

# Surface Geology

## Amidon Quadrangle, North Dakota

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2008

### EXPLANATION

#### QUATERNARY SYSTEM

##### HOLOCENE

- Mc** Abandoned Coal Mine
- Ef** Engineered Fill

##### HOLOCENE/PLEISTOCENE

- Qal** Alluvium  
Brownish gray to black sand, silt, clay, and lenses of gravel; floodplain deposits along recent drainages. Typically less than 50 feet thick.
- Qw** Windblown Features  
Most of the deposits mapped as Qw in this quadrangle are small semi-circular depressions or blowouts that were created when the wind scoured into poorly cemented Paleocene sandstones that were exposed at the surface. These blowout features are softened where they have been repeatedly farmed, but are still quite evident on aerial photographs. The northeast corner of section 33 contains northwest-southeast trending longitudinal blowouts followed downwind (to the southeast) by a dune field.
- Qls** Landslide Deposits  
Variable mixture of strata and deposits that have slid to the base of steep slopes.
- Qc** Colluvium  
Poorly sorted mixture of sand, silt, clay, and gravel forming aprons at the base of steep slopes.
- Qp** Pediment Gravel  
An apron of gravel that slopes away in all directions from the Chalky Buttes. The gravels were derived from the White River and Arikaree strata that comprise the Chalky Buttes and are dominated by tuffaceous siltstones and sandstones, marlstones, and reworked gravels from the Chadron Formation (primarily volcanic porphyries and quartz). These pediments range from a few feet to tens of feet in thickness and are the major source of gravel in the area.
- Qp1** Pediment Gravel  
Qp1 are gravels that lie on an older pediment surface that is generally preserved on isolated buttes and ridges that are elevated above the younger, more continuous Qp surface. These pediments range from a few feet to tens of feet in thickness and are a source of gravel in the area.

#### TERTIARY SYSTEM

##### MIOCENE

- Ta** ARIKAREE FORMATION  
The Arikaree Formation is up to 125 feet thick in this area and consists of interbedded gray to green colored marlstone as well as tuffaceous siltstone, sandstone, and conglomerate. The sandstone ranges from poorly to very-well cemented. The marlstone caps the Chalky Buttes, is vuggy in places, contains conglomeratic lenses, pebbles, and chert nodules. The dip of the marlstone blocks indicates that this unit was at one time stratigraphically higher and is out of place. The Arikaree Formation unconformably overlies the White River Group.

##### OLIGOCENE

##### WHITE RIVER GROUP

- Tb** BRULE FORMATION  
The Brule Formation is roughly 25 feet thick in the area and consists of interbedded white to pink colored siltstone and mudstone. The rocks are generally tuffaceous, highly fractured, and weather to rounded or bulbous surfaces. The Brule Formation was removed by erosion prior to deposition of the Arikaree Formation along the north edge of the Chalky Buttes.
- Tc** CHADRON FORMATION  
The Chadron Formation is the basal stratigraphic unit in the White River Group and consists of two members, the Chalky Buttes Member and the overlying South Heart Member. The Chalky Buttes Member is up to 80 feet thick and consists of grayish green to white conglomeratic, cross-bedded, poorly-cemented sandstone. Pebbles include volcanic porphyries, quartz and some petrified wood. The South Heart Member is up to 100 feet and consists of brown, pink, and green colored claystone. The claystone is bentonitic with a popcorn weathering surface and contains silicified zones.

##### PALEOCENE

- Tsb** SENTINEL BUTTE FORMATION  
The Sentinel Butte Formation is roughly 250 feet thick in this area and is unconformably overlain by the White River Group. The Sentinel Butte consists of interbedded brownish gray sandstone, siltstone, mudstone, and lignite. The Sentinel Butte rocks are bleached white to purple where they underlie the White River unconformity.
- Tbc** BULLION CREEK FORMATION  
The Bullion Creek Formation consists of interbedded, yellow to light gray sandstone, siltstone, mudstone, and lignite. Because the lithologies are similar between the Bullion Creek and Sentinel Butte Formations, these units are differentiated on color. The Bullion Creek is lighter and more brightly colored than the drab-colored Sentinel Butte.

*HEALTH WARNING: The Arikaree and White River strata and the pediment gravels in this area may contain arsenic. Epidote is a fibrous zeolite that has been linked to lung cancer in other parts of the world. Until scientists can determine the risks of exposure to this mineral, precautions should be taken to avoid inhaling dust generated from these rocks.*

#### Geologic Symbols

- Known contact between two geologic units
- Approximate contact between two geologic units
- Contact between two buried geologic units (Sentinel Butte and Bullion Creek Formations)

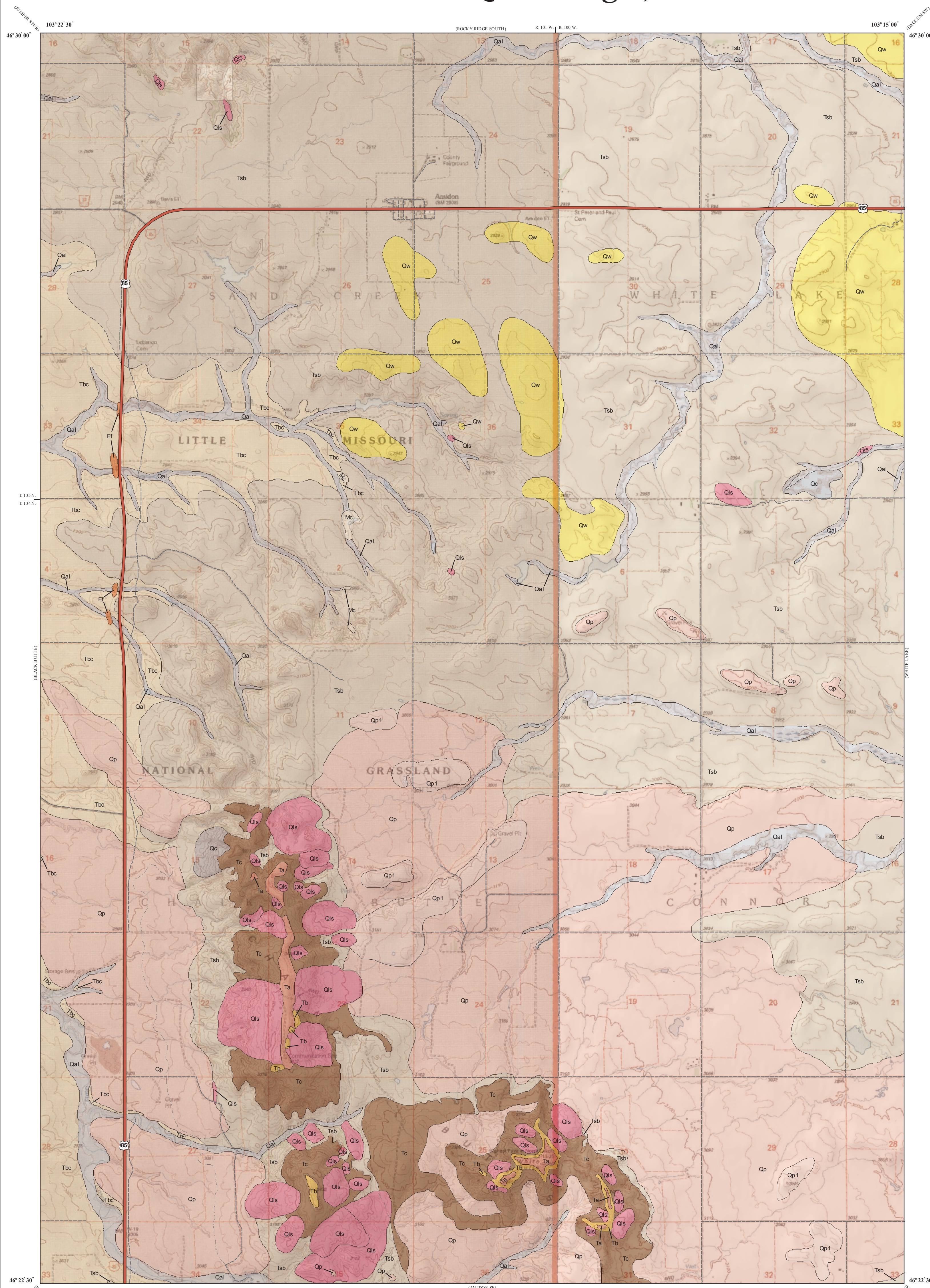
#### Other Features

- Federal Highway
- Unpaved Road

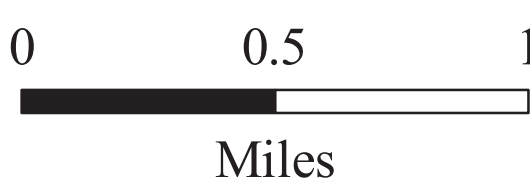
#### Correlation of Map Units

Quaternary	Holocene	Qal	Qls	Qw	Qc	Qp	Qp1
	Pleistocene						
Tertiary	Miocene	Ta					
	Oligocene	Tb					
	Eocene	Tc					
Paleocene	Tsb						

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program. Cartographic Compilation: Etroy L. Kadmas

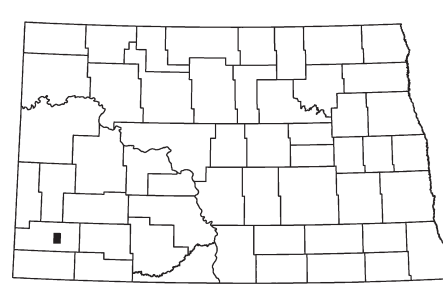
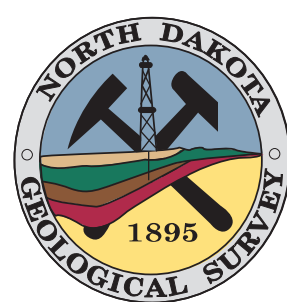
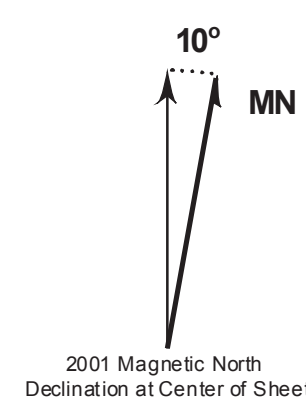


Scale 1:24,000



Miles

Lambert Conformal Conic Projection Standard Parallels 46° 22' 30" and 46° 30' 00"  
1927 North American Datum NGVD 1929  
USGS 7.5 Minute Topographic Map Contour Interval 20 Feet  
Road Layer Rectified to 2003 NAIP Digital Orthophoto



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