



EXPLANATION

- Magnetic contours with flight traverse; dashed contours indicate incomplete or doubtful data
- Magnetic contour enclosing area of lower magnetic intensity
- Measured maximum or minimum intensity within closed high or closed low
- Index map of Minnesota

An aeromagnetic survey covering an area of approximately 30,000 square miles in north-central Minnesota was undertaken 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 the known iron ore deposits and to indicate areas which 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 which 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 being 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.

Dr. G. M. Schwartz, Director of the Minnesota Geological Survey, has supplied the geologic data and drill hole information presented on this map.

The northern part of Otter Tail County has three well-defined belts of glacial deposits. The western one-third of the area is covered with terminal moraine. East of the moraine is a belt of outwash about 10 miles wide and beyond that a wide till plain.

The drill holes in this area indicate that the drift is thinnest in the northeast, where a hole penetrated decomposed rock at 190 feet. This decomposed material is found in several holes at depths greater than 200 feet. Much of it consists of clay in various shades of green to white. These residual deposits are widespread in Minnesota but are well exposed only along the Minnesota River, in the southern part of the state. There it is clear that the weathering was prior to the Cretaceous time and that the Cretaceous sea reworked some of the material.

A series of 15 drill holes in sec. 26, T. 135 N., R. 38 W., provides the best geologic information in this area. These holes were drilled in 1910 by E. J. Longyear and R. M. Bennett, and the data have been made available by R. D. Longyear and R. H. Bennett.

All 15 holes reached bedrock at depths ranging from 265 to 303 feet. The upper surface of the rock consists of decomposed oxidized material. The following log is for a hole that penetrated to a depth of 302 feet, about 100 feet deeper than the other holes in this area.

- Feet**
- 0-294 Glacial drift
 - 294-320 Pink schist
 - 320-350 Green schist
 - 350-365 Transformation or ferruginous slate
 - 365-400 Brown siliceous iron-impregnated schist and cherty rock seam
 - 400-475 Cherty magnetic iron-formation
 - 475-480 Greenstone schist with pegmatite inclusions
 - 480-502 Greenstone schist