



AEROMAGNETIC AND GEOLOGIC MAP OF NORTHEASTERN  
KOOCHICHING COUNTY, MINNESOTA

This aeromagnetic contour map and accompanying profiles are a part of a series showing the results of aeromagnetic surveys over approximately 45,000 square miles in Minnesota. The survey was conducted by the U. S. Geological Survey in cooperation with the Minnesota Geological Survey. Total-intensity aeromagnetic data were obtained by flying north-south lines spaced one mile apart at elevations ranging between 100 and 1,100 feet above the ground. Magnetic detecting equipment consisted of the continuous-recording AN ASQ-3A airborn magnetometer modified for geophysical use with the detecting element (used about 75 feet below the plane). A continuous record of the elevation above the ground was obtained by use of a recording radio altimeter. Flight lines plotted on aerial photos were used for pilot guidance. The actual flight path was recorded by a gyro-stabilized continuous-strip camera. A system of simultaneous identification points marked all records, and strip film established the ground location control. East-west base lines were flown to facilitate correction for diurnal variation and drift, and to adjust the flight lines to a common arbitrary datum. The area of this map is part of ancient glacial Lake Agassiz, and the bedrock is largely overlain by glacial drift covered by glacial lake deposits. About half of the area is unconsolidated and the remainder is mostly silt fill, modified by wave action. Outcrops are scarce except along the shore and islands of Rainy Lake and in both T. 68 N., R. 22 and 23 W. Some exposures also occur along the Little Fork River in Tps. 67 and 68 N., R. 24 and 25 W.

Rocks in the southeastern part of the map area are mainly granite with many biotite schist inclusions. Farther west biotite schist is the predominant outcrop, but dikes of pegmatite are common. These exposures indicate that the western contact of the batholith of Vermilion granite is about at R. 24 W. The large areas of dike and granite complex in T. 67 N., R. 24 W., are recent discoveries of the M. A. Hanna Co.

There are abundant outcrops along the shore and islands of Rainy Lake at the northeastern edge of the map area. This is the area of the controversial Cochrane series of Lawson which, according to some geologists, is a series of metamorphosed sediments underlying the Keweenaw series (Grant, 1925).<sup>1</sup> The exposed rocks are a complex of gneiss, mica schist, conglomerate, granite, and diabase dikes of more recent age.

The long magnetic high extending across the northeastern part of the area is believed to be caused by an extensive belt of ironstone. The type of rock causing the magnetic high shown in T. 67 N. is unknown, but the originating body is estimated to lie at a considerable depth beneath the surface.

<sup>1</sup>Grant, F. F., 1925, Cochrane problem: Geol. Soc. America Bull., v. 36, p. 351-364.

**Note**  
Aeromagnetic data are obtained and compiled along a continuous line, whereas ground magnetic surveys are made at 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.

**EXPLANATION**

- FORMATIONS**
- Vermilion granite
  - Knife Lake group, with granite, pegmatite, and diabase intrusions
  - Ely greenstone
- OUTCROPS (Lithologic symbols)**
- Basic dikes
  - Gabbro
  - Granite
  - Greenstone
  - Knife Lake group with granite intrusions
  - Knife Lake group
- Indefinite contact**

**Magnetic contours with flight traverses:** dashed contours indicate incomplete or doubtful contours; dashed contour encloses area of lower magnetic intensity; "C" and number denote location and value measured maximum or minimum intensity within closed contour.

**Scale:** 1 inch = 2.5 miles

**Contours interval:** 50, 250, and 500 gammas

**Aeromagnetic survey flown:** 1000 feet above the surface

**Scale:** 1:63,360

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