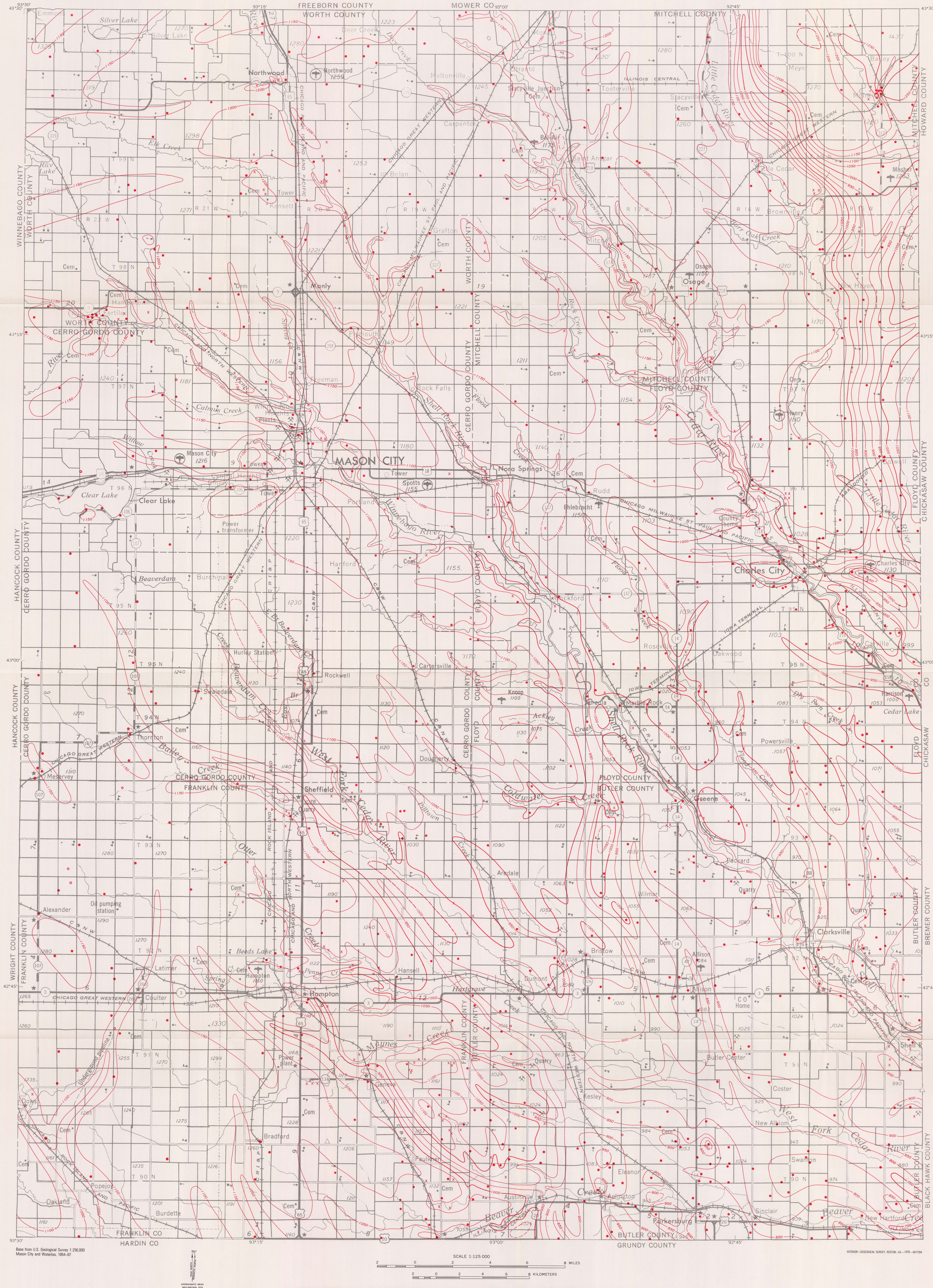
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
IOWA GEOLOGICAL SURVEY

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I–1080 (EAST HALF)



EXPLANATION

● Log data
Bedrock penetrated

○ Log data
Bedrock not penetrated

x Quarry or outcrop

—1250— Bedrock contours
Show altitude of bedrock surface. Dashed where approximately located. Contour interval is 50 feet. Datum is mean sea level.

INTRODUCTION

The bedrock in Iowa (Hershey, 1969) is generally overlain by deposits of glacial drift and alluvium, which range in thickness from less than 1 ft to more than 400 ft, and from less than 1 ft to about 60 ft respectively. The configuration of the bedrock surface is the result of a complex system of ancient drainage courses which were developed during a long period of preglacial erosion and during shorter, but more intense, periods of interglacial erosion.

The following conversion factors can be used in this report to convert English units to their metric equivalents:

English	Multiply by	Metric
feet (ft)	0.3048	meters (m)
gallons per minute (gal/min)	0.0630	liters per second (L/sec)

BEDROCK TOPOGRAPHY

Primary control for the map is geological log data and information from quarries and outcrops. Some published well data (Norton, 1912) are available, but the well locations given are too general to locate on the map or to assign land-surface altitudes with reasonable accuracy. The published data are useful, however, because they aid in delineating such features as ridges or buried channels. More detailed information about the control data is available in the files of the Iowa Geological Survey and the U.S. Geological Survey, Iowa City, Iowa.

The accuracy of the map is related to the density of control points; the greater number of points in a given area, the more exact is the placement of the contours. In several places dashed contours were used where it seemed reasonable to continue a ridge or valley, but where no control point was available to confirm the contours.

The principal features of the map are the buried channels that occur along the eastern and the western parts of the area. Separating these two areas of buried drainage is a broad, generally flat-lying divide that extends north-south through the area.

The divide occupies the central part of the map area and is about 20 miles wide near the southern border, but gradually widens to about 40 miles wide at the northern border. Nearly three-fourths of the divide is at an elevation of 1100–1150 ft above sea level. The rest is above 1150 ft with several small areas above 1200 ft occuring in the north-central part of the area. Several present-day streams have incised their valleys into bedrock along the eastern edge of the divide.

The buried drainage in the southeast corner of the map is part of the basin of the Bremer Channel. This channel and the rest of it's basin are shown in the map of northeast Iowa (Hansen, 1975). The northernmost extension of the Bremer Channel occurs along the extreme northeast border of this map.

Elements of three buried drainage systems appear to be present in the area west of the divide. The largest system is a series of three shallow channels, trending south, that are tributaries to the buried Skunk Channel (Twenter and Coble, 1965). In the extreme northwest corner of the area are several small channels that trend northward into Minnesota. And lastly, in west-central Kossuth County are two small channels that trend west. These are the headward extensions of two tributaries to a deeply buried channel that is known to exist in the counties adjacent to the map area.

USES OF MAP

The bedrock map, when used in conjunction with land-surface altitudes, is a vital tool for studying hydrologic, environmental, and geological problems.

Hydrology.—The map is an aid in locating supplies of ground water. The areas that are most favorable for the development of ground-water supplies are the buried bedrock channels and the alluvial valleys of present-day streams. The buried bedrock channels generally contain sand and gravel aquifers that are used as a source of water by farms in the area. Recorded yields from these buried-channel aquifers range from 5 to 20 gal/min; however, one well is reported to have flowed at a rate of over 30 gal/min.

The alluvial deposits range in thickness from less than 1 ft to about 40 ft and contain water-bearing sand and gravel. Reported yields from the alluvial aquifers generally are less than 30 gal/min; however, it is recorded (Norton, 1912, p. 622) that part of the public supply for Greene was obtained from a 25-ft well finished in alluvial sand and gravel. Alluvial aquifers generally are not widespread in this area of the State because this is the headwater area for several of the larger streams and many of the stream valleys are narrow or developed on bedrock. Therefore, test drilling is requisite to the development of any substantial supply.

The map will help the drilling contractor when planning the construction of a well. By determining the depth of bedrock, the contractor can estimate casing needs and prepare more accurate cost estimates. And, where overburden is thick, the contractor can be better prepared for any problems attendant to drilling this material.

Other uses for the map are in river-basin hydrologic studies and in analyzing surface-water and ground-water relationships at selected locations.

Environment.—The bedrock information is particularly valuable to State, regional, and local planners concerned with environmental problems such as the location of landfill sites. The thickness of overburden, which can be determined with the aid of this map, is an important factor to consider for the protection of ground-water supplies from potential sources of contamination such as landfills.

Geology.—The bedrock map shows the location of bedrock highs—information of value to quarry operators and to construction engineers concerned with foundation problems. The map also aids in the interpretation of drainage changes caused by glacial movements and in mapping the aerial distribution of unconsolidated rocks.

ACKNOWLEDGMENTS

Particular recognition is given to the present and past members of the Iowa Geological Survey who, over a period of many years, have collected and analyzed drillhole samples, determined land-surface altitudes, and compiled other information necessary to the preparation of this map. Further acknowledgment is made to the many well-drilling contractors who have voluntarily collected drill cuttings and have provided other well data.

SELECTED REFERENCES

Arey, M. F., 1909, Geology of Butler County: Iowa Geol. Survey Ann. Rept., v. 20, p. 1–59.
Calvin, Samuel, 1896, Geology of Cerro Gordo County: Iowa Geol. Survey Ann. Rept., v. 7, p. 117–195.
———— 1902, Geology of Mitchell County: Iowa Geol. Survey Ann. Rept., v. 13, p. 293–338.
Hansen, R. E., 1975, Bedrock topography of northeast Iowa: U.S. Geol. Survey Misc. Geol. Inv. Map I–933.
Hershey, H. G., 1969, Geologic map of Iowa: Iowa Geol. Survey.
Kay, G. F., and Appel, E. T., 1929, The pre-Illinoian Pleistocene geology of Iowa: Iowa Geol. Survey Ann. Rept., v. 34, 304 p.
Macbride, T. H., 1898, Geology of Humboldt County: Iowa Geol. Survey Ann. Rept., v. 9, p. 109–154.
———— 1902, Geology of Kossuth, Hancock, and Winnebago Counties: Iowa Geol. Survey Ann. Rept., v. 13, p. 81–122.
———— 1909, Geology of Hamilton and Wright Counties: Iowa Geol. Survey Ann Rept., v. 20, p. 97–149.
Norton, W. H., and others, 1912, Underground water resources of Iowa: U.S. Geol. Survey Water-Supply Paper 293, p. 619–669.
———— 1912, Underground water resources of Iowa: Iowa Geol. Survey Ann. Rept., v. 21, p. 749–810.
Twenter, F. R., and Coble, R. W., 1965, The water story in central Iowa: Iowa Geol. Survey Water Atlas no. 1, 89 p.
Williams, I. A., 1899, Geology of Worth County: Iowa Geol. Survey Ann. Rept., v. 10, p. 315–377.
———— 1905, Geology of Franklin County: Iowa Geol. Survey Ann. Rept., v. 16, p. 453–507.

BEDROCK TOPOGRAPHY OF NORTH-CENTRAL IOWA

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