

BEDROCK GEOLOGY

By
John H. Mossler
1995

MAP SYMBOLS

- Contact—Approximately located; generally concealed
- Inferred fault—Ball on downthrown side
- Inferred anticline—Crest and direction of plunge shown
- Inferred syncline—Axis of trough and direction of plunge shown
- Approximate area where Cretaceous rocks overlie Paleozoic bedrock

INTRODUCTION

Fillmore County, unlike most of Minnesota, has abundant and widespread exposures of bedrock at the land surface. The map on this plate shows the Paleozoic bedrock formations that are exposed or lie immediately beneath unconsolidated Cretaceous and Quaternary deposits. The generalized distribution of Cretaceous rocks is also shown.

The information used to create this map was chiefly compiled from examination of exposures of bedrock and was supplemented with subsurface geologic data taken from water-well drillers logs, geologists' descriptions of water-well cuttings, wireline geophysical logs, engineering drawings, and geotechnical logs. In areas with thick glacial deposits or alluvium, depth to bedrock was determined using refraction seismic technology; rock type was inferred from seismic velocity readings. Seismic soundings were done by the Division of Waters of the Minnesota Department of Natural Resources.

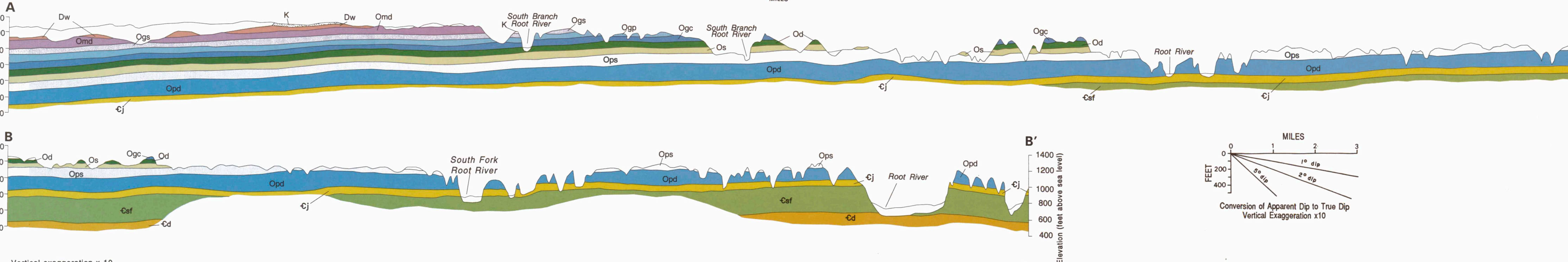
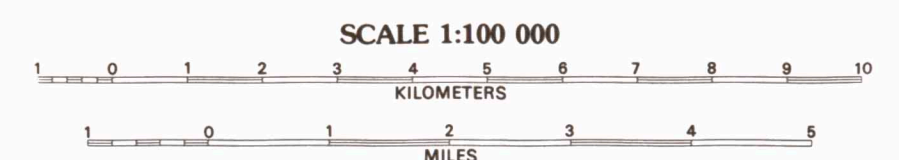
In addition, many unpublished sources were consulted, including geologic field notes by R.E. Sloan (1954-1960), D.W. Kohls (1959-1960), M.P. Weiss (1953), T.N. Bayer (1965), R.L. Bleifuss (1966), and G.S. Austin (1971). Other sources were unpublished outcrop descriptions by C.O. Leverson and A.J. Gerk (1971-1974), and geologic and topographic maps of the Spring Valley area by Hanna Coal and Ore Corporation (1956). Some of these unpublished sources describe outcrops that are no longer available for examination because they have been built over or are overgrown.

The cross sections accompanying the bedrock map add the dimension of depth and illustrate stratigraphic and structural relationships among bedrock formations. The geological formations are thin in relation to their areal extent and would only be a tenth as shown on the cross sections if no vertical exaggeration were used. At this scale the mantle of unconsolidated deposits that overlies the bedrock outside the river valleys can be shown only where it is relatively thick. The exaggeration that is used to show the thin rock formations also exaggerates their dip or slope—both the regional slope, which is less than 20 feet per mile, and localized, small-scale deviations. The more deeply buried Mt. Simon Sandstone and Precambrian crystalline rocks are not shown on the cross sections because information on their depth and thickness is scarce.

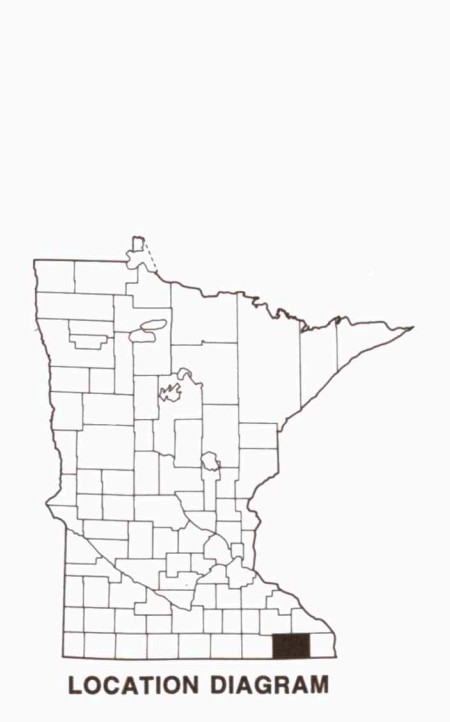
STRATIGRAPHIC COLUMN

SYSTEM OR SERIES	GROUP, FORMATION, MEMBER	MAP SYMBOL	LITHOLOGY	THICKNESS (feet)	GENERALIZED DESCRIPTION
UPPER DEVONIAN	OSTRANDER MEMBER	Omd	Sand and gravel, unconsolidated, quartzose. Minor silt and clay. Siltified fossils of Ordovician and Devonian age. Finely divided goethite imparts distinctive yellow to orange color to gravel. Clay generally gray or white. Pointed surfaces on coarse sand grains and pebbles. Iron Mill Member: Goethite ore with minor hematite. Broken, rubby to nodular appearance; may have horizontal bedding. Forms tabular bodies in Spillville Formation and fills joints in Stewartville Formation.	20-30	
	LITTLE CEDAR FORMATION	Ocd	Dolomite, finely crystalline, dense, minor vugs. Silty. Sparingly fossiliferous. Thin, platy beds where weathered; medium bedded to massive where unweathered. Moistly in subsurface.	20-25	
MIDDLE DEVONIAN	PILOTTOWN MEMBER	Opc		17-28	
	SPILLVILLE FORMATION	Osp		65-80	
UPPER ORDOVICIAN	MAQUOKETA FM.	Omd		70	
	DUBUQUE FM.	Ogd		20-34	
	STEWARTVILLE FORMATION	Ogs		75-85	
	PROSSER LIMESTONE	Ogp		40-51	
	CUMMINGSVILLE FM.	Ogc		57-83	
UPPER ORDOVICIAN	DECORAH SH.	Ods		22-46	
	PLATTEVILLE FM.	Opl		21-25	
	GLENWOOD FM.	Ogl		3-5	
LOWER ORDOVICIAN	ST. PETER SANDSTONE	Oss		80	
	WILLOW RIVER MBR.	Ows		120	
LOWER ORDOVICIAN	PRAMIE DU CHIEN GROUP				
	ONEOTA DOLOMITE	Ood		160	
UPPER CAMBRIAN	JORDAN SANDSTONE	Ocj		60-80	
	LODI MEMBER	Olo		130	
	BLACK EARTH MEMBER	Obe		155	
	RENO MBR.	Ore		120	
	IRONTON & GALESVILLE SANDSTONES	Oed		108-120	
UPPER CAMBRIAN	EAU CLAIRE FORMATION	Oec		108-120	
	MT. SIMON SANDSTONE	Oms		320-355	
PRECAMBRIAN					

Digital base modified from 1990 Census TIGER/Line Files of U.S. Bureau of the Census (source scale, 1:100,000); digital base annotation by Minnesota Geological Survey
Universal Transverse Mercator Projection, grid zone 15
1927 North American Datum



Vertical exaggeration x 10
Scattered, thick intervals of unconsolidated Quaternary deposits shown uncolored on cross sections; not shown on map



- LIMESTONE
- DOLOMITE
- SANDY SANDSTONE
- FINE TO VERY FINE MEDIUM TO COARSE SILTSTONE
- SHALE
- GABBRO
- Iron stain
- Goethite-hematite ore
- Phosphate pellets
- Algal mats
- Digital algal stromatolites
- Algal domes; stromatolites
- Fossiliferous; fossils (symbol not used in limestone and dolomite units)
- Worm bored
- Pebbles (gravel in unconsolidated units)
- Flat-pebble conglomerate
- Cross-bedded (testoon)
- Cross-bedded (planar to tangential)
- Ripple cross-laminations
- Dolomitic
- Calcareous
- Contact marks a major erosional surface
- Vugs (commonly filled with coarse calcite)
- Breccia; brecciated
- Stylolites
- K-bentonite bed (altered volcanic ash bed)
- Oolites
- Glauconite

Every reasonable effort has been made to ensure the accuracy of the factual data on which this map interpretation is based; however, the Minnesota Geological Survey does not warrant or guarantee that there are no errors. Users may wish to verify critical information; sources include both the references listed here and information on file at the offices of the Minnesota Geological Survey in St. Paul. In addition, effort has been made to ensure that the interpretation conforms to sound geologic and cartographic principles. No claim is made that the interpretation shown is rigorously correct, however, and it should not be used to guide engineering-scale decisions without site-specific verification.

Partial funding for this project approved by the Minnesota Legislature (M.L. 91, Ch. 254, Art. 1, Sec. 14, Subd. 4[F], and M.L. 93, Ch. 172, Sec. 14, Subd. 11[g]) as recommended by the Legislative Commission on Minnesota Resources from the Minnesota Environment and Natural Resources Trust Fund

The University of Minnesota is an equal opportunity educator and employer