UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Prepared as a part of the Department of Interior's program for development of the Missouri River Basin

MISSOURI RIVER BASIN
GEOLOGIC MAPPING AND MINERAL RESOURCE INVESTIGATIONS
MISSOURI-SOURIS, NORTH DAKOTA

PRELIMINARY
GEOLOGIC MAP OF THE GRANO QUADRANGLE NORTH DAKOTA

Base compiled from U.S. Geological Survey Planimetric (7-1/2) quadrangle, 1946

Geology mapped in 1947 by Richard W. Lemke, Fred S. Jensen, and J. Hiram Smith

Mean declination 1946

Scale: 1/48,000

1 1/2 0 1 2 3 MILES

U. S. Geological Survey
OPEN FILE REPORT
This map is preliminary and has not been edited or reviewed for conformity with Geological Survey standards or nomenclature.

EXPLANATION

QUATERNARY

Recent

Qal

Alluvium

Postglacial sand, silt, and clay constituting the floor of the Souris River valley; also includes larger alluvial and colluvial fans.

Pleistocene

Wisconsin stage

Late Wisconsin

Ql

Landslides

Areas of low subparallel ridges along walls of the Souris River valley commonly with undrained depressions on the upslope sides. Material constituting the landslides is predominantly till but also includes numerous beds of silt, sand, or fine-grained gravel intercalated in the till and tilted at angles up to vertical.

Qt

Outwash terrace deposits

Remnants of glacial outwash fill left as terraces along walls of the Souris River valley. Commonly 15 to 25 feet thick and consisting of moderately to poorly sorted sand, gravel, and boulders. Deposits in sec. 30, T. 160 N., R. 85 W., and in sec. 3, T. 159 N., R. 85 W., are exceptionally coarse-grained consisting chiefly of well-rounded gravel and cobbles 6 to 10 inches in diameter.

Qco \ Qc

Outwash channel deposits

Deposits in channels cut by glacial meltwater. (Qco) is moderately well sorted gravel, sand, and silt generally less than 5 feet thick but in a few places more than 10 feet thick. (Qc) is chiefly silt and clay ranging in thickness from a few feet to less than a foot; in places includes small deposits of slope wash and thin deposits of Recent alluvium deposited by small intermittent streams incised in the floors of the channels. (Qco) and (Qc) intergrade.

Qgf

Glaciofluvial deposits, undifferentiated as to origin

Glacial outwash consisting predominantly of sand and silt and minor amounts of gravel, generally poorly sorted and intermixed with till. Deposits constitute low mounds and ridges mostly on the upland surface near the walls of the Souris River valley. Some fine-grained deposits considerably modified by wind action.

Qk

Kames

Irregular-shaped mounds and ridges, generally less than 15 feet high, composed of moderately to poorly sorted gravel, sand, and silt; minor amounts of till.

Qgm

Ground moraine

Chiefly compact, highly impervious, stony, clay-rich till, commonly 100 to 250 feet thick; locally mantled by sand, silt or clay deposited by glacial meltwater. Also includes small deposits of alluvium and colluvium deposited in numerous kettles and other undrained depressions.

Contact, sharply defined

Contact, approximate

Contact, indefinite

Trend of former glacial outwash channel where outwash has been removed and channel outline modified by postglacial erosion.

Scarp (separates two terrace levels)

Lake

Poorly drained area, intermittently marshy

Intermittent stream

Sand and gravel pit

Section line

County line

Road, secondary (circle denotes numbered state highway)

BM ×1731'

Bench mark with altitude, location approximate

Farm building

Church

School

1626'
⊙ 248'

Approximate location of test hole drilled by the U. S. Geological Survey. Top figure gives surface altitude (aneroid determination). Bottom figure is interpreted maximum depth to bedrock. In some holes depth to bedrock may be considerably less than indicated.

Notes: Culture interpreted from aerial photos and planimetric sheets.