North Dakota Geological Survey
100K Series: Grm - c

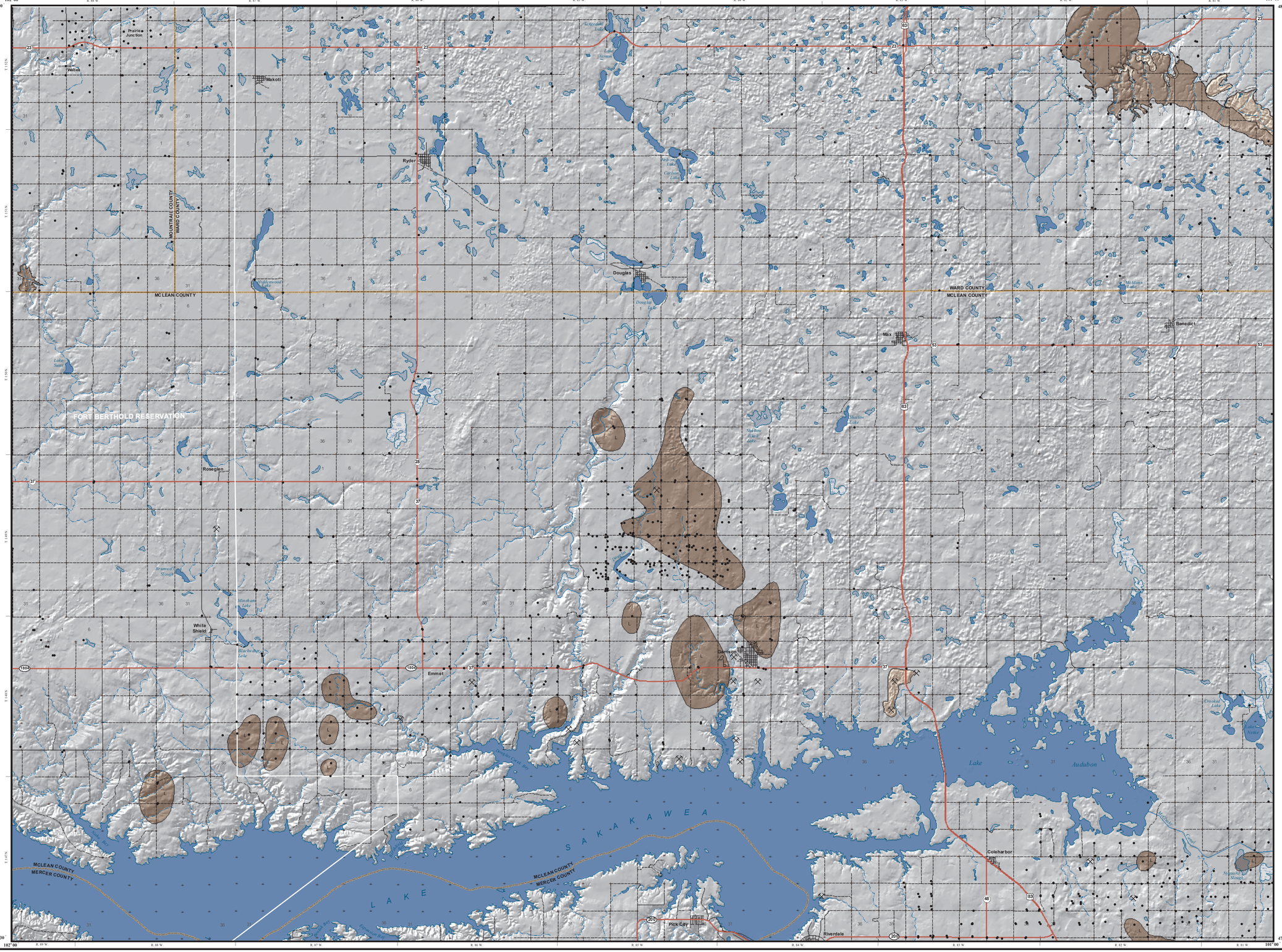
Lignite Reserves
Garrison 100K Sheet, North Dakota

Stanley	Minot	Velva
Parshall		Drake
Killdeer	Hazen	Mc Clusky

Adjoining 100K Maps

12°
1979 Magnetic North Declination at Center of Sheet

Edward C. Murphy, State Geologist
Lynn D. Helms, Director Dept. of Mineral Resources



Edward C. Murphy

2006

The Garrison 100K sheet contains approximately 640 million tons of mineable lignite. Most of this reserve occurs within the Bonnes Coulee (270 million tons in T152N, Rs81&82W) and Garrison deposits (277 million tons in Ts148-150N, Rs84&85W). The Douglas Creek deposit (65 million tons in Ts147&148N, Rs87&88W) is the only other deposit within this map sheet that exceeds 10 million tons (Murphy, 2006). Most of the mineable coals in this area are less than ten feet thick, but the Coteau bed in the Bonnes Coulee deposit and a coal seam in the Garrison deposit are both up to 12 feet thick (Murphy, 1998). The combined mineable thickness of two beds in several of the deposits in this map sheet is 11 or 12 feet.

Glacial sediments (primarily till) cover the surface of most of this map sheet. The Sentinel Butte and Bullion Creek Formations (Paleocene) are present at the surface along drainages or underlie the glacial cover.

According to the records of the North Dakota Public Service Commission, at least 37 coal mines operated at one time or another in this area. Approximately 20 mines operated in and around the Bonnes Coulee deposit in Ward County and another ten were within a six-mile-radius of the town of Garrison. The majority of coal mines in this map sheet were small underground mines that opened in the early 1900s and 1910s and closed in the 1930s or 1940s. The Velva (1927-1986) and Custer (1947-1964) mines were the two largest operations in this map sheet.

References
Murphy, E.C., 1998, The Coteau lignite bed in north-central North Dakota: North Dakota Geological Survey Open-File Report no. 98-2, 11 p.
Murphy, E.C., 2006, The lignite reserves of North Dakota: North Dakota Geological Survey Report of Investigation no. 104, 141 p.

UNIT DESCRIPTIONS

Geology Undifferentiated

Area of Mined Lignite

L — Economic Coal Deposits

Economic coal deposits are those that meet the minimum criteria established by coal companies operating surface mines in North Dakota. These economic criteria include a minimum cumulative coal thickness of ten feet-typicallyoccuring in less than two beds, a minimum individual bed thickness of at least 2.5 feet, a ratio of overburden to coalthickness of not more than 10:1, a minimum of 25 feet of overburden, and a maximum depth to coal of approximately 150 feet.

Geologic Symbols

Extent of Local Lignite Reserves

Data Points

Includes coal exploration NDGS/USGS drill holes, sub-surface mineral drill holes, oil & gas wells, and NDSWC drill holes.

Abandoned coal mine plotted from the records of the Abandoned Mine Land Division of the North Dakota Public Service Commission.

Other Features

- Water
- Water - Intermittent
- Marsh
- River/Stream - Perennial
- River/Stream - Intermittent
- Section Corners
- Reservation Boundary
- County Boundary
- Federal Highway
- State Highway
- Paved Road
- Unpaved Road

Scale 1:100,000

0 1 2 3 4
Miles

Mercator Projection 1927 North American Datum
Standard parallel 47°30 Central meridian 101°30'
USGS NED Shaded Relief - Vertical Exaggeration 9x

The North Dakota Geological Survey can publish on demand 1:24,000 scale quadrangle maps (24k - c series) of the mineable coal deposits in the Garrison 100k sheet. These maps would include information on mineable coal thicknesses.

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Cartographic Compilation: Elroy L. Kadrmas