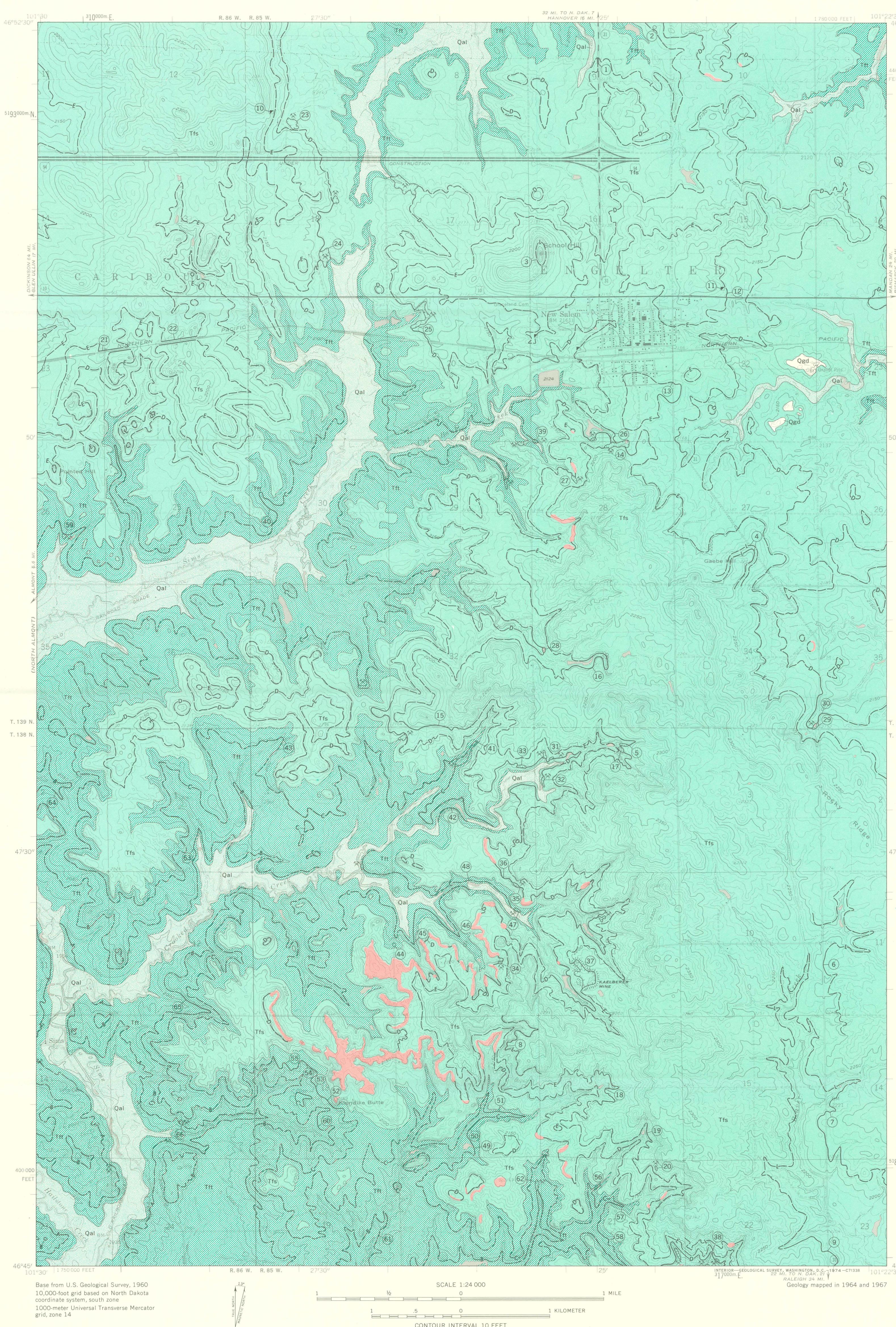
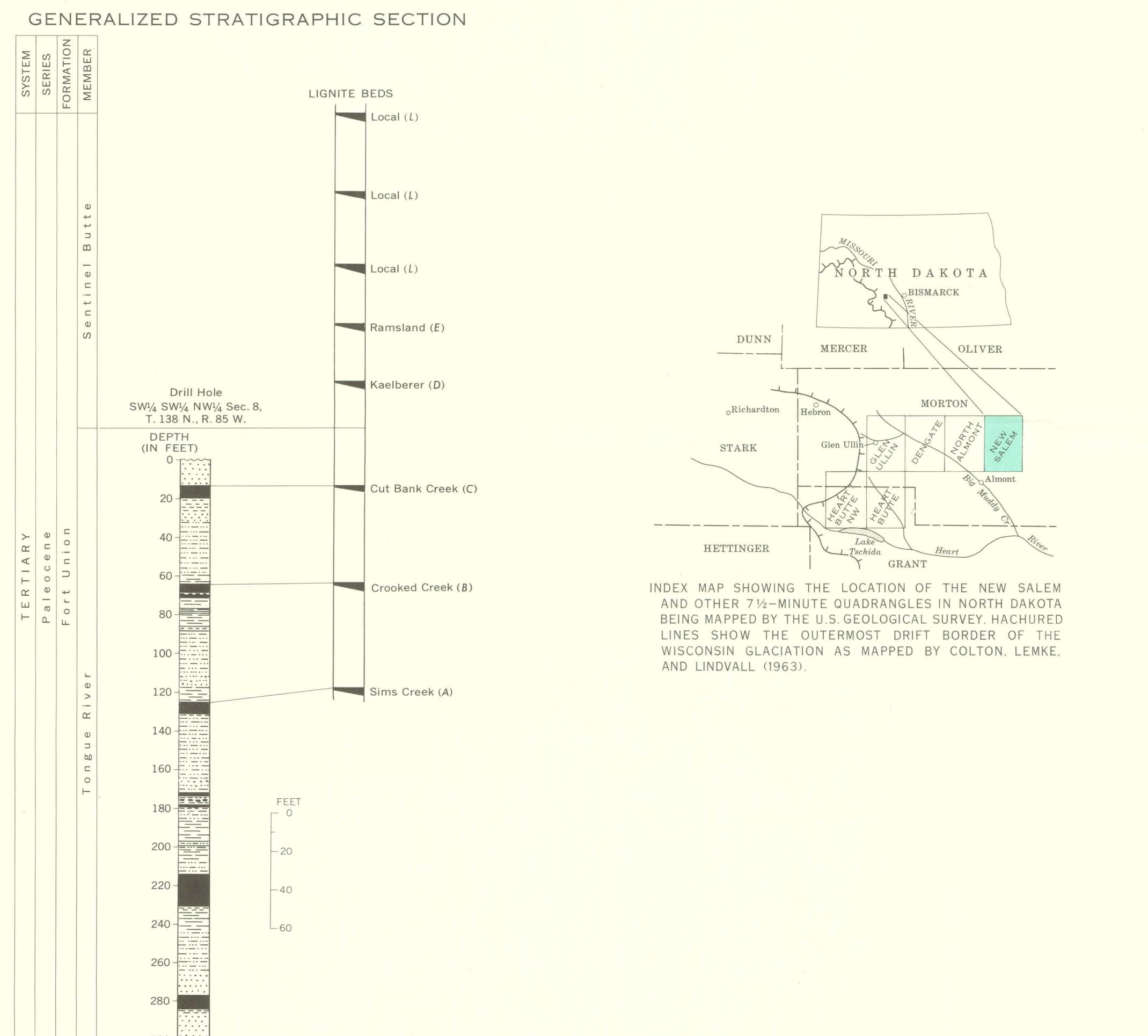


LIGNITE BEDS



GEOLOGIC MAP AND LIGNITE DEPOSITS OF THE NEW SALEM QUADRANGLE,  
MORTON COUNTY, NORTH DAKOTA

By  
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- EXPLANATION**
- QUATERNARY**
  - Qal Alluvium
  - Qgd Glacial drift
  - Tfs Tongue River Member
  - Tt<sub>s</sub> Sentinel Butte Member
  - TERtiary**
  - Baked and fused rock
  - Lignite bed
  - Dashed where approximately located. Circled number indicates location of measured section; letter indicates name of bed shown in generalized stratigraphic section.
  - Approximate contact
  - Lignite strip mine
  - Abandoned strip mine
  - Abandoned shaft mine
  - Abandoned slope mine
  - Mine dump
  - Drill hole

**GEOLOGY**

The New Salem quadrangle was mapped as part of the U.S. Geological Survey program of classifying and evaluating mineral lands in the public domain. The quadrangle covers an area of about 51 square miles in Morton County and lies about 29 miles west of Bismarck.

Rocks of the Tongue River and Sentinel Butte Members of the Fort Union Formation occur in the surface and subsurface throughout the area. Glacial drift deposits occur in the northeast part of the quadrangle. Deposits of alluvium are found in and along the principal streams. A concentration of glacial erratic composed of metamorphic and igneous rocks from the drift sheet of Pleistocene age trends in a northwest-southeast direction across the quadrangle. This trend corresponds closely with the outer edge of the advance of the (Iowan?) drift sheet as shown by Colton, Lemke, and Lindvall (1963). Baked and fused rocks formed by the in situ burning of lignite beds are common in the southern part of the quadrangle.

The Tongue River Member consists of massive light-yellow to orange coarse to very fine grained sandstone, dark to light-gray siltstone, claystone, carbonaceous shale, and lignite beds. Thin lenses of ironstone concretions are found in the upper part of the member. Freshwater bivalves and pelecypods were found in cores from the lower 110 feet of the drift hole in sec. 8, T. 138 N., R. 85 W.

The lithology of the Sentinel Butte Member is similar to that of the Tongue River; however, the rocks, except for some sandstones, are darker. Silicified wood, logs, and stumps are common in the Sentinel Butte, but were not seen in the Tongue River Member. The contact between the members is gradational. Baked and fused rocks described by Royce (1967). In the New Salem quadrangle the contact is placed at the base of a dark-gray bentonitic claystone and the underlying light-gray to tan siltstone and sandstone of the Tongue River.

The gravel deposits in the quadrangle are probably glacial drift composed of igneous and metamorphic rock as well as cobbles and pebbles of sandstone and ironstone from the Fort Union Formation. The alluvium is mostly sand and silt derived from the Fort Union.

**ECONOMIC GEOLOGY**

Lignite is the principal mineral deposit of economic importance in the quadrangle. Beds of lignite less than 1 foot to 135 feet thick are exposed along crop lines, roads, stream banks, and in the bottom of T. 138 N., R. 85 W., and sec. 8, T. 138 N., R. 85 W. Four face samples from mines in and near the quadrangle and one core sample of lignite from the drift hole in T. 138 N., R. 85 W., were analyzed on an as-received basis by the U.S. Bureau of Mines (U.S. Bureau of Mines, 1948; Smith, 1970). The results of the analysis showed an average heat value of 6,826 British thermal units, an average ash content of 6.5 percent, and an average sulfur content of 0.5 percent. One of the first large-scale mines in North Dakota was opened at Sims by the Northern Pacific Railway in 1884. Mining continued at Sims and New Salem until the 1920's. Most of the early mining was done by sinking shafts or drifting into hillsides. In 1970 only one strip mine, the Kaelberer Mine, about 4 miles south of New Salem, was operating. The bed mined is 8.4 feet thick and is overlain by siltstone and sandstone 30-50 feet thick. The lignite was sold locally for domestic fuel. The total estimated original reserves of coal from the beds in the quadrangle are more than 426 million short tons.

No oil and gas tests have been made in the quadrangle, and the potential for oil and gas in the rock in the subsurface is not known. Gravel deposits in sec. 22, T. 138 N., R. 85 W., and clinker provide a source for road material.

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For sale by the U.S. Geological Survey, price 75 cents