings, they were not covered by the survey since the target is located north of the bisecting stream. Thus a total of 4.40 line kilometres were cut with 1.40 line kilometres on claim L 531562 for which the work has been submitted.

Magnetic Surveys: The instrument used on all magnetic traverses was a Phoenix Fluxmaster Model MV I magnetometer. Requiring only 'bull's-eye' levelling it has a sensitivity of 10 gammas per scale division and a reading accuracy of 5 gammas on the most sensitive scale. Five switch-selectable scales are available which allow the observer to monitor an overall range of relative vertical field magnetic values of $\pm$ 100,000 gammas. Readings were taken nominally every 25 metres.

Diurnal variation was monitored by completing closed loops to any base station located at or near pre-selected grid line-baseline intersection point.

The time interval between checks was kept within one hour or less throughout these surveys.

VLF Surveys

The instrument used for this EM survey was a Geonics EM-16. The EM-16 is known for its effectiveness in areas of uniform resistive cover to search for mineralized shear and fault zones, and sulphide stringers.

The unit is a one piece system which uses the signals transmitted by large coastal submarine communication transmitters.

The vertical antenna current from these stations creates a concentric horizontal magnetic field, which when intercepting a conductive body in the ground will produce radiating secondary fields. This equipment measures the vertical component of these secondary fields.

At a given station, the total field component is made up of the vertical secondary field plus the horizontal primary field's magnetic component. This total field is tilted locally on both sides of the conductive feature. The local vertical field is generally not the same phase as the primary field on the ground surface. The EM-16 permits the measurement of the in-phase component or angle of the vertical field by means of a graduated clinometer-dip needle and measurement of the out of phase component or quadrature by a graduated vernier scale as a percent.

The quadrature polarity is particularly useful for distinguishing the types of anomalous responses. A positive

quadrature component represents surface features or a fault or shear zone, whereas a negative component may indicate a local sulphide concentration.

Station readings were taken at a 25 metre spacing interval while observing a north facing throughout the survey.

Presentation and Discussion of Results

Magnetometer Survey: All magnetic data, corrected for hourly drift and diurnal variation is presented and contoured on drawing M3698.

A contour interval of 500 gammas has been used with all recorded data and station positions plotted at a metric scale of 1:2000.

Background magnetic values of 500 to 600 gammas predominate the areas covered by overburden. Local highs of up to 2300 gammas were obtained on outcrops with no visual explanation for the magnetic source.

A total of 117 observations were made covering 2.925 line kilometres of which 50 stations on 1.35 line kilometres are located on claim L531562.

EM-16 VLF Survey: All EM-16 survey results are presented on drawing E3696 as in-phase and quadrature profiles at a scale of 1cm = 10% on a horizontal scale of 1:2000.

All readings used the Cutler, Maine (NAA) transmitter station operated at a frequency of 17.8 k Hz and were consistantly obtained facing north at each survey station.

The in-phase component only was "Fraser Filtered" with

the calculated data shown and contoured to highlight the conductive horizons on drawing F3697.

One main conductive horizon striking north-west dominates and was traced from BL2+50E to line 1W at 2+00N. The zone has good negative quadrature correlation and probably is the source of the airborne anomaly. Depth to the source is approximately 50 metres on line 2E at BL+25N and plunges to a depth of 100 metres on line 1W at 2+00N.

On line 00 at BL+60N, a secondary conductive zone appears to branch off the main conductor and assumes a northeast-southwest strike traceable to line 1W at BL+15N.

This branch zone has positive quadrature correlation and could be due to subcropping bedrock topography but a cross-cutting shear cannot be ruled out in particular since the strike direction is in correlation with another minor zone at the southern end of the survey area running parallel to the stream.

Another minor, near surface anomaly with positive quadrature correlation was traced some 200 metres north of the main conductive horizon and running parallel to it.

Although located in areas of mapped outcrop this minor zone could indicate a fracture and since the area was investigated mainly for its possible precious metal potential it might warrant further attention.

Conclusion

The main conductive zone follows the south edge of a ridge of outcrops and correlates with generally lower magnetic values. Although a bedrock trough is indicated, the source of the

anomaly appears to be in bedrock and a shear zone cannot be ruled out. The eastern end of the anomaly, it's shallowest portion, shows some magnetic activity not completely covered by the VLF.

The northern VLF conductive horizon also correlates with a bedrock depression but is at least in part over an area of outcrops and magnetic correlation suggests a contact or minor shear zone.

The VLF anomaly near the stream at the south-end of the survey area is fairly shallow and it's source is apparently entirely within overburden.

Recommendation

The strongest VLF anomaly is located on line 1E at BL+70N at a point where two zones of different strike directions join. Calculated depth to the main conductive source at this point is 75 m and since topographical features prevent a horizontal loop Max-Min survey, detail vertical loop EM should be considered to verify the structure.

The east end of this anomaly also warrants further attention in the vicinity of BL-3E, where magnetic activity increases, bedrock was mapped within 10 metres north of the baseline but the VLF survey was stopped short of a possible conductive indication near surface.

The northern VLF conductor although minor might indicate a near surface shear zone and should be investigated for precious metal potential in areas of outcrops.

H. Beckmann

October 31, 1980

H. Beckmann

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

Type of Survey VLF Electromagnetic and Magnetic Survey

Township or Area Otto Twp. Kirkland Lake Area, Ont.

Claim holder(s) Rio Tinto Canadian Exploration Ltd.
2400-120 Adelaide St. W. TorontoM5H 1W5

Author of Report H. Beckmann

Address 2400-120 Adelaide St. W. Toronto, M5H 1W5

Covering Dates of Survey June - July 1980
(linecutting to office)

Total Miles of Line cut 1.40 line kilometres

SPECIAL PROVISIONS CREDITS REQUESTED

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

ENTER 20 days for each additional survey using same grid.

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

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

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

DATE: October 30, 1980 SIGNATURE: H. Beckmann
Author of Report

MINING CLAIMS TRAVERSED
List numerically

L531562
(prefix) (number)

If space insufficient, attach list

TOTAL CLAIMS 1

OFFICE USE ONLY

PROJECTS SECTION

Res. Geol. _____ Qualifications 2.144

Previous Surveys _____

Checked by _____ date _____

L.D.

GEOLOGICAL BRANCH

Approved by _____ date _____

GEOLOGICAL BRANCH

Approved by _____ date _____

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS

Number of Stations Mag 50 VLF 42 Number of Readings 50/42

Station interval 25 metres

Line spacing 100 metres

Profile scale or Contour intervals 1 cm = 10% / 500 gammas
(specify for each type of survey)

MAGNETIC

Instrument Phoenix Fluxmaster MV 1

Accuracy - Scale constant 5 gammas .1% of full scale

Diurnal correction method Linear distribution of variation between base checks

Base station location BL 00 - 610 gammas

ELECTROMAGNETIC

Instrument Geonics EM-16 VLF

Coil configuration

Coil separation

Accuracy

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

Frequency 17.8 k Hz Cutler, Maine NAA
(specify V.L.F. station)

Parameters measured In-phase and quadrature component of secondary field.

GRAVITY

Instrument

Scale constant

Corrections made

Base station value and location

Elevation accuracy

INDUCED POLARIZATION -- RESISTIVITY

Instrument

Time domain Frequency domain

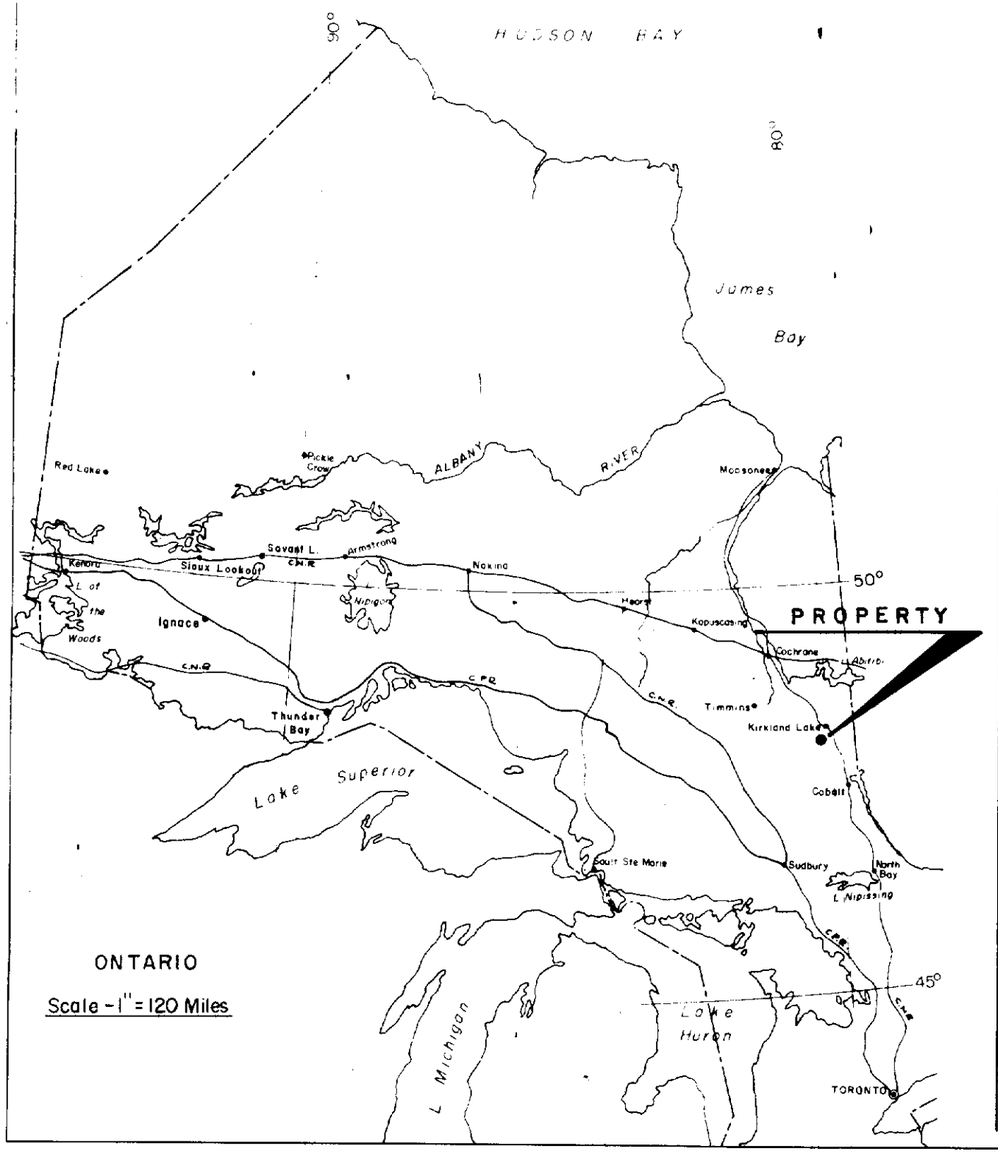
Frequency Range

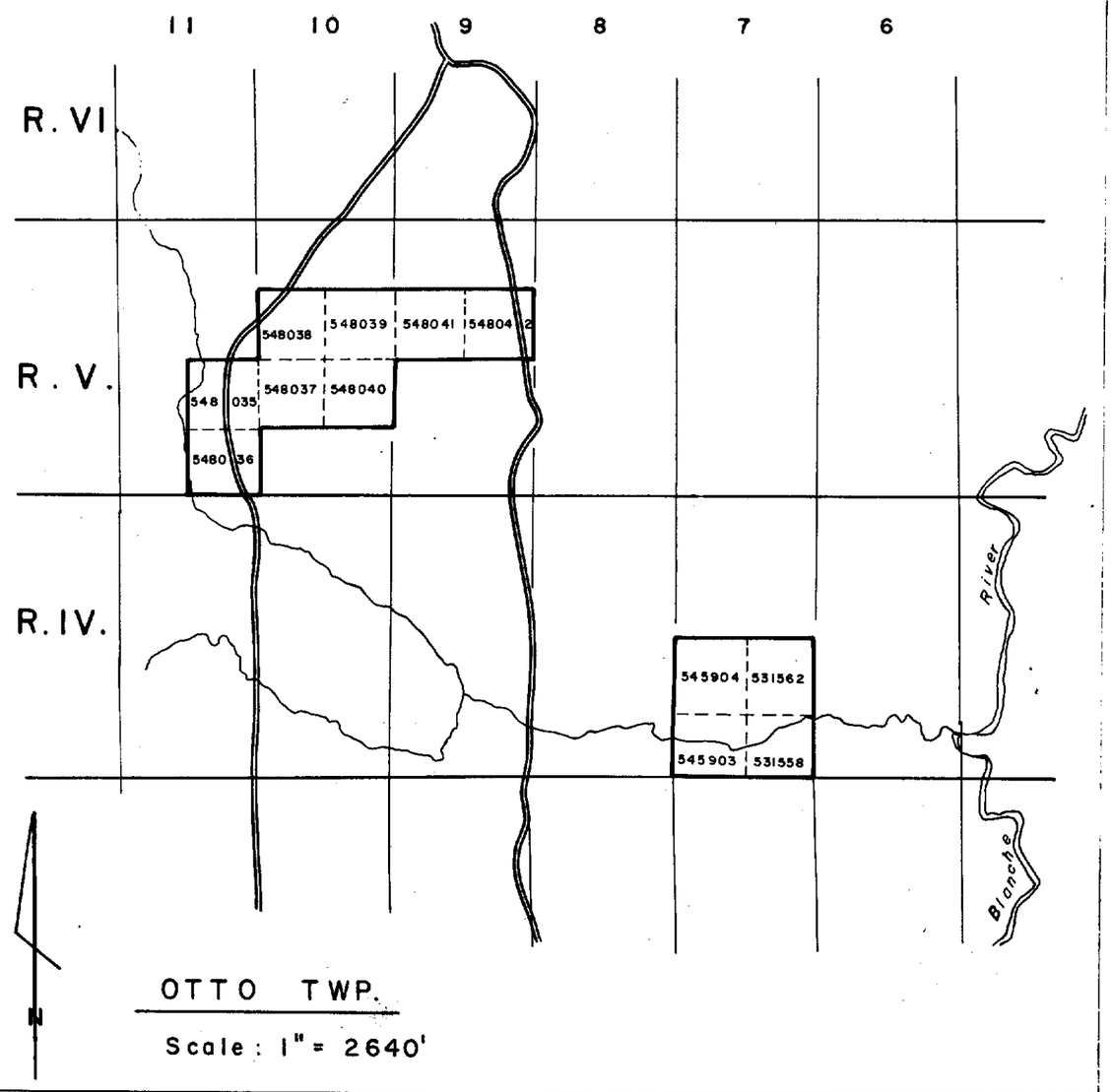
Power

Electrode array

Electrode spacing

Type of electrode





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42 - A - 1

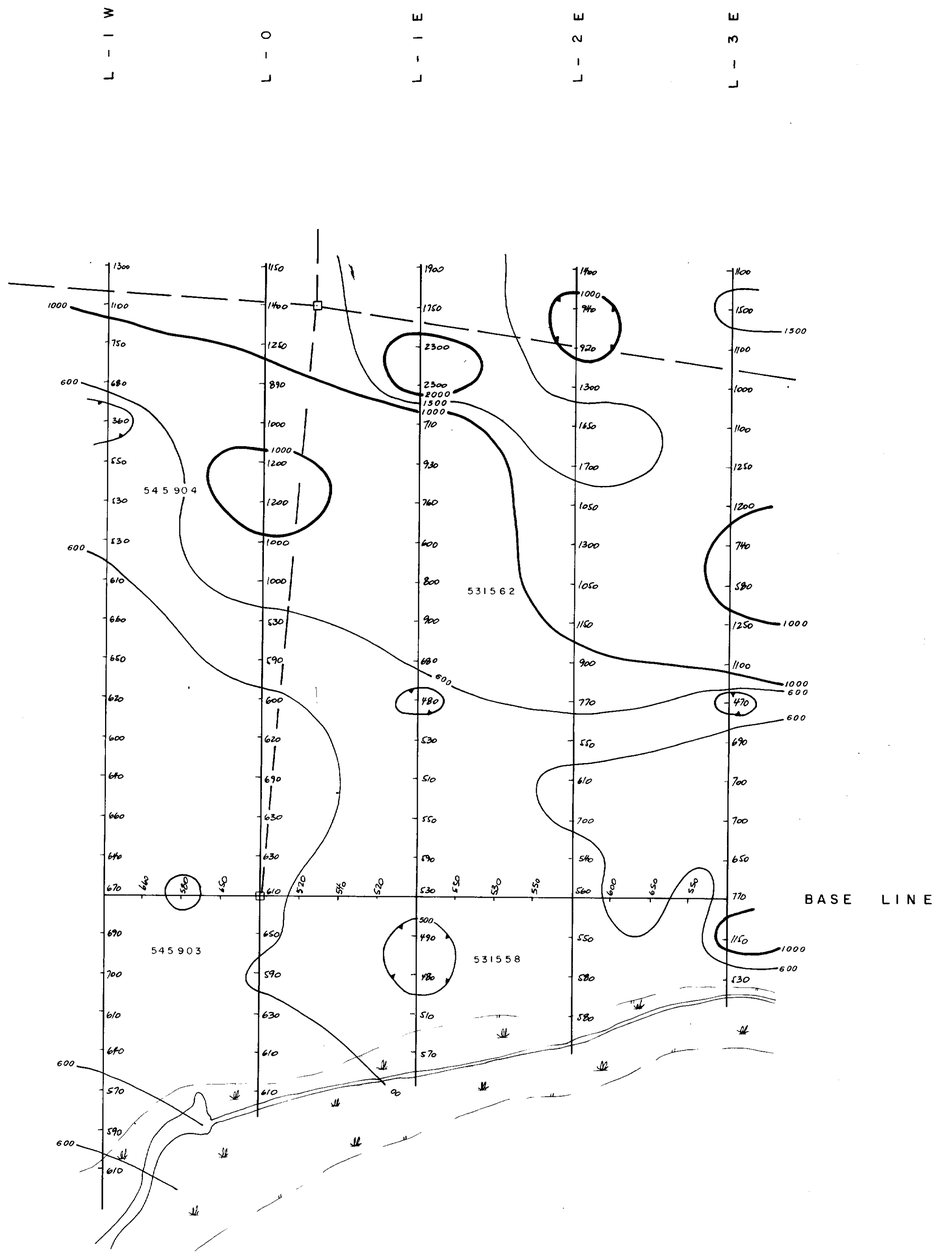
RIO TINTO CANADIAN EXPLORATION LTD.

KIRKLAND LAKE CLAIMS - OTTO TWP. - ONT.

LOCATION MAP

Sept. - 1980 e. b. DWG L 2821

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October 31, 1980 H. Beckmann

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LEGEND:

630 Value in gammas

Contour Interval : 500 gammas

	Gamma	Contour
500	"	"
1000	"	"
1500	"	"
2000	"	"

Mag Depression

N. T. S.
42 - A - 1

SCALE 1 : 2000

80 0 80 160
METRES

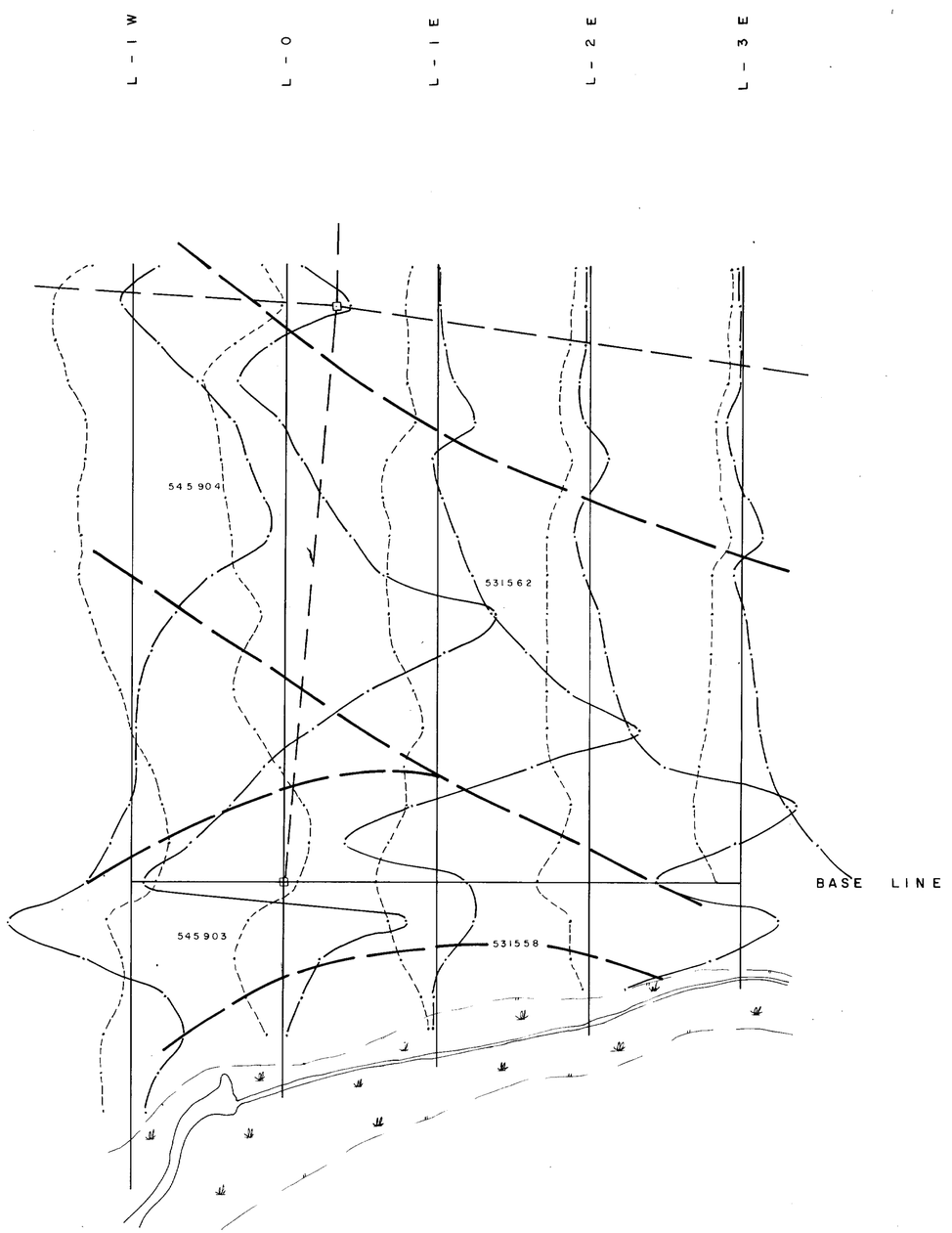
RIO TINTO CANADIAN EXPLORATION LIMITED

KIRKLAND LAKE CLAIMS - OTTO TWP.-ONT.

SOUTH GRID

MAGNETOMETER SURVEY

Sept. - 1980 | H. B. / e. b. | DWG. M 3698



October 31, 1980 H. Beckmann

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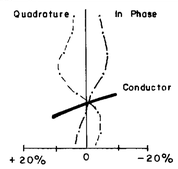
LEGEND:

Instrument : Geonics EM-16 VLF-EM unit

Readings : Ratio of vertical to horizontal components of primary field expressed as percentages

Frequency : 17-8 kHz

1 cm : 10 %



N. T. S.
42 - A - 1

SCALE 1: 2000

80 0 80 160
METRES

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220

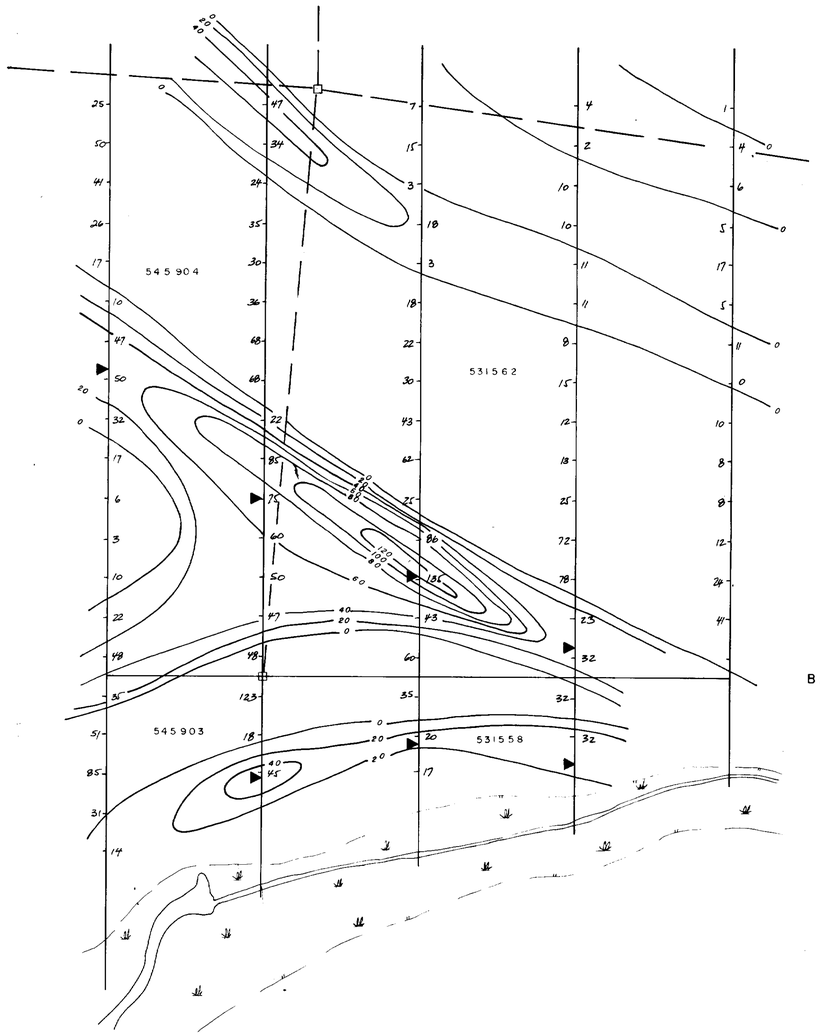
RIO TINTO CANADIAN EXPLORATION LIMITED

KIRKLAND LAKE CLAIMS - OTTO TWP.-ONT.

SOUTH GRID

VLF - EM PROFILES

Sept. - 1980 | H. B. / e. b. | DWG. E 3696



October 31, 1980 H. Beckmann

LEGEND :

Quantity : Filtered In Phase data
Contour Interval : 20 filter %
Instrument : Geonics EM-16 VLF-EM unit
Transmitter : Cutler Maine (NAA, 17.8 kHz)
▶ : Good in Phase quadrature ratio

Filter data

N. T. S.
42 - A - 1

SCALE 1 : 2000

80 0 80 160
METRES

RIO TINTO CANADIAN EXPLORATION LIMITED

KIRKLAND LAKE CLAIMS - OTTO TWP.-ONT.

SOUTH GRID

FRASER FILTER CONTOURS

Sept. - 1980 | H. B. / e. b. | DWG. F 3697

42A01SE0153 2.3531 OTTO