

EXPLANATION

FORMATION	OUTCROPS (Lithologic symbols)
Kenoweran Basic intrusives and Duluth gabbro (Middle Kenoweran)	Conglomerate Gabbro Granite
Maestri Virginia slate (Annikie)	Greenstone
Maestri Bibbick iron-formation (Annikie)	Iron-formation
Maestri (?) Giants Range granite and Vermilion granite (Algoma)	Slate
Kenoweran Kaif Lake slate schist Ogishke conglomerate member of Kaif Lake slate (Kaif Lake)	
Kenoweran Soudan iron-formation	
Kenoweran Ely greenstone	

PRECAMBRIAN

Indefinite contact

The stratigraphic classification and nomenclature of this report follow the usage of the Minnesota Geological Survey.

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

An aeromagnetic survey covering an area of approximately 30,000 square miles in north-central Minnesota was made during May and August 1947, May 1948, and September and October 1949 by the U. S. Geological Survey in cooperation with the Minnesota Geological Survey. The purpose of the survey was to delineate the major magnetic trends associated with known iron ore deposits and to indicate areas that may be favorable for additional exploration.

North-south traverses were flown at 1-mile intervals. This spacing was selected to cover as large an area as possible with a minimum of flying. The aeromagnetic information is presented in two forms: as an aeromagnetic map, contoured to a common arbitrary datum, and as magnetic profiles that accompany the map.

The measurements were made with an AN/ASQ-3A airborne magnetometer installed in a Beechcraft AT-11 airplane for the 1947 and 1948 flights and in a Douglas C-47 for the 1949 flights; the detecting element of the magnetometer was towed about 75 feet below the plane. The elevation of the plane, ranging between 900 and 1,100 feet above the ground, was recorded with a continuous-recording radio altimeter. Aerial photographs were used for pilot guidance during the flights, and the flight path was recorded by a gyro-stabilized continuous-strip camera. Positional accuracy of all the surveys after 1947 was increased by use of a gyro-stabilized vertical sight.

The geologic information presented on this map was provided by G. M. Schwarz, Director of the Minnesota Geological Survey.

This region is one of extremely complex geology. Outcrops are generally abundant, and those located to date are shown on the map.

The Duluth gabbro occurs only in the southeastern corner of T. 61 N., R. 12 W., southeast of the eastern tip of the Mesabi range. The other formations are eliminated to the northeast, so that the Bibbick iron-formation and the Virginia slate are absent and the gabbro is in contact with the Giants Range granite. The Giants Range granite underlies most of the southeastern part of the area south of the Vermilion district.

The iron ore deposits of the Vermilion district occur in the Soudan iron-formation, which has been intricately folded into the Ely greenstone. A belt of greenstone extends from east to west across the central part of the area. North of this belt and occupying most of the northern tier of townships is the south edge of the batholith of Vermilion granite.

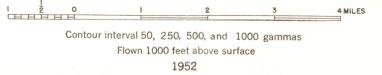
The iron-bearing deposits in the Soudan appear as lenses within the greenstone and follow a fairly definite horizon. This horizon apparently produces a belt of relatively high magnetic values. The structure of the western end of the formation near Tower is not fully understood, but the magnetic map seems to leave little doubt that the belt of greenstone and iron-formation makes an abrupt turn and trends southward across T. 61 N., R. 14 W., where it is terminated by the Giants Range granite. No exploration work is known to have been done in the area of this southeast-trending anomaly.

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.



TOTAL INTENSITY AEROMAGNETIC AND GEOLOGIC MAP OF PART OF NORTHEASTERN ST. LOUIS COUNTY, MINNESOTA
RELATIVE TO ARBITRARY DATUM



SHEET 1 OF 2

Aeromagnetic survey 1949 by J. R. Henderson and J. L. Meuschke
Compilation directed by J. L. Meuschke

For sale by U. S. Geological Survey
PRICE 70 CENTS

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