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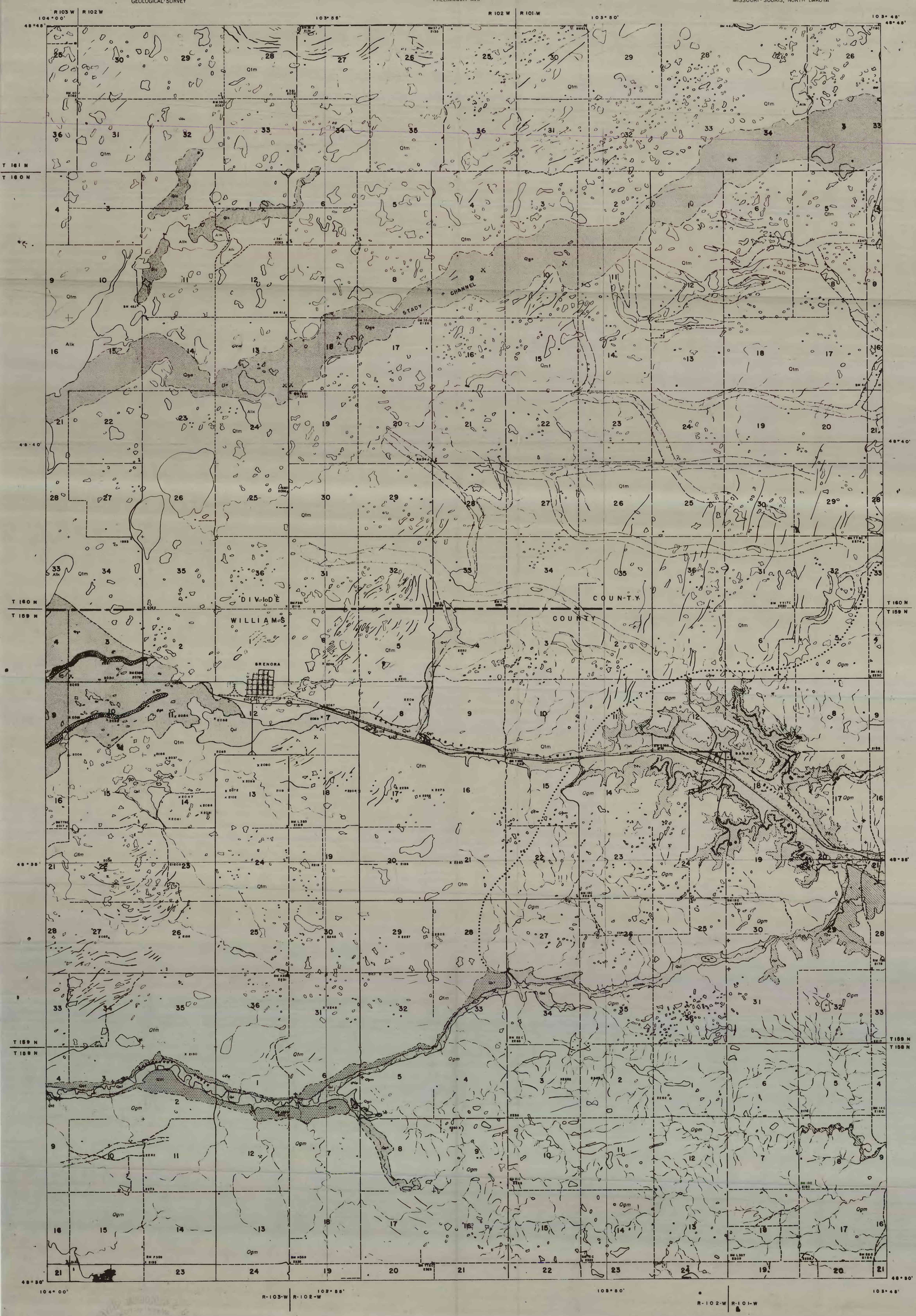
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PRELIMINARY MAP

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



LEGEND

RECENT — QUATERNARY

Qal — ALLUVIUM

Clays, silt, sand and gravel. Possibly includes some glacial outwash.

Qgo — GLACIAL OUTWASH

Find sand that grades into a gravel averaging 1¼" in diameter. Consists mainly of granite, limestone, and gneiss, with varying amounts of basic igneous and metamorphic rocks, dolomite, lignite slack, chert and chalcedony. Caliche common near surface. Bedded and well-sorted.

Qe — ESKER

Fine sand to coarse gravel. Poorly bedded and sorted. Often covered by a concentration of boulders and in many places veneered with till.

Qkt — KAME TERRACE

Poorly to well-stratified sand and gravel. Often shows some sign of slumping.

PLEISTOCENE — QUATERNARY

Qic — ICE CONTACT DEPOSIT

Fluvio-glacial sand and gravel. Symmetrical, isolated knobs to highly irregular tracts. Often fairly well-bedded and sorted with bedding dipping away from crest and parallel to surface profile.

Qtm — ALTAMONT (?) TERMINAL MORAINE

Late Wisconsin (Mankato ?) Mostly calcareous, blue-gray till, gray-brown where oxidized. Contains numerous scattered lenses of sand and gravel. Finer fraction derived mostly from underlying Fort Union sediments. Coarser materials include granite, pegmatite, limestone, gneiss, schist, quartzite and dolomite. Stones range from small pebbles to large boulders.

Qgm — GROUND MORAINE

Pre-Altamont (?) (Wisconsin). Lithologically similar to Altamont (?).

Qtm / Qgm — ALTAMONT (?) TERMINAL BOUNDARY

Indicates the southern terminal limits of the last ice (Altamont ?) in the area.

AXES OF MORAINAL RIDGES AND ELONGATED TILL HILLS.

ICE MARGINAL CHANNELS

PALEOCENE — TERTIARY

Tfu — FORT UNION FORMATION (TONGUE RIVER MEMBER)

Gray, tannish-gray, and blue-gray shale and shaly clay interbedded with light colored sands and calcareous sandstone. Solid line indicates lignite outcrop, dashed line indicates buried lignite bed, and carets indicate clinker or baked and fused shale and sand where coal has burned.

GRAVEL PIT

LIGNITE MINE (WITH "A" — ABANDONED)

ROADS

Graveled, all weather

Partially graveled

Drained and graded

Primitive

Closed solid lines indicate kettles and irregular closed depressions, marshes and ephemeral lakes. Alkali lakes marked "Alk".

FORT UNION OUTCROP.

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text in (200) R290 no. 14

Base compiled from township plats and aerial photographs by use of sketchmaster in the north half. Ground survey and Multiplex compilations by Topographic Branch in south half.

GEOLOGY OF
ZAHL 3 QUADRANGLE, NORTH DAKOTA

SCALE 1 0 1 2 3 4 5 feet 5000 miles

Geology by Garland B. Gott, Robert M. Lindvall, and Wallace R. Hansen. 1948.

North Dakota (Zahl no. 3 quad). Geol. 1:48,000. 1946.
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