DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE MINNESOTA GEOLOGICAL SURVEY

GEOPHYSICAL INVESTIGATIONS
MAP GP 98

TOTAL INTENSITY AEROMAGNETIC AND GEOLOGIC MAP OF EAST-CENTRAL ITASCA COUNTY, MINNESOTA

RELATIVE TO ARBITRARY DATUM

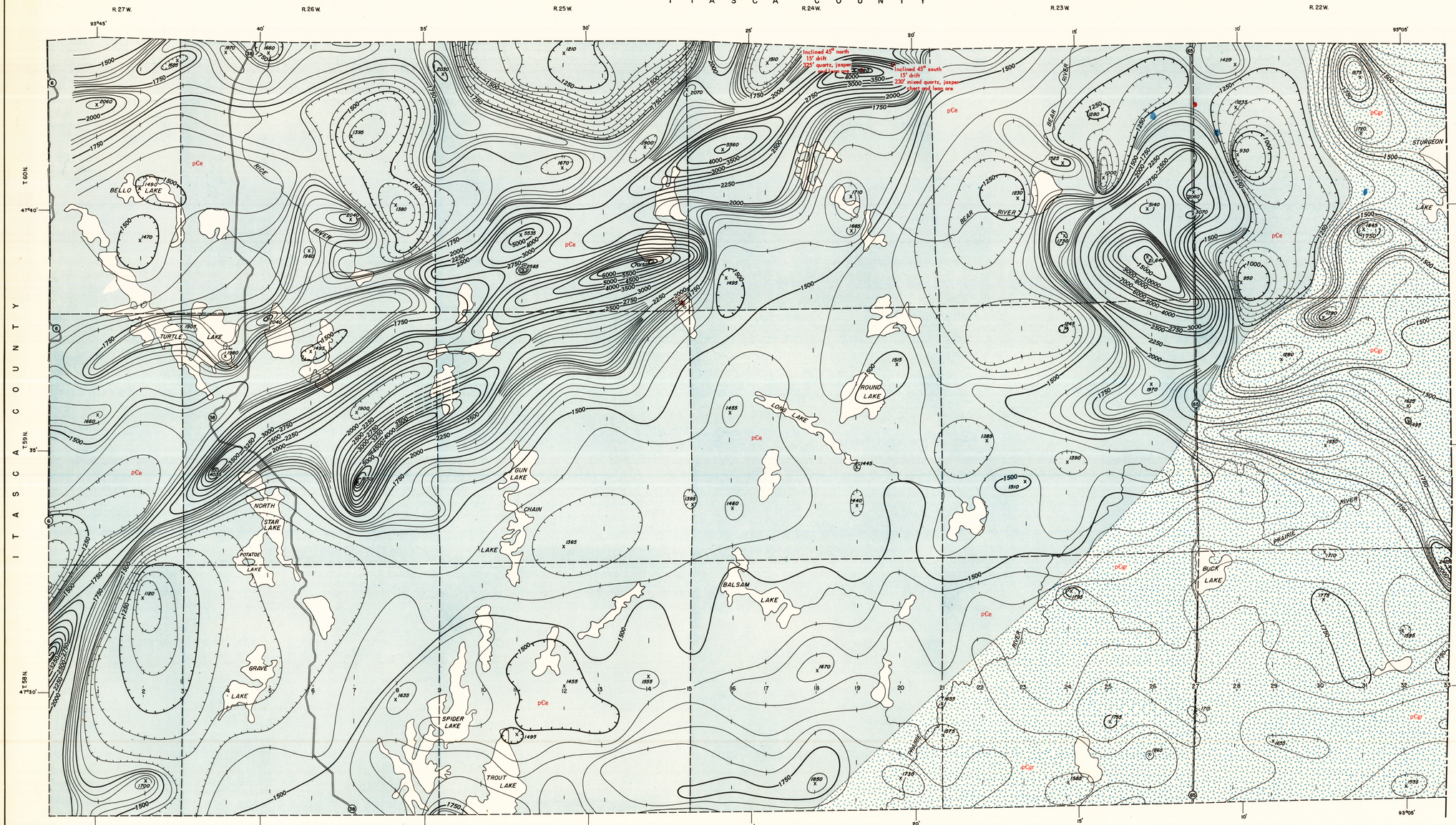
1 0 1 2 3 4 MILES

Contour interval 50, 250, 500, 1000, & 5000 gammas

Flown 1000 feet above surface

1953

SHEET 1 OF 2



EXPLANATION

FORMATIONS

OUTCROPS (Lithologic symbols)

Keewatin — Huronian(?) — PRE-CAMBRIAN

pCgr — Giants Range granite (Algoman)

pCe — Ely greenstone

Granite

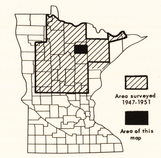
Greenstone

Iron-formation

Indefinite contact

Drill hole

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



Index map of Minnesota

17
X2432

Magnetic contours with flight traverse; dashed contours indicate incomplete or doubtful data; hachured 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 DC-3 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 gyrostabilized continuous-strip camera. Positional accuracy of all the surveys after 1947 was increased by use of a gyrostabilized vertical sight.

G. M. Schwartz, Director of the Minnesota Geological Survey, supplied the geologic and drill-hole information for this map.

The extensive glacial drift (Pleistocene) that covers this area consists of a swampy till plain in the eastern half of the area and a north-trending belt of terminal moraine with a parallel belt of outwash in the western half. The terminal moraine belt contains numerous lakes.

The only outcrops of bedrock known in this area of heavy drift are in T. 60 N., Rs. 22, 23, and 25 W. These outcrops are schists of the Ely greenstone with two exceptions, which are possibly iron-formation. Available data from the adjacent areas indicate that the western edge of the Giants Range granite extends across this area from the northeastern corner southwestward through the southeastern corner of T. 59 N., R. 24 W. The junction of the magnetic highs in T. 60 N., R. 22 W., with the low area to the west coincides with the contact of granite and greenstone, as shown on the geologic map of Minnesota. The evidence from the magnetic map, however, does not show the location of the contact south of T. 59 N.

The remainder of the mapped area is probably underlain with Ely greenstone and interbedded zones of the Soudan iron-formation. The presence of the iron-formation in this area was verified by the finding, in a drill hole in the northeastern corner of T. 60 N., R. 24 W., of jasper and other associated rocks similar to those of the Soudan iron-formation in the Vermilion district. The series of magnetic anomalies that begin a few miles north of the drill-hole locations and extend across the mapped area are presumably related to the iron-formation.

From what is known of magnetic patterns over various rock types, the area of irregular highs and lows of T. 60 N., R. 26 W., probably represents some other formation, possibly a stock or a batholithic intrusion.

The cause of the anomaly of exceptionally high magnitude in the southeastern part of T. 60 N., R. 23 W., is unknown.

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.

Base from Minnesota Department of Highways maps

Aeromagnetic survey 1948 by J. R. Henderson and J. L. Meuschke
Compilation directed by J. L. Meuschke

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.