North Dakota Geological Survey
John P. Bluemle, State Geologist

Geology of the Fryburg NW, North Dakota Quadrangle

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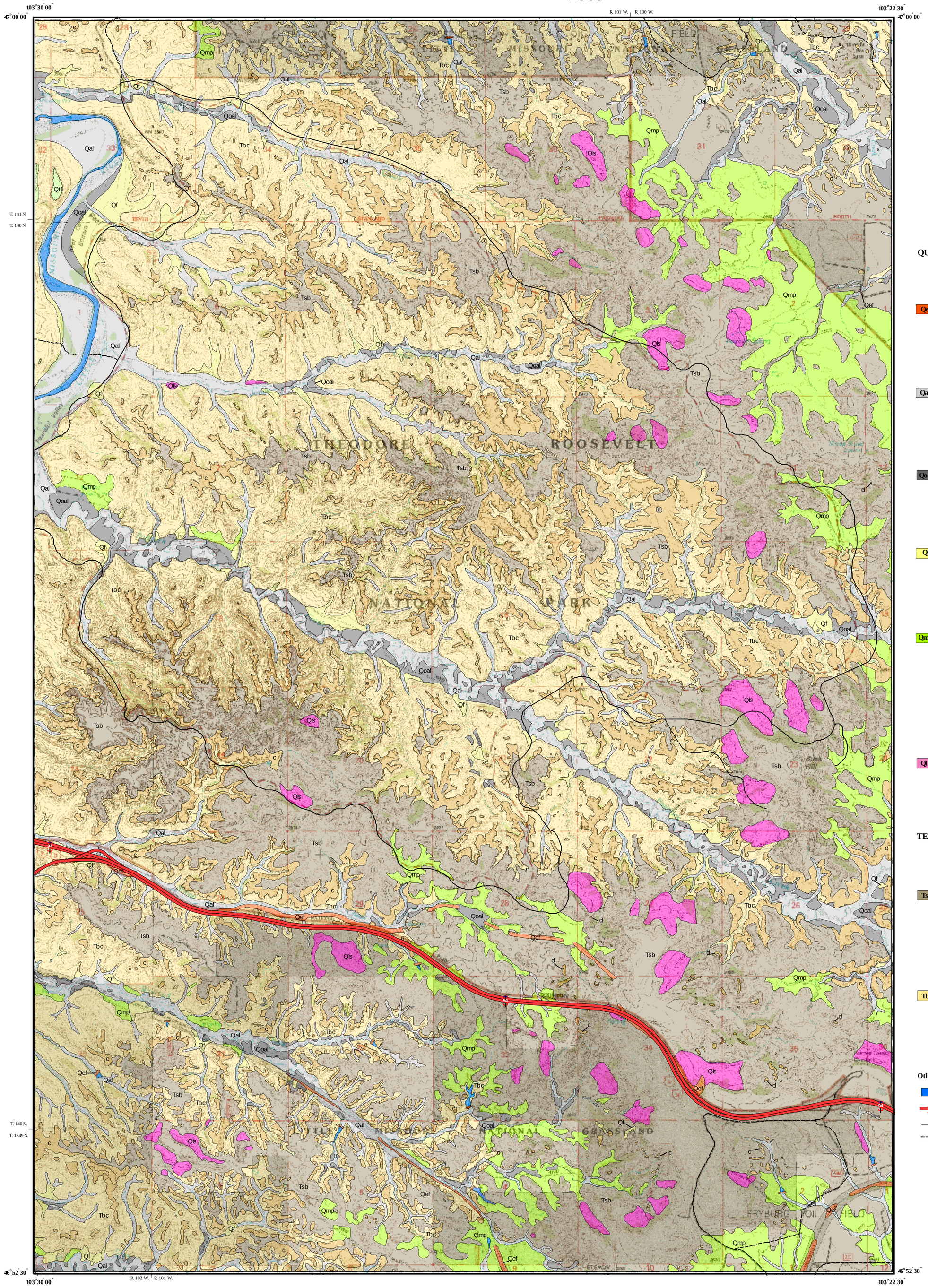

UNIT DESCRIPTIONS

QUATERNARY SYSTEM

RECENT

Qef **Artificial Deposits/Engineered Fill**

Fill used in the construction of roadways and railroads, and spoil resulting from construction of railroads and straightening of channelization of streams.

OAHE FORMATION

Qal **Modern Alluvium Deposits**

Sand, silt, clay, and gravel deposited in modern stream channels, flood plains, and beneath low stream terraces. Sediments comprise cross-stratified and coarse planar-stratified channel deposits of sand and gravel, grading upward to ripple cross-stratified and finely planar-stratified overbank deposits of sand, silt, and clay. Sediments are moderately to moderately-well sorted. Locally includes small alluvial-fan and valley-margin colluvial deposits.

Qoal **Older Alluvial Deposits**

Sand, silt, clay, and gravel deposited beneath Holocene-age terraces. Sediments typically display an upward-fining sequence: crudely cross-stratified gravel and sand predominate in the lower section and finely planar-stratified and ripple cross-stratified sand, silt, and clay in the upper section. Buried soil profiles are common. Locally includes small alluvial-fan and valley-margin colluvial deposits.

Qf **Fan Deposits**

Active and incised alluvial deposits of sand, silt , clay, and gravel deposited at the mouths of canyons and at confluences where low-order streams empty into higher-order streams. Sediments are poorly stratified and poorly to moderately sorted. Deposits contain thin layers of transported soil and weak profiles of soils formed in situ. Gravel may be clast-or matrix-supported. Some beds have massive or reverse bedding. Locally includes colluvium deposited by slopewash at the base of steep hillsides.

Qmp **Mantled Pediment Deposits**

Complex assemblage of active and incised alluvial deposits of sand, silt, and clay deposited over pediments. Sediments represent alluvium (weakly stratified, poorly sorted) washed from superjacent hillslopes and a combination of reworked (weakly stratified, well-sorted) and in situ (massive, well-sorted) eolian material. Deposits contain thin layers of transported soil and weak profiles of soil formed in situ. Some surface soils are well developed. Deposits are typically less than 3 feet (1 meter) thick and locally 6 feet (2 meters) thick or more.

RECENT/PLEISTOCENE

Qls **Landslide Deposits**

Variable mixture of strata and deposits that have slid or slumped to the base of steep slopes principally by gravity. Ground surface of may landslide deposits is characterized by hummocky topography, numerous arcuate scarps, and chaotic bedding. Locally includes hillslopes affected by creep and hillslope material transported by debris flows.

TERTIARY SYSTEM

PALEOCENE

Tsb **SENTINEL BUTTE FORMATION**

Alternating beds of gray to grayish brown, variably lithified sandstone, siltstone, mudstone, claystone, clinker, and lignite. Calcite-cemented sandstone concretions, siderite nodules, and petrified wood are common. Sediments deposited in river, lake, and swamp environments. Typically forms sparsely vegetated, steep, rilled slopes and badlands topography. About 750 feet (230 meters) thick, though only the lower 300 feet (80 meters) are exposed in the map area. The HT Butte clinker, found immediately above the contact with Tbc, is designated by "c". Other unnamed but mapped beds of clinker are designated by "cl".

Tbc **BULLION CREEK FORMATION**

Alternating beds of yellow to yellowish-brown, variably lithified sandstone, siltsone, mudstone, claystone, clinker, and lignite. Sediments deposited in river, lake, and swamp environments. Only the upper 300 feet (80 meters) are exposed in the map area. Unnamed but mapped beds of clinker are designated by "cl".

Other Features

- Water
- Interstate Highway
- Paved Road
- Unpaved Road

Geologic Symbols

- Known contact between two geologic units
- Approximate contact between two geologic units

Fryburg NW, North Dakota Quadrangle

Scale 1:24,000

0 0.5 1

Miles

Lambert Conformal Conic Projection
Standard Parallels 46°52'30" and 47°00'00"

The North Dakota Geological Survey compiled this map according to conventional cartographic standards, using what is thought to be the most reliable information available. The North Dakota Geological Survey does not guarantee freedom from errors or inaccuracies and disclaims any legal responsibility or liability for interpretations made from the map, or decisions based thereon. This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program.

Cartographic Compilation: E. L. Kadrmas