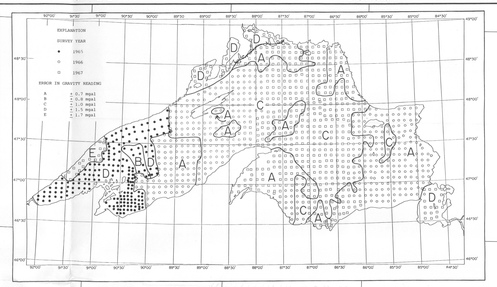
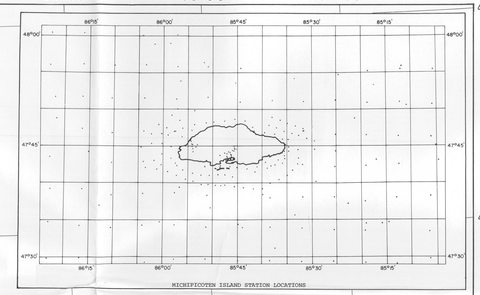
Index map showing location of study area.




## EXPLANATION

-20 Bouguer gravity anomaly contours—Contour interval 2 milligals; hachures indicate areas of lower gravity

Location of gravity station

[1]U.S. Geological Survey, Woods Hole, Mass. 02543
[2]Naval Ocean Research and Development Activity, Bay St. Louis, Miss. 39520

An underwater gravity survey was started in Lake Superior in 1965 and continued through 1967 (Wold and Oetenso, 1966). A total of 1132 readings were taken from bottom gravity stations located on an 8-km grid. In addition, gravity readings from 94 bottom stations near Michipicoten Island and 49 stations on the island were taken in 1967 (Berkson, 1969). The underwater gravity data were obtained with La Coste and Romberg geodetic underwater gravity Meters. The instruments were lowered to the lake bottom, leveled, and read remotely. The absolute observed values were determined using ties with the gravity control network station in Madison, Wisconsin (Woollard, 1958). Most of the underwater stations were located by LORAC radiopositioning, though some near-shore stations were located by radar. The vertical control of the underwater stations is based on a pressure transducer in the gravity meter. The ship's echosounder was used only for comparison since the gravity meter is not necessarily on the lake floor under the ship.

The observed gravity was corrected for drift. No corrections were made for the minimal effects of tide or terrain. The Bouguer anomalies were computed using the following formulas:

BOUGUER ANOMALY (mgals) = observed gravity + (.060) (lake elevation (ft) − water depth (ft)) + (.0127) (water depth (ft)) − theoretical gravity.

The term for correction of the water layer above the underwater gravity station assumes the density of lake water to be 1.00 g/cm³, and the Bouguer correction term assumes an average rock density of 2.67 g/cm³. The theoretical gravity was computed using the 1930 international formula.

These data were collected while the authors were at the University of Wisconsin at Madison, under contracts with the U.S. Army Map Service.

### REFERENCES

Berkson, J. M., 1969, A gravity survey in the vicinity of Michipicoten Island, Lake Superior: Madison, Wisconsin, Univ. of Wisconsin, Madison, unpub. M.S. thesis, 57 p.
Wold, R. J., and Oetenso, N. A., 1966, Aeromagnetic, gravity, and sub-bottom studies in western Lake Superior, *in* Steinhart, J. S., and Smith, T. S., eds., The Earth beneath the continents: Am. Geophys. Union Geophys. Mon. Ser., v. 10, p. 66–94.
Woollard, G. P., 1958, Results for a gravity control network at airports in the U.S.: Geophysics, v. 23, no. 3, p. 520–535.

Base from U.S. Lake Survey Chart No. 9, polyconic projection.

SCALE 1:500,000

KILOMETERS 10 5 0 10 20 30 40 50 60 70 80

STATUTE MILES 10 5 0 10 20 30 40 50

# BOUGUER GRAVITY ANOMALY MAP OF LAKE SUPERIOR

By

Richard J.Wold[1] and Jonathan M. Berkson[2]

1977

Anomalies mapped by R. J. Wold and J. M. Berkson, 1965–67.

Interior—Geological Survey, Reston, Va.—1976—G76128 —1977

For sale by Branch of Distribution, U.S. Geological Survey, 1200 South Eads Street, Arlington, VA 22202