

PRELIMINARY COPY

ISOMAGNETIC LINES (Arson Top Field)
 CONTOUR INTERVAL: 20 Gauss
 FLIGHT ALTITUDE: 250 Feet Above Terrain
 MAGNETIC DEPRESSION: 0.0



QUESTOR SURVEYS LIMITED
 Western Decalita
 PETROLEUM LIMITED

Project No.	
Date	
Survey	
Area	
Scale	
Projection	
Contour	
Notes	
Sheet	

QUESTOR SURVEYS LIMITED

AIRBORNE MAGNETIC SURVEY REPORT

AREA 1970 - 49A

NORTH-WEST TERRITORIES

PREPARED FOR

WESTERN DECALTA PETROLEUM LIMITED

NOVEMBER 1970

19-7-4-40

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TACS - DATA STORAGE CENTRE		
Dist. #	Est. No.	Date Filed
19	259	Dec 11/70
Dist. Name/Est. 1970 49A		
Est. No. 6326		

D.I.A.N.D. PROJECT # 19-7-4-70-2



QUESTOR SURVEYS LIMITED

AIRBORNE MAGNETIC SURVEY REPORT

AREA 1970 - 49A

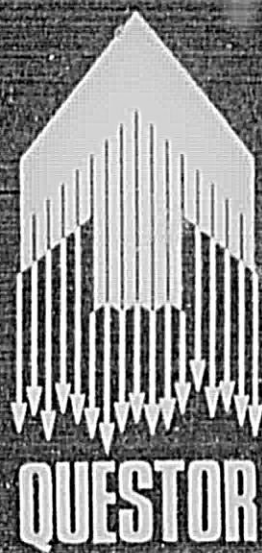
NORTH-WEST TERRITORIES

PREPARED FOR

WESTERN DECALTA PETROLEUM LIMITED

NOVEMBER 1970

19-7-4-40
OH.



Questor Surveys Limited, 20 Canso Rd., Rexdale, Ontario, Canada.



QUESTOR SURVEYS LIMITED

AIRBORNE MAGNETIC SURVEY REPORT

AREA 1970 - 49A

NORTH-WEST TERRITORIES

PREPARED FOR

WESTERN DECALTA PETROLEUM LIMITED

NOVEMBER 1970

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AREA OUTLINE

INTRODUCTION

This report contains a description of the flying procedure, the equipment used and our interpretation of the airborne magnetometer survey. The map to accompany this report covers a total of 792 line miles in the Horn Plateau Area, N.W.T. A Beaver CF-JKG equipped with a Barringer AM-104 Precision magnetometer was used for the survey. The operating base was Fort Providence, N.W.T. The survey was flown on August 29, 30, and September 1, 3, 1970.

SURVEY PROCEDURE

An approximate speed of 90 miles an hour was used at a terrain clearance of 250 feet. A normal S-pattern flight path with 1/2 mile turns was employed. An equipment operator monitored the instruments and logged the flight details. Navigational mosaics at a scale of 1" = 1/2 mile were used for control.

A line spacing of 1/4 mile was used.

MAP COMPILATION

The base maps are uncontrolled mosaics constructed from 1" = 1 mile National Air Photo Library photographs. These mosaics were reproduced at a scale of 1" = 1/2 mile on stable transparent film from which white prints can be made.

Flight path recovery was accomplished by comparison of the prints of the 35 mm camera film with the mosaic in order to locate the fiducial points.

DATA PRESENTATION

A map of isomagnetic lines of the total magnetic field is presented with contour lines every 20 gammas.

BARRINGER AM-104 PROTON PRECESSION MAGNETOMETER

The AM-104 magnetometer which measures the total magnetic field has a sensitivity of 5 gammas and a range of 20,000 gammas to 100,000 gammas.

DISCUSSION OF THE RESULTS

Block "A"

In the south-east portion of this block, it is felt that a change in rock type is causing the high magnetic intensities, probably basic igneous rocks. The depth to the top of the basement has been estimated to be 2060 feet.

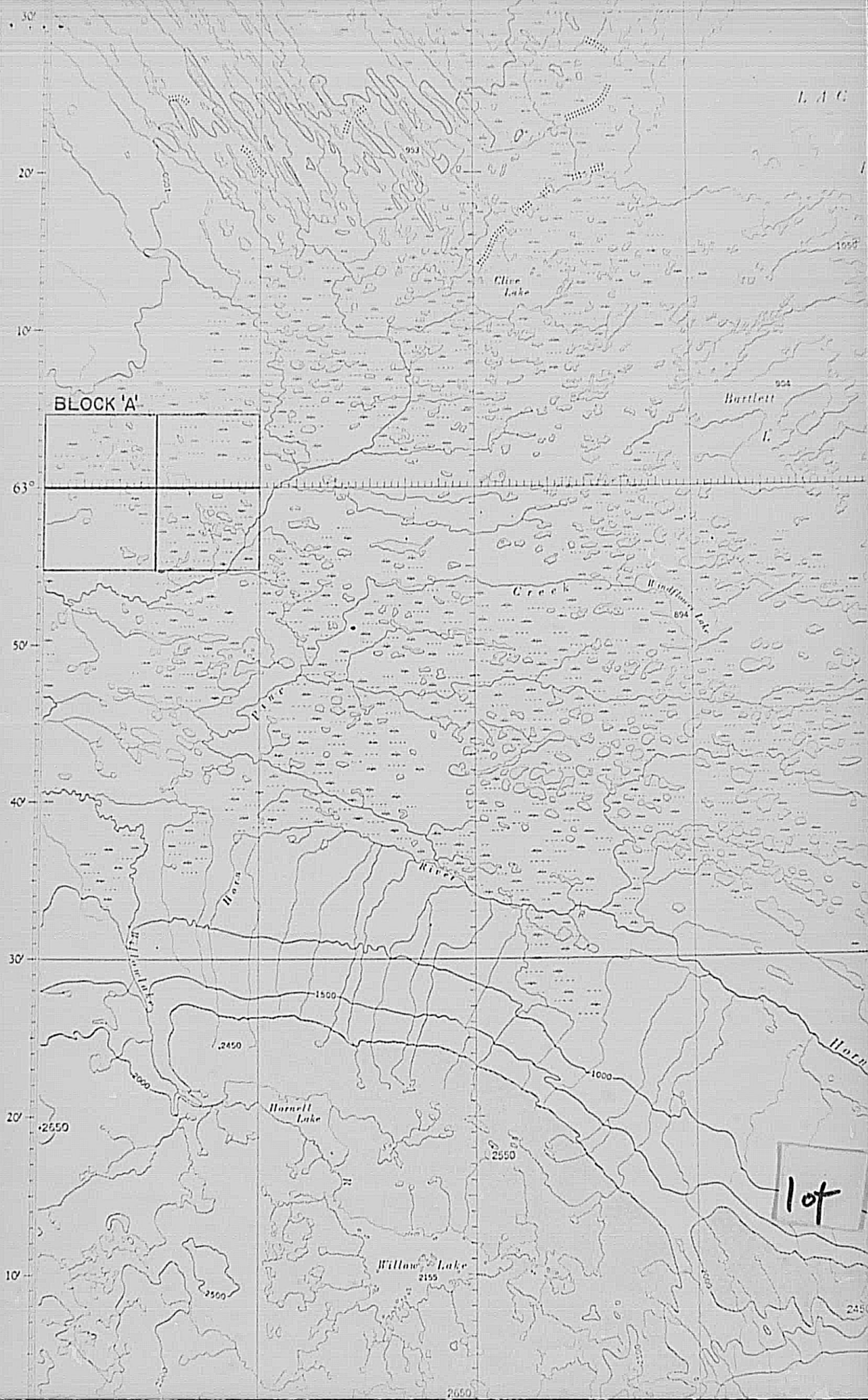
No structural features, ie. folding, faulting, etc. can be correlated with the magnetic data.

R. J. de Carle
R. J. de Carle

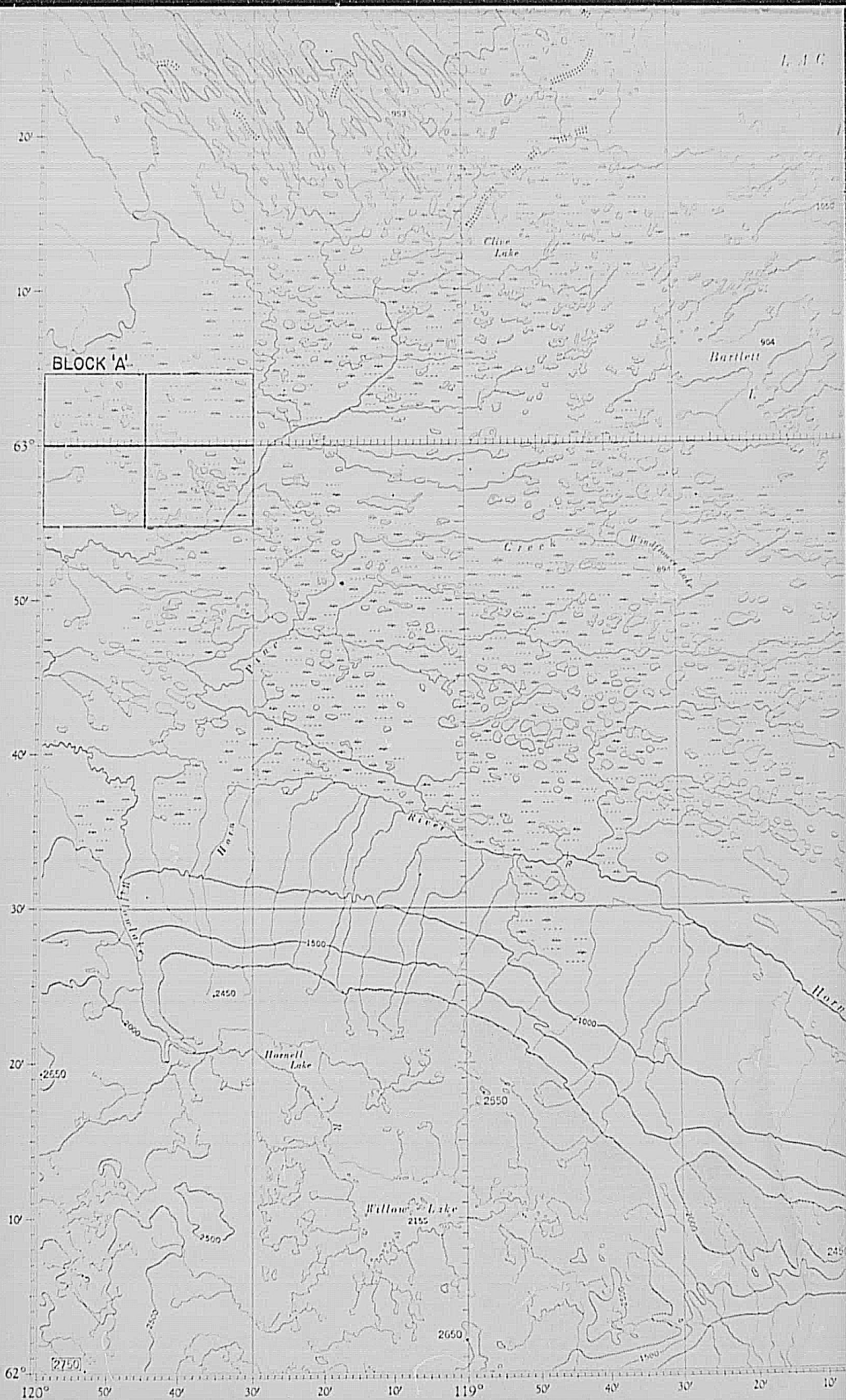

P. G. Lazenby

Poor Copy

(Jones Wrigley 95 N.W. and 95 N.E.)



(Joins Wagley 95 N.W. and 95 N.E.)



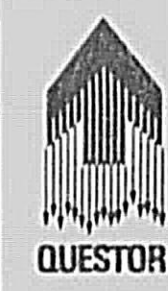
Poor Copy

2 of 2



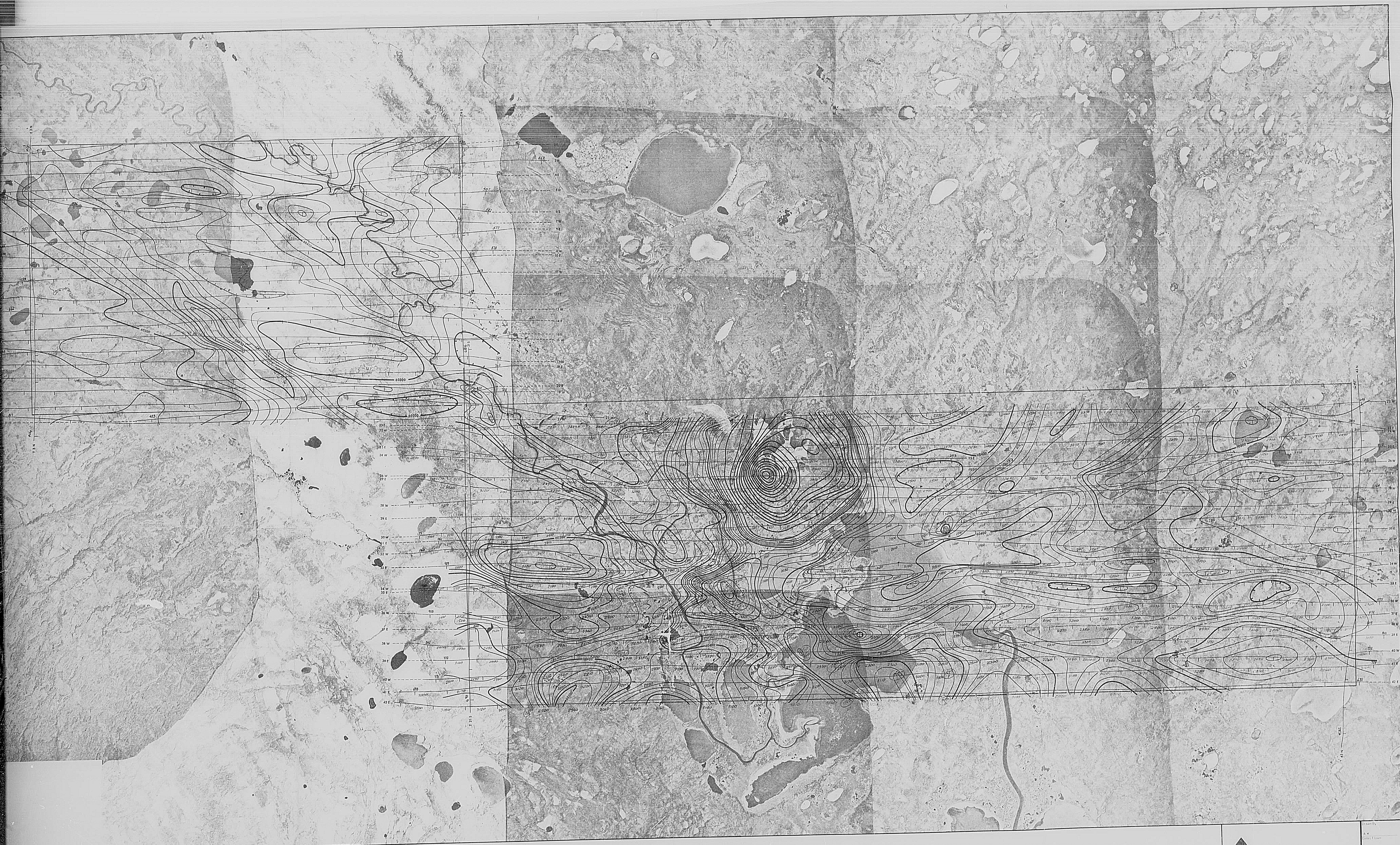
ISOMAGNETIC LINES (Absolute Total Field)
 CONTOUR INTERVAL 20 Gauss
 FLIGHT ALTITUDE 250 Feet Above Terrain
 MAGNETIC DEPRESSION

104

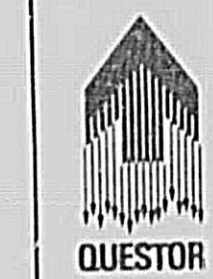


QUESTOR SURVEYS LIMITED
 WESTERN DECALTA
 PETROLEUM LIMITED

Scale - 1 inch = 2640 feet



ISOMAGNETIC LINES (Absolute Total Field)
 CONTOUR INTERVAL 20 Gamma
 FLIGHT ALTITUDE 250 Feet Above Terrain
 MAGNETIC DEPRESSION



QUESTOR SURVEYS LIMITED
 10000
 WESTERN DECALTA
 PETROLEUM LIMITED

Scale - 1 inch = 2640 feet

2 of 2

Drawn by	
C. A. Jones	
Checked by	
August, 1970	
Flight Path Recovery	
C. D. A. S.	
Data Reduction	
Computed	
Checked	
D. W.	
File No.	
1970, 49 C	



QUESTOR SURVEYS LIMITED

AIRBORNE GAMMA RAY SPECTROMETER AND MAGNETOMETER SURVEY

AREA 1970 - 49B, C

PERMIT NUMBERS 4541 - 4548, 4698 - 4699

NORTH-WEST TERRITORIES

PREPARED FOR

WESTERN DECALTA PETROLEUM LIMITED

NOVEMBER 1970

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SAMPLE RECORD

AREA OUTLINE

INTRODUCTION

Questor Surveys Limited performed an airborne gamma ray spectrometer and magnetometer survey totaling 2175 line miles on Permit Numbers 4541 to 4548, 4698 and 4699 in the Horn Plateau Area, North-West Territories on August 29, 30, 31 and September 1, 3, 4, 5, 10, and 11, 1970.

A Beaver (CF-JKG) on floats was utilized for the survey and the operating base was Fort Providence, N.W.T. A line spacing of 1/4 mile was used. An area outline is shown at the end of the report; this is part of the National Topographic Series sheet number 85 N.W.

EQUIPMENT

The aircraft was equipped with an Exploranium Corporation DGRS-1000 four channel differential gamma ray spectrometer, a Barringer AM-104 Precession magnetometer and a Bonzer radar altimeter was used for vertical control. The outputs of these instruments together with fiducial timing marks were recorded on an MFE (Mechanics for Electronics) recorder using heat sensitive paper. A 35 mm continuous strip film camera was used for recording the actual flight path.

Three 6" x 4" Sodium Iodide crystals were used to detect the gamma rays, and a source of cesium 137 was used as reference for the Spectrum stabilizer. The window widths of the differential analysers were set at 12 1/2% of the energy peaks of bismuth 214, thallium 208 and potassium 40. For example, bismuth 214 has an energy peak of 1.76 Mev and therefore the window width is 2.20 Kev.

The sensitivity of the potassium, thorium and uranium channels was set at 1 cm = 20 counts/second and the total count at 1 cm = 160 counts/second.

A time constant of two seconds was used. Spectral interaction was eliminated by the use of subtraction circuits.

The channel positions from top to bottom are:-

Altimeter
Total Count
Thorium
Uranium
Potassium
Magnetometer

The gamma ray spectrometer channels show an increase in the count rate upwards and the altimeter channel shows an increase in terrain clearance downwards. The altimeter scale is not linear; an example is shown at the end of this report.

The Barringer AM-104 Proton Precession Magnetometer which measures the total magnetic field has a sensitivity of 5 gammas and a range from 20,000 gammas to 100,000 gammas.

SURVEY PROCEDURE

An approximate speed of 90 miles an hour was used at a terrain clearance of 250 feet. A normal S-pattern flight path with 1/2 mile turns was employed. An equipment operator monitored the instruments and logged the flight details. Navigational mosaics at a scale of 1" = 1/2 mile were used for control.

MAP COMPILATION

The base maps are uncontrolled mosaics constructed from 1" = 1 mile National Air Photo Library photographs. These mosaics were reproduced at a scale of 1" = 1/2 mile on stable transparent film from which white prints can be made.

Flight path recovery was accomplished by comparison of the prints of the 35 mm camera film with the mosaic in order to locate the fiducial points.

DATA PRESENTATION

Maps of isomagnetic lines of the total magnetic field are presented with contour lines every 20 gammas.

As there were no uranium anomalies intercepted during the survey, a detailed gamma ray spectrometer presentation is not covered in this report. A set of Mylar copies of the block areas with the flight lines plotted will be submitted for the clients own use.

RESULTS

To obtain maximum use of the radiometric survey data, contoured maps should be made corrected for altitude, build-up factor, Compton Scattering, diurnal changes and instrument drift. Ideally, acquisition of the data should be by digital means and processed by a computer. In this survey, however, economics did not allow for this sophistication.

Anomalies arise from several sources. One of these is from actual deposits of uranium or pitchblende. Others may result when passing over boulder fields, or when passing over outcrop after flying over covered areas. Anomalies may also result when altitude decreases. These, however, are easily recognized and can be eliminated. Geologic contacts may also be spotted such as between sandstone and granite. The background is much higher and more erratic over granitic areas.

BRIEF DESCRIPTION OF THEORY INVOLVED

Uranium 238, thallium 208 and thorium 232 are long lived alpa emitters and together with potassium 40 (gamma emitter), they contribute all the natural environment radiation.

Uranium 238 is measured indirectly from bismuth 214 which is a gamma emitter. Similarly, thorium 232

is measured indirectly from thallium 208, also a gamma emitter. Bismuth 214 and thallium 208 are daughter products of uranium 238 and thorium 232 respectively. Potassium, however, is measured directly from potassium 40.

Bismuth 214 and thallium 208 were selected because their energy peaks are above the 1 Mev level and in airborne applications energies below the 1 Mev level are difficult to resolve. Equilibrium in the decay series must be present in the U and Th series to give an accurate indication of uranium and thorium. This equilibrium is assumed to be present in our surveys as no indication to the opposite has evolved.

Detection of gamma rays is by means of the Sodium Iodide thallium activated crystals which emit light when a gamma particle is absorbed by them. Photomultiplier tubes pick up the light and produce electric pulses which are proportional to the incident light. These electric pulses are integrated and recorded on the analog chart.

Discrimination to the various channels is by means of the gated windows which are positioned to sample the energies of potassium, thorium and uranium.

INTERPRETATION

Block "B"

The magnetic intensities in this area are felt to be due to the different rock types in the Precambrian and where the intensities are greater, basic igneous rocks are probably the cause. Prominent magnetic lows have been indicated throughout the area. These could be the result of acidic volcanic intrusives or minor depressions in an area where there could be basic igneous rocks and because of its depth, a low magnetic intensity was recorded. The average estimated depth to the Pre-

cambrian appears to be 1500 feet.

It is felt that in the south-east portion of this block, the higher magnetic intensity is probably due to a change in rock type in the basement and not due to the basement rock having a shallow depth.

From the magnetic data, it is rather difficult to surmise anything in regard to structure, i.e. faulting, folding, etc in the basement rock.

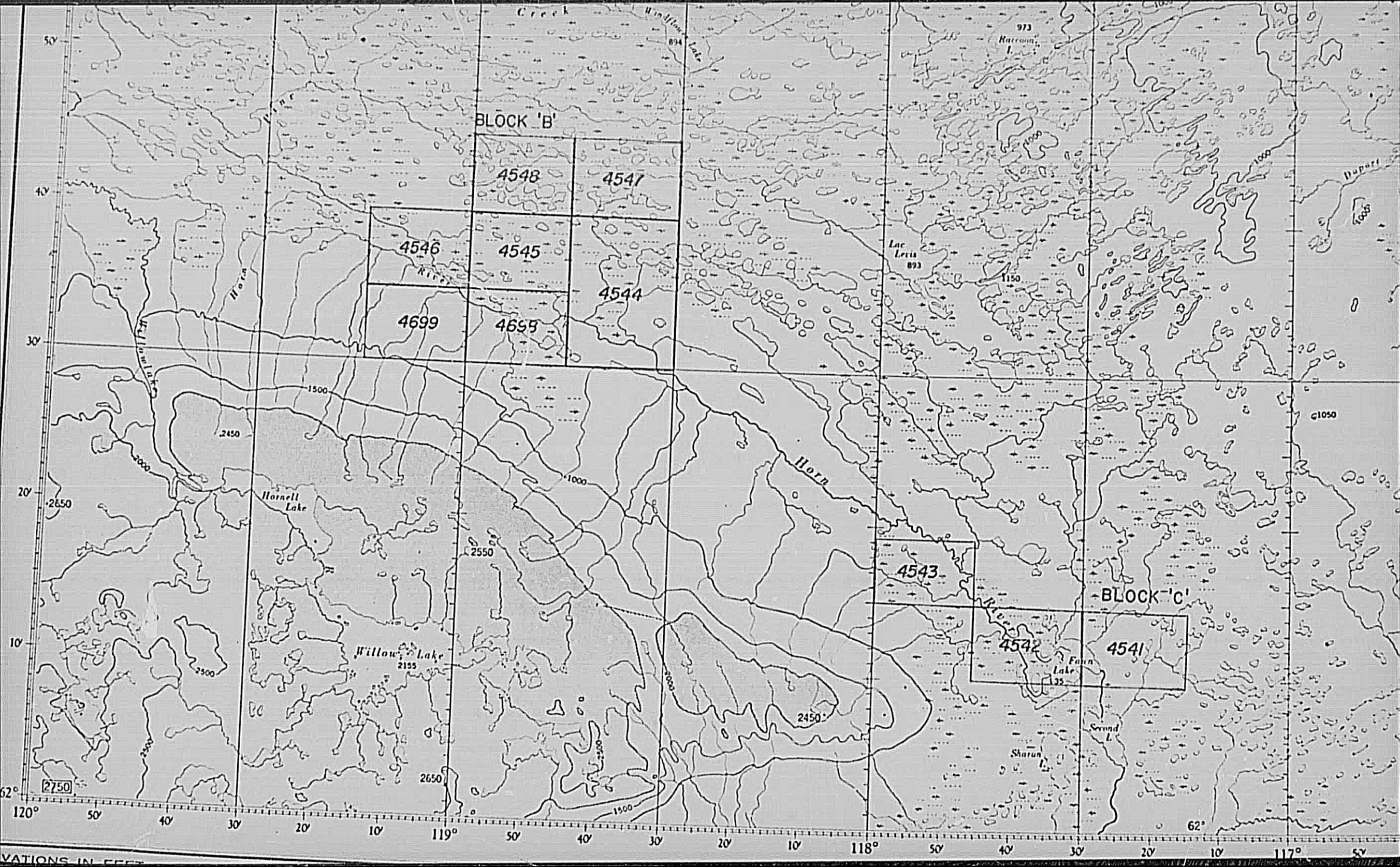
Block "C"

In the north-central portion of the block, it has been estimated that the depth to the top of the source, causing the high magnetic intensities, is approximately 730 feet. It is felt that the cause could be a basic intrusive, which had evaded erosion, resulting in the formation of a "hill" on the Precambrian surface. If the latter does exist, it presents an interesting possibility. It could be the instrument in setting up a trap for oil in one of the overlying sedimentary horizons. Depths to the basement in surrounding areas in this block have been estimated to be between 1100 and 1200 feet.

A diabase dike could be the cause of the magnetic high in the north-west portion of Block "C". The estimated depth to the top of the source was found to be 884 feet. It strikes roughly N 50° W.

R. J. de Carle
R. J. de Carle





ALTIMETER

100 Feet
150 Feet
200 Feet
250 Feet
300 Feet
400 Feet
500 Feet

TOTAL COUNT

800 Counts Per Second

THORIUM

100 Counts Per Second

URANIUM

100 Counts Per Second

POTASSIUM

100 Counts Per Second

MAGNETOMETER

Fine Scale: 1cm. = 100 gammas

Course Scale: 1cm. = 1000 gammas

lot

ALTIMETER

100 Feet
150 Feet
200 Feet
250 Feet
300 Feet
400 Feet
500 Feet

MECHANICS FOR ELECTRONICS, INC.

170

800

TOTAL COUNT

800 Counts Per Second

MECHANICS FOR ELECTRONICS, INC.

100

THORIUM

100 Counts Per Second

MECHANICS FOR ELECTRONICS, INC.

100

URANIUM

100 Counts Per Second

MECHANICS FOR ELECTRONICS, INC.

100

POTASSIUM

100 Counts Per Second

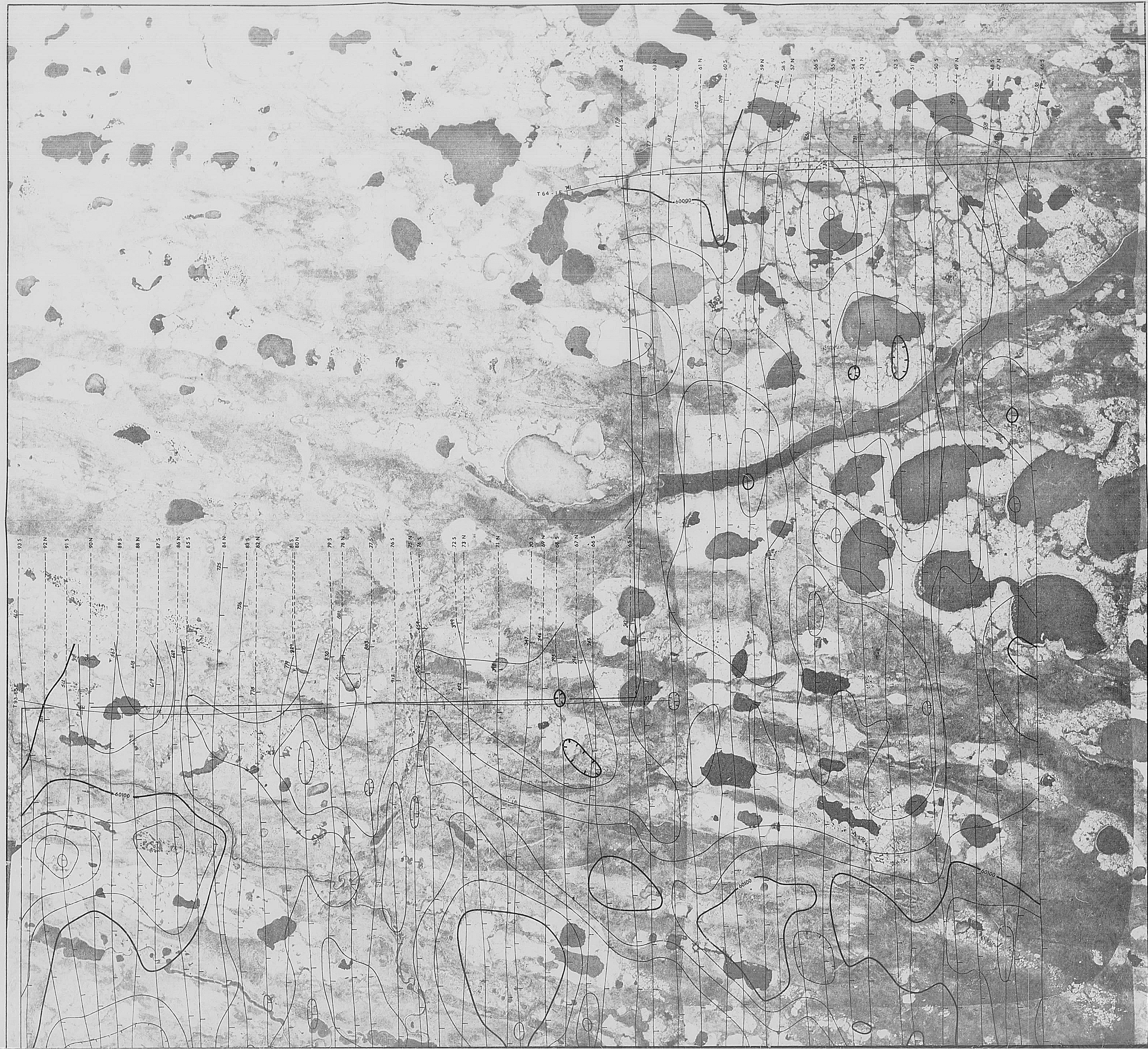
MECHANICS FOR ELECTRONICS, INC.

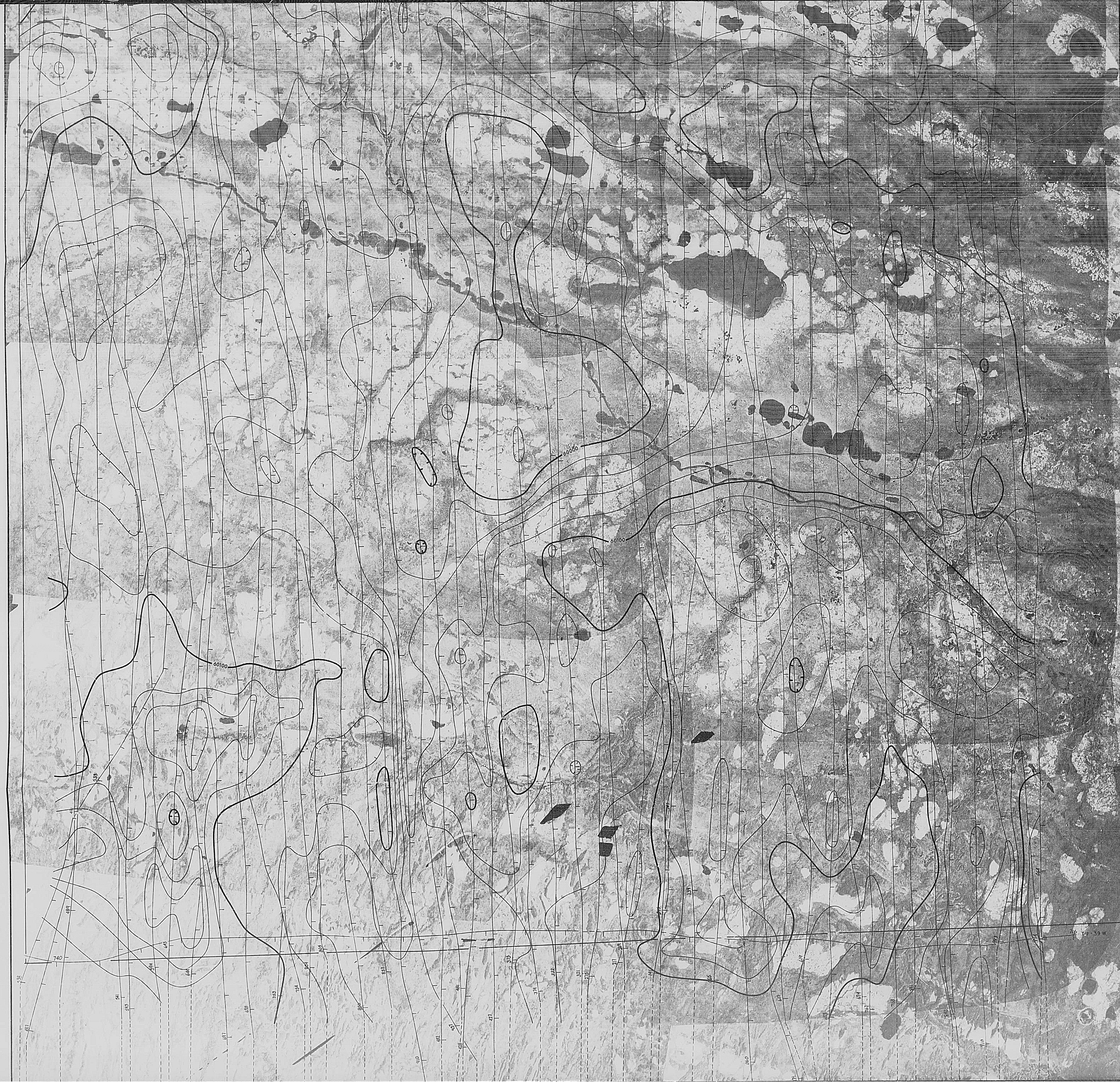
100

Fine Scale: 1cm. = 100 gammas

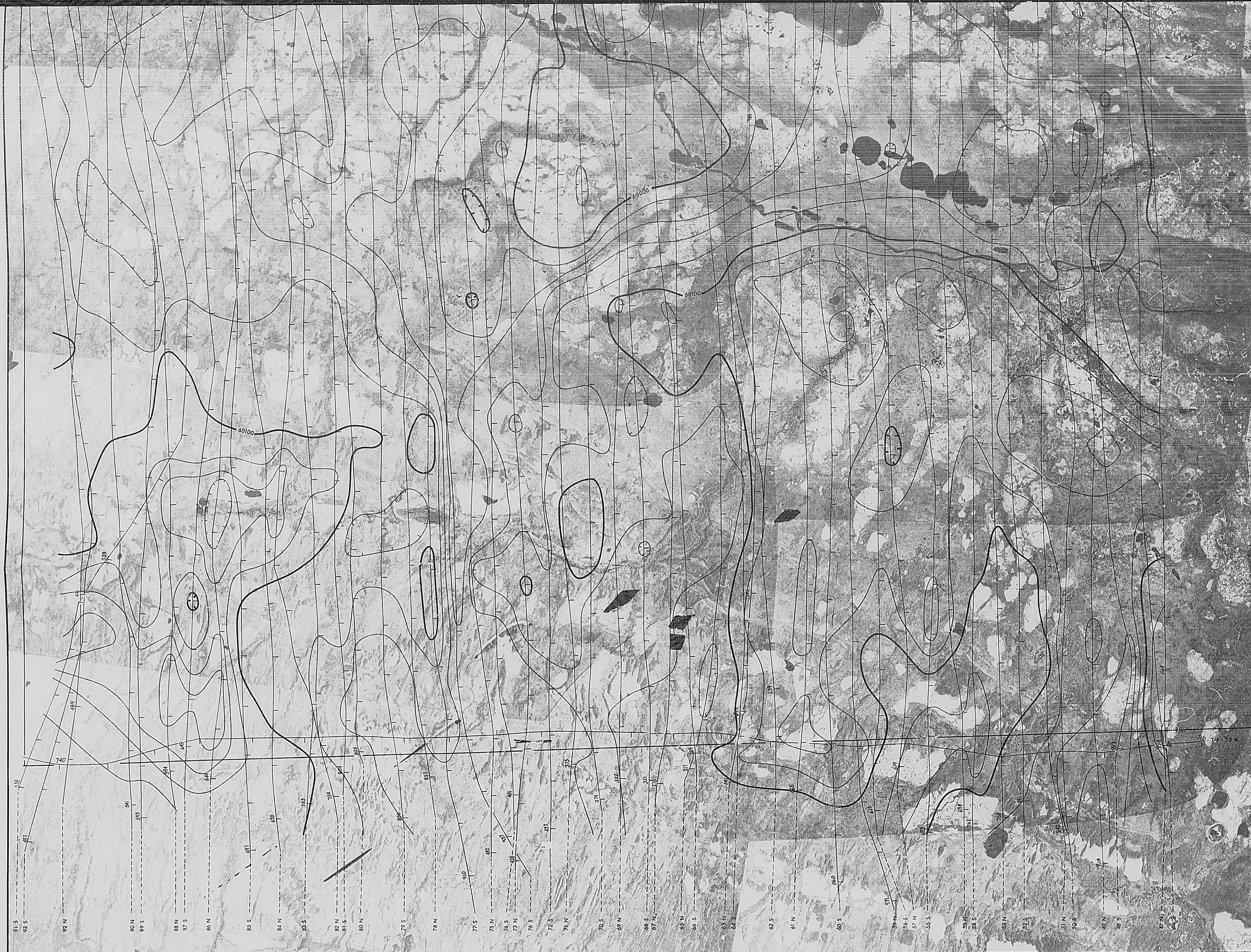
MAGNETOMETER

Course Scale: 1cm. = 1000 gammas

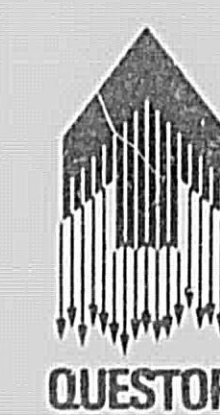




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ISOMAGNETIC LINES (Absolute Total Field)
 CONTOUR INTERVAL 20 Gammas
 FLIGHT ALTITUDE 250 Feet Above Terrain
 MAGNETIC DEPRESSION

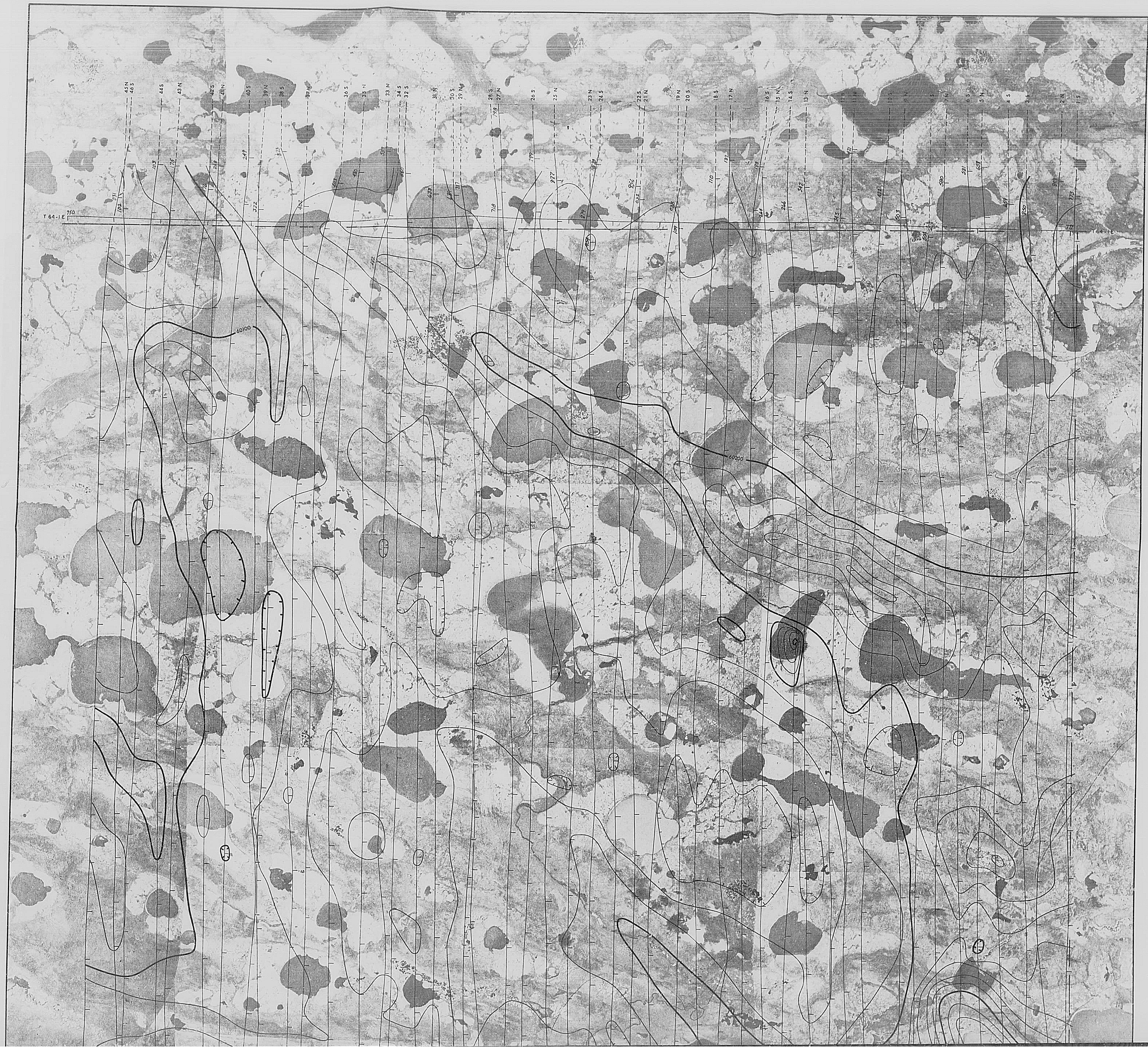


QUESTOR SURVEYS LIMITED
 Airborne Magnetometer Survey

WESTERN DECALTA
 PETROLEUM LIMITED

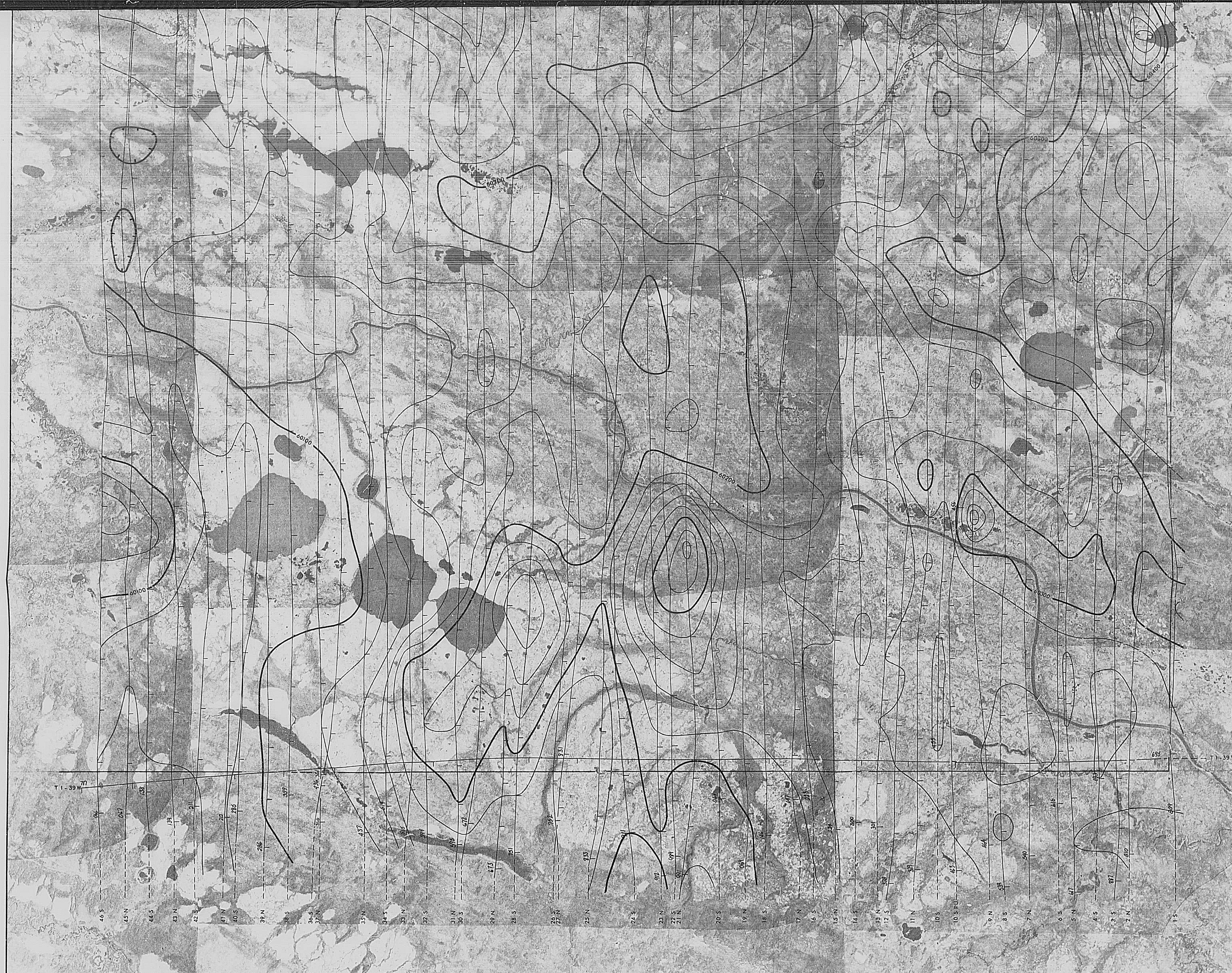
Scale — inch = 2640 Feet

Drawn By	A. K.
Dates Flown	September, 1970
Flight Path Recovery	J. D. B. R. D.
Data Reduction	R. D.
Completed	
Contoured	
File No.	1970-49 h

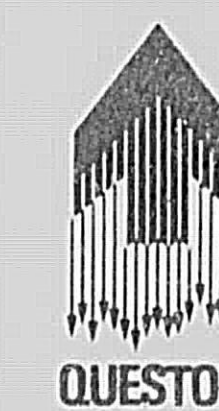




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ISOMAGNETIC LINES (Absolute Total Field)
 CONTOUR INTERVAL 20 Gammas
 FLIGHT ALTITUDE 250 Feet Above Terrain
 MAGNETIC DEPRESSION



QUESTOR SURVEYS LIMITED
 Magnetic Survey

WESTERN DECALTA
 PETROLEUM LIMITED

Scale — 1:100,000 Feet

Drawn By
 A. K.
 Date Plotted
 September 1970
 Flight Path Recovery
 Data Reduction
 R. D.
 Completed
 Contoured
 R. D.
 File No.
 900-49-B