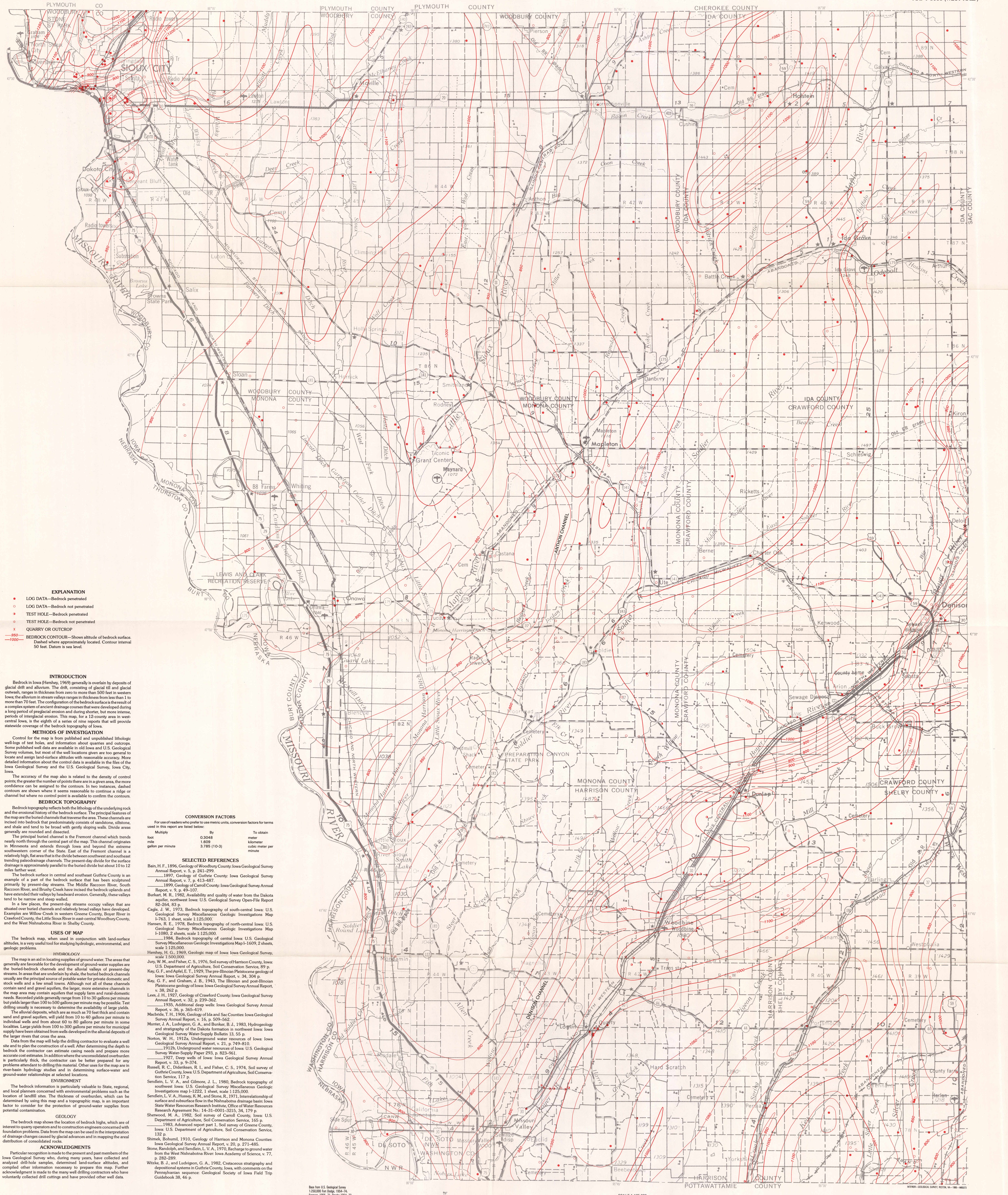
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
IOWA GEOLOGICAL SURVEY

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I–1688 (WEST HALF)



EXPLANATION

- ● LOG DATA—Bedrock penetrated
- ○ LOG DATA—Bedrock not penetrated
- ◑ TEST HOLE—Bedrock penetrated
- ⦶ TEST HOLE—Bedrock not penetrated
- X QUARRY OR OUTCROP
- —950— —1000— BEDROCK CONTOUR—Shows altitude of bedrock surface. Dashed where approximately located. Contour interval 50 feet. Datum is sea level.

INTRODUCTION

Bedrock in Iowa (Hershey, 1969) generally is overlain by deposits of glacial drift and alluvium. The drift, consisting of glacial till and glacial outwash, ranges in thickness from zero to more than 500 feet in western Iowa; the alluvium in stream valleys ranges in thickness from less than 1 to more than 70 feet. The configuration of the bedrock surface is the result of a complex system of ancient drainage courses that were developed during a long period of preglacial erosion and during shorter, but more intense, periods of interglacial erosion. This map, for a 12-county area in west-central Iowa, is the eighth of a series of nine reports that will provide statewide coverage of the bedrock topography of Iowa.

METHODS OF INVESTIGATION

Control for the map is from published and unpublished lithologic well-logs of test holes, and information about quarries and outcrops. Some published well data are available in old Iowa and U.S. Geological Survey volumes, but most of the well locations given are too general to locate and assign land-surface altitudes with reasonable accuracy. 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 also is related to the density of control points; the greater the number of points there are in a given area, the more confidence can be assigned to the contours. In two instances, dashed contours are shown where it seems reasonable to continue a ridge or channel but where no control point is available to confirm the contours.

BEDROCK TOPOGRAPHY

Bedrock topography reflects both the lithology of the underlying rock and the erosional history of the bedrock surface. The principal features of the map are the buried channels that traverse the area. These channels are incised into bedrock that predominately consists of sandstone, siltstone, and shale and tend to be broad with gently sloping walls. Divide areas generally are rounded and dissected.

The principal buried channel is the Fremont channel which trends nearly north through the central part of the map. This channel originates in Minnesota and extends through Iowa and beyond the extreme southwestern corner of the State. East of the Fremont channel is a relatively high, flat area that is the divide between southwest and southeast trending paleodrainage channels. The present-day divide for the surface drainage is approximately parallel to the buried divide but about 10 to 12 miles farther west.

The bedrock surface in central and southeast Guthrie County is an example of a part of the bedrock surface that has been sculptured primarily by present-day streams. The Middle Raccoon River, South Raccoon River, and Brushy Creek have incised the bedrock uplands and have extended their valleys by headward erosion. Generally, these valleys tend to be narrow and steep walled.

In a few places, the present-day streams occupy valleys that are situated over buried channels and relatively broad valleys have developed. Examples are Willow Creek in western Greene County, Boyer River in Crawford County, the Little Sioux River in east-central Woodbury County, and the West Nishnabotna River in Shelby County.

USES OF MAP

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

HYDROLOGY

The map is an aid in locating supplies of ground water. The areas that generally are favorable for the development of ground-water supplies are the buried-bedrock channels and the alluvial valleys of present-day streams. In areas that are underlain by shale, the buried bedrock channels usually are the principal source of potable water for private domestic and stock wells and a few small towns. Although not all of these channels contain sand and gravel aquifers, the larger, more extensive channels in the map area may contain aquifers that supply farm and rural-domestic needs. Recorded yields generally range from 10 to 30 gallons per minute but yields larger than 100 to 500 gallons per minute may be possible. Test drilling usually is necessary to determine the availability of large yields.

The alluvial deposits, which are as much as 70 feet thick and contain sand and gravel aquifers, will yield from 10 to 40 gallons per minute to individual wells and from about 60 to 80 gallons per minute in some localities. Large yields from 100 to 300 gallons per minute for municipal supply have been obtained from wells developed in the alluvial deposits of the larger rivers that cross the area.

Data from the map will help the drilling contractor to evaluate a well site and to plan the construction of a well. After determining the depth to bedrock the contractor can estimate casing needs and prepare more accurate cost estimates. In addition where the unconsolidated overburden is particularly thick, the contractor can be better prepared for any problems attendant to drilling this material. Other uses for the map are in river-basin hydrology studies and in determining 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 by using this map and a topographic map, is an important factor to consider for the protection of ground-water supplies from potential contamination.

GEOLOGY

The bedrock map shows the location of bedrock highs, which are of interest to quarry operators and to construction engineers concerned with foundation problems. Data from the map can be used in the interpretation of drainage changes caused by glacial advances and in mapping the areal distribution of consolidated rocks.

ACKNOWLEDGMENTS

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

CONVERSION FACTORS

For use of readers who prefer to use metric units, conversion factors for terms used in this report are listed below:

Multiply	By	To obtain
foot	0.3048	meter
mile	1.609	kilometer
gallon per minute	3.785 (10-3)	cubic meter per minute

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Base from U.S. Geological Survey 1:250,000 Fort Dodge, 1954–74; Fremont, 1956–71; Omaha 1954–72, and Sioux City, 1958–69

5½°
TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1986

SCALE 1:125 000
2 1 0 2 4 6 8 10 MILES
2 1 0 2 4 6 8 10 KILOMETERS

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BEDROCK TOPOGRAPHY OF WEST-CENTRAL IOWA

By

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