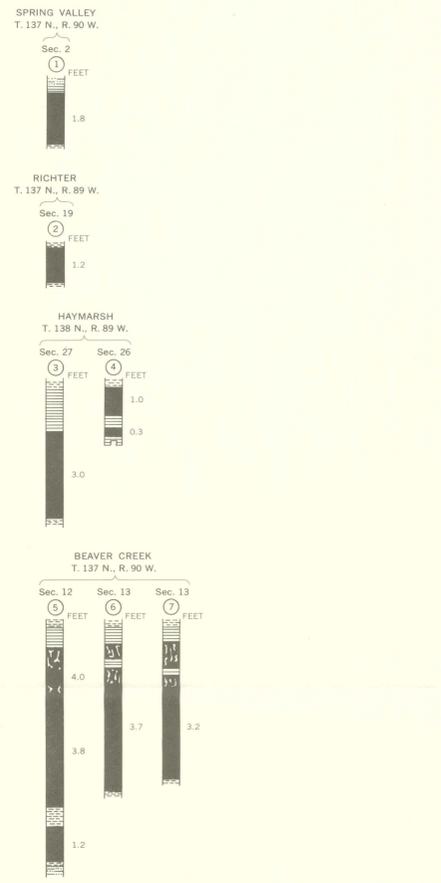
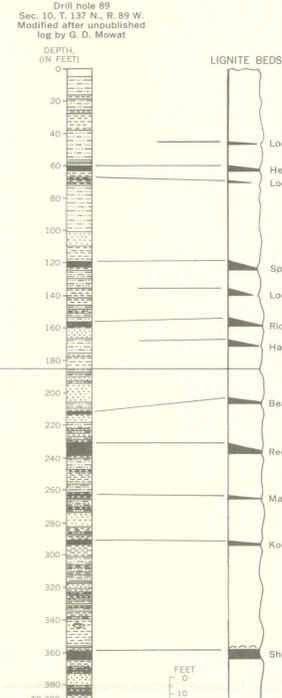


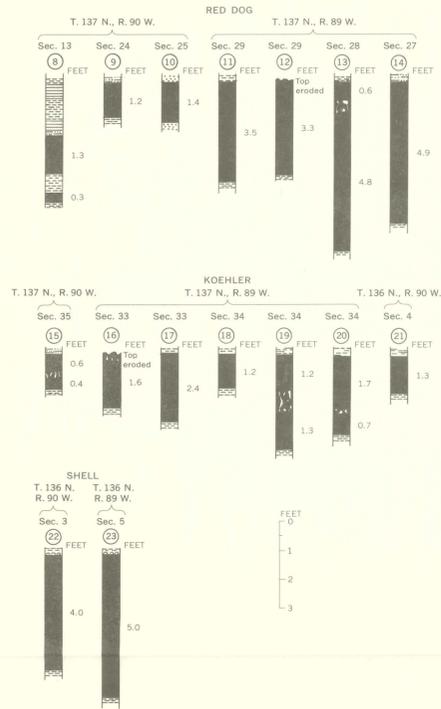
COAL SECTIONS AND LIGNITE BEDS IN THE  
HEART BUTTE NW QUADRANGLE



GENERALIZED STRATIGRAPHIC SECTION



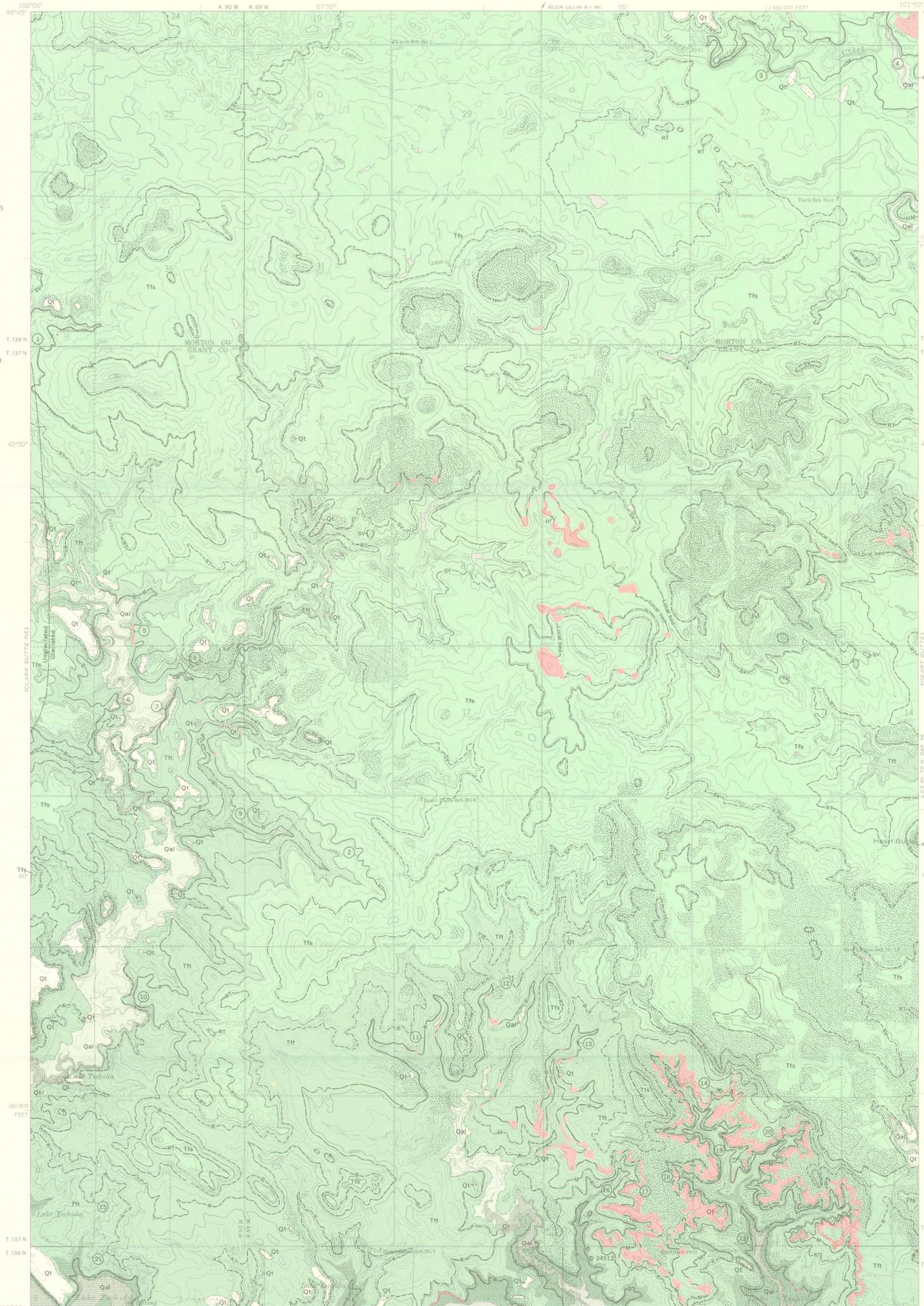
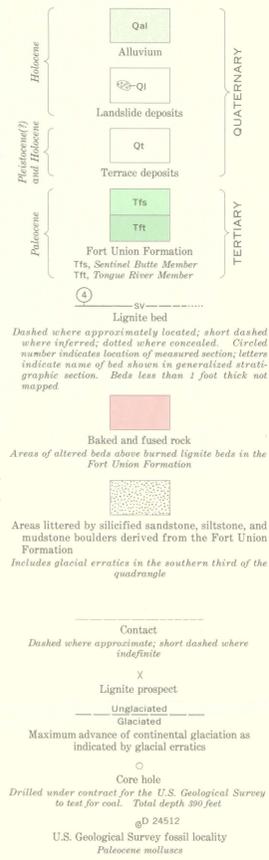
| SYSTEM   | SERIES    | FORMATION  | MEMBER         |
|----------|-----------|------------|----------------|
| TERTIARY | Paleocene | Fort Union | Sentinel Butte |
|          |           |            | Tongue River   |



EXPLANATION



EXPLANATION



**GEOLOGY**

The quadrangle was mapped as part of the U.S. Geological Survey program of classifying and evaluating mineral lands in the Public Domain. Rocks exposed in the Heart Butte NW quadrangle are included in the Tongue River and Sentinel Butte Members of the Fort Union Formation of Paleocene age. Numerous areas of bedrock have been baked and fused above burned lignite beds. Extensive areas of the surface are littered by blocks of silicified sandstone, siltstone, and mudstone derived from eroded beds of the Fort Union. Glacial erratics, mainly of gneissic granite and rare silicified conglomerate of Precambrian age, are scattered across the quadrangle east of a line through secs. 2, 11, and 14, T. 137 N., R. 90 W. Deposits of alluvium and terrace gravels are in and along the larger drainageways.

The Tongue River Member consists of about 225 feet of coarse-grained to very fine grained sandstone, siltstone, claystone, and lignite. Colors range from dark-gray claystone to nearly white sandstone, but the overall east of the member is yellowish gray. The member characteristically contains well-preserved fresh-water gastropods and pelecypods, ironstone concretions, and limonite layers.

The Sentinel Butte Member, about 185 feet thick, is similar to the underlying Tongue River Member except that the Sentinel Butte is more drab and gray and contains much petrified wood and silicified carbonaceous layers. The contact between the two members in western North Dakota is described in detail by Royse (1967). In the quadrangle the contact is arbitrarily placed at the base of dark bentonitic claystone beds that overlie light-colored siltstone inter-layered with dark-colored bentonitic claystone and siltstone.

The Heart Butte NW quadrangle is on the southeast margin of the Williston Basin. Regional dip in the basin is northwest, about 15 feet per mile; within the quadrangle, however, the rocks are nearly flat lying.

Nomenclature of the lignite beds is informal; the Spring Valley and Richter beds are named after mines to the north and east of the quadrangle. Lignite resources in the area seem to be too small to expect future exploitation, and no production figures are available for the small lignite prospect pits shown on the map. Heating values of the lignite are about 6,000 Btu as-received and 9,300 Btu air-dried.

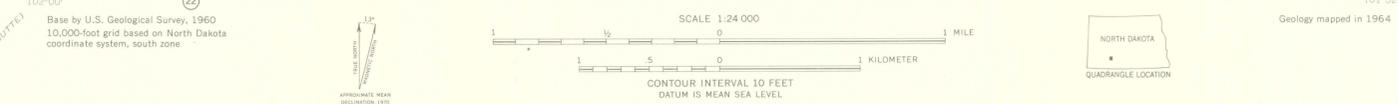
Oil and gas have been produced from rocks ranging in age from Triassic to Ordovician in the Williston Basin. At least 5,000 feet of these reservoir rocks exists beneath the quadrangle. The quadrangle lies along the trend of an anticline that appears to connect the Nesson anticline in northern North Dakota with the Pierre anticline in South Dakota (Sandberg and Mappel, 1968). The trend parallels the Cedar Creek anticline, and stratigraphic or structural traps may occur in the rocks beneath the quadrangle.

The baked and fused rocks above burned lignite beds and gravel from stream terraces are used locally for road metal. Blocks of silicified rocks and glacial erratics have been used for riprap.

**REFERENCES CITED**

Royse, C. F., Jr., 1967, The Tongue River-Sentinel Butte contact in western North Dakota: N. Dak. Geol. Survey Rept. Inv. 45, 53 p.

Sandberg, C. A., and Mappel, W. J., 1968, Devonian System of the Northern Rocky Mountains and Plains, in Oswald, D. H., ed., Internat. Symposium on the Devonian System, Calgary, Alberta, Sept. 1967: Calgary, Alberta Soc. Petroleum Geologists, v. 1, p. 845-877.



GEOLOGIC MAP OF THE HEART BUTTE NW QUADRANGLE, MORTON AND GRANT COUNTIES, NORTH DAKOTA

By  
E. Vernon Stephens  
1970