

AIRBORNE MAGNETOMETER SURVEY
NAHANNI AREA
NORTHWEST TERRITORIES
CANADIAN FIRN OIL LIMITED

SCALE: 1 INCH TO 2 MILES

OBSERVED AEROMAGNETIC MAP

Scale: 1:250,000

NORMAL VARIATION
CORRECTION APPLIED

FLIGHT ALTITUDE
TRaverse INTERVAL
CONTROL LINE INTERVAL
CONTOUR INTERVAL
BASE INTENSITY

1000 FEET BAR
1/4 MILE RILES
0 MILES
10 MILES
ARBITRARY

HORIZONTAL CONTROL
BASED ON
1:250,000 MAPS PUBLISHED BY THE DEPARTMENT
OF ENERGY, MINES AND RESOURCES

SPRINGFIELD LIMITED
OTTAWA, ONTARIO

PERMIT BOUNDARY

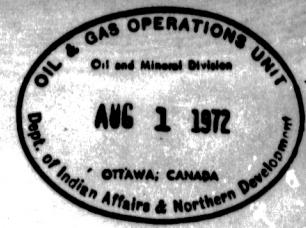
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OTT.

Abstracted for
Geo-Science Data Index

Do. _____

AEROMAGNETIC SURVEY
NAHANNI AREA
NORTHWEST TERRITORIES
FOR
PETROFINA CANADA LTD.
BY
GAI-GMX CANADA LIMITED

March 1972



AEROMAGNETIC SURVEY

NAHANNI AREA
NORTHWEST TERRITORIES

Abstracted for
Geo-Science Data Index

Date

FOR

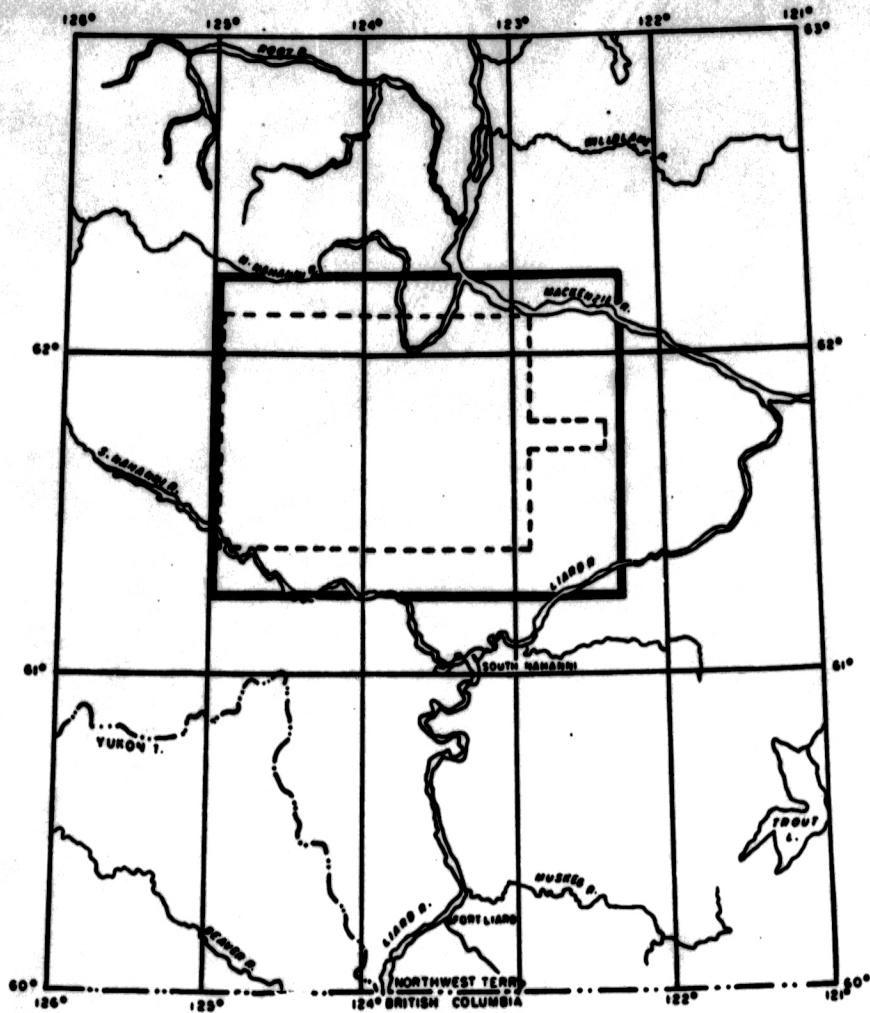
PETROFINA CANADA LTD.

BY

GAI-GMX CANADA LIMITED

Calgary, Alberta

March 1972



SCALE: 1 IN / 32 MI

INDEX MAP

GAI-GMX CANADA LIMITED

----- SURVEY OUTLINE

— MAP OUTLINE

SUMMARY

The Nahanni Area aeromagnetic survey is located in the Northwest Territories. The survey consists of 2157 line miles of data and the Index Map indicates the exact survey boundaries.

The observed data are flown by Spartan Aero Limited in 1971. Quality control and interpretation are by GAI-GMX Canada Limited. Ownership of the observed and interpretive data remains with Petrofina Canada Ltd.

The interpretation is based on techniques developed in the GAI-GMX organization. Available geological information is incorporated as control for the analysis. The significant contribution of this analysis is a map that is geological in nature. It is, where possible, related to a particular geological horizon.

INTRODUCTION

This report covers the interpretation of a Gulf Fluxgate magnetometer survey over Nahanni Area in the Northwest Territories. The basic flight pattern consists of east-west traverse lines 1.5 nautical miles apart and control lines 6 nautical miles apart at a constant barometric altitude of 7000 ft.

Technically, the survey uses the very latest developments in airborne magnetic instrumentation. A continuous magnetometer record is produced by two 10 inch rectilinear dual channel recorders coupled with a controller that isolates the signals from the detector. Readings are graphed on the analog recorder and in addition all data are stored digitally. This survey instrument is installed in a Grand Commander aircraft.

The position of the flight lines are controlled by aerial photography and by an extremely accurate Bendix Doppler Navigation system. In addition, this Doppler system is coupled to the chart drive motors on the recorders to insure a constant ground distance to chart length ratio. The digital records used by GAI-GMX are at a vertical scale of 10 gamma/inch and a horizontal scale of 0.72 mi/in.

A ground magnetometer was established at the base of operations near the survey area, to record variations of the earth's magnetic field during the survey.

All survey data are obtained during quiet magnetic periods when the ground magnetometer traces shows departures of less than five gammas from any chord two minutes long.

A summary of the survey operations and other descriptive details is given in Appendix I, Data Resumé.

The method of interpretation is outlined in principle in GSA Memoir 47 (1951), the method being generally known as the "model" technique which assumes polarization of the basement rocks by the earth's normal magnetic field. The principal facts of this field for this area are: Inclination 79°, Declination 34° E, and Total Intensity 59,700 gamma.

The "model" technique as outlined in the Memoir is dependent upon the recognition and analysis of large anomalies caused by the magnetization

of large units of the basement rocks of varying susceptibilities. This technique, as applied to this interpretation, is amplified by the inclusion of anomalies caused by plates of basement material also having variable magnetizations. The latter category, termed "supra-basement," is of great importance in this area because of the large structural effects present which can be approximated by the plate type anomalies.

OBJECT OF INTERPRETATION

The basic reason for the survey and interpretation of the Nahanni area is the evaluation of the Petrofina Canada Ltd. land concession block in the southwestern corner of the survey and to tie the area with known well information to the east of the survey.

The objective of this analysis is to produce a structural map on the magnetic basement. Where possible, this surface will be correlated with the geological section.

In order to produce a structural map, the observed magnetic data must be translated into geological events. This translation is accomplished by the use of the Observed Map, and the most important of all, the observed profiles. Changes in composition and structure of the magnetic basement produce magnetic anomalies which can be analysed for the shapes and depths of causative bodies.

OBSERVED MAP

The magnetic field data are reduced to an arbitrary datum, the regional magnetic gradient is removed, and the results are presented in contour form on a latitude-longitude grid at a scale 1 in/2 mi. The observed field is everywhere anomalous. Individual anomalies are for the most part a type that is associated with mineralization. Whereas anomaly size increases west of the northeasterly striking low between TL-6 and TL-7 on the southern boundary to the northeast corner of the survey, the entire survey consists of low amplitude anomalies. The basic northeasterly and northwesterly trends, present over the whole area, are reflected in local basement structure; but the amplitudes of anomalies from local basement relief are not sufficient to dominate the magnetic field. The cause for the alignment of the field is mineralization patterns. The conclusion is therefore that there is an inter-relationship between mineralization and structure. The exact nature of the relationship is not determined by this analysis.

CONCLUSION

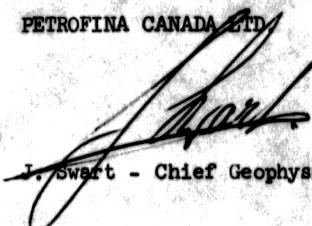
The results of the aeromagnetic data analysis are presented as a contour map of the deepest magnetic surface and its structural trends. The analysis is believed to successfully depict the regional basement altitude of the region.

GAI-GMX CANADA LIMITED

D.C. Burr

Respectfully submitted,

PETROFINA CANADA LTD.


J. Swart - Chief Geophysicist

APPENDIX I

Data Resume

NAME OF SURVEY	Nahanni Area			
AREA	Northwest Territories			
CONTRACTOR	Spartan Aero Limited			
FLYING				
INITIATION	1971			
COMPLETION	1971			
SURVEY MILEAGE	2157 line miles			
AIRCRAFT	Grand Commander			
LOCATION SYSTEM	Photographic and Doppler			
FLIGHT DIRECTION	East - West			
FLIGHT ALTITUDE	7000 ft. asl.			
TRAVERSE INTERVAL	1.5 nautical mi. x 6 nautical mi.			
MAGNETOMETER	Gulf Fluxgate			
ORIGINAL RECORDING				
	Type	Vertical Scale	Horizontal Scale	Quality
ANALOG	Rectilinear	10 γ/in	0.75 mi/in	Good
DIGITAL	Rectilinear	10 γ/in	0.72 mi/in	Good

PRINCIPAL FACTS OF EARTH'S NORMAL FIELD

INCLINATION	79°
DECLINATION	34°E
INTENSITY	59,700 gamma

OBSERVED MAPS

BASE	Latitude - Longitude
SCALE	1 in/2 mi
NUMBER OF SHEETS	1
CONTOUR INTERVAL	10 gamma

REPORTS

FINAL	March 1972
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