

C A N A D A  
 M A N I T O B A



EXPLANATION

- 109
- Magnetic contours with flight traverses; dashed contours indicate incomplete or doubtful data. Contour interval 50 and 250 gamma
- Magnetic contour enclosing area of lower magnetic intensity
- X<sub>465</sub>
- Measured maximum or minimum intensity within closed high or closed low
- Drill hole



Index map of Minnesota showing area covered by this map

This aeromagnetic contour map and accompanying profiles are a part of a series showing the results of aeromagnetic surveys over approximately 40,000 square miles in Minnesota. The survey was conducted by the U. S. Geological Survey in cooperation with the Minnesota Geological Survey. The purpose of the investigation was to delineate the major magnetic trends associated with known iron ore deposits and to indicate areas that may be favorable for additional exploration.

Total-intensity aeromagnetic data were obtained by flying north-south lines spaced a mile apart at altitudes close to 500 feet above the ground. Magnetic detecting equipment consisted of the continuous recording AN-142A airborne magnetometer modified for geophysical use with the detecting element towed about 75 feet below the aircraft. A continuous record of the altitude above ground was obtained by a recording audio altimeter. Flight lines plotted on aerial photos were used for plot guidance. The actual flight path was recorded by a georeferenced continuous-strip camera establishing ground location control. A system of simultaneous identification points marked the camera, altimeter, and magnetometer records. East-west base lines were drawn to correct for diurnal variation and drift and to adjust the flight lines to a common arbitrary datum.

The magnetic anomalies shown on this map result from differences in the magnetic properties of the buried Precambrian rocks, not of the overlying rocks described in this text. The available data on both the depth of drift and the nature of rocks underlying the glacial drift—although meager—are as complete as possible.

The area mapped covers the eastern part of Roseau County with the exception of four townships adjacent to the northeast corner. It is entirely within the bed of former glacial Lake Agassiz and has a thick cover of glacial drift and lake sediments that are largely a result of the retreating of drift. A considerable part of the area is swampy and is a part of the so-called "Big Bog." In general the surface slopes to the northwest. The relief is slight. Glacial drift and lake sediments are from 100 to 150 feet thick in the western part of the area and from 50 to 100 feet thick in the eastern part.

There are no outcrops of Precambrian rocks; and, as few water wells extend through the drift, information on the nature of the bedrock is scanty. Adjacent areas, however, do furnish some data. The bedrock surface is nearly level and is largely covered by a thin mantle of residual clay. At Warroad, just east of the map boundary, a well cuts probable Precambrian rocks represented by clay, sand, and lignite lying in a local depression in the Precambrian rocks. It is probable that Cretaceous sedimentary rocks are fairly extensive in the southeastern part of the map area.

Twelve miles east of the east border of the map, Precambrian granite crops out in sec. 1, T. 162 N., R. 35 W. West of Warroad and near the northeast corner of the map, "black granite" that is probably granite or diabase has been found in wells at depths of 100 to 150 feet. Probable granite was penetrated at 190 feet in a well on the east line of sec. 7, T. 160 N., R. 39 W. Granite is reported at 100 feet in a well at Roseau. Green clay in wells in sec. 32 and 34, T. 162 N., R. 40 W., is suggestive of a weathered basic rock.

The pattern of the magnetic contours suggests an area underlain largely by granite.

Note

Aeromagnetic data are obtained and compiled along a continuous line, whereas ground magnetic surveys are made as separate points. Errors within the normal limits of any magnetic measurement may cause slight discrepancies between flight lines in an aeromagnetic map, which would be more obvious than similar discrepancies between points in a ground magnetic map. For this reason as much care should be exercised in evaluating magnetic features that appear as elongations along a single aeromagnetic traverse as in interpreting an anomaly indicated by a single ground station.

Base from Minnesota Department of Highway maps  
 Planimetry does not meet national standard map accuracy

AEROMAGNETIC MAP OF EASTERN ROSEAU COUNTY, MINNESOTA

By  
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 TOTAL INTENSITY CONTOURS RELATIVE TO ARBITRARY DATUM

