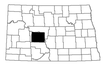
North Dakota Geological Survey
Geologic Investigation No. 259

Salt Isopach of the Devonian Prairie Formation

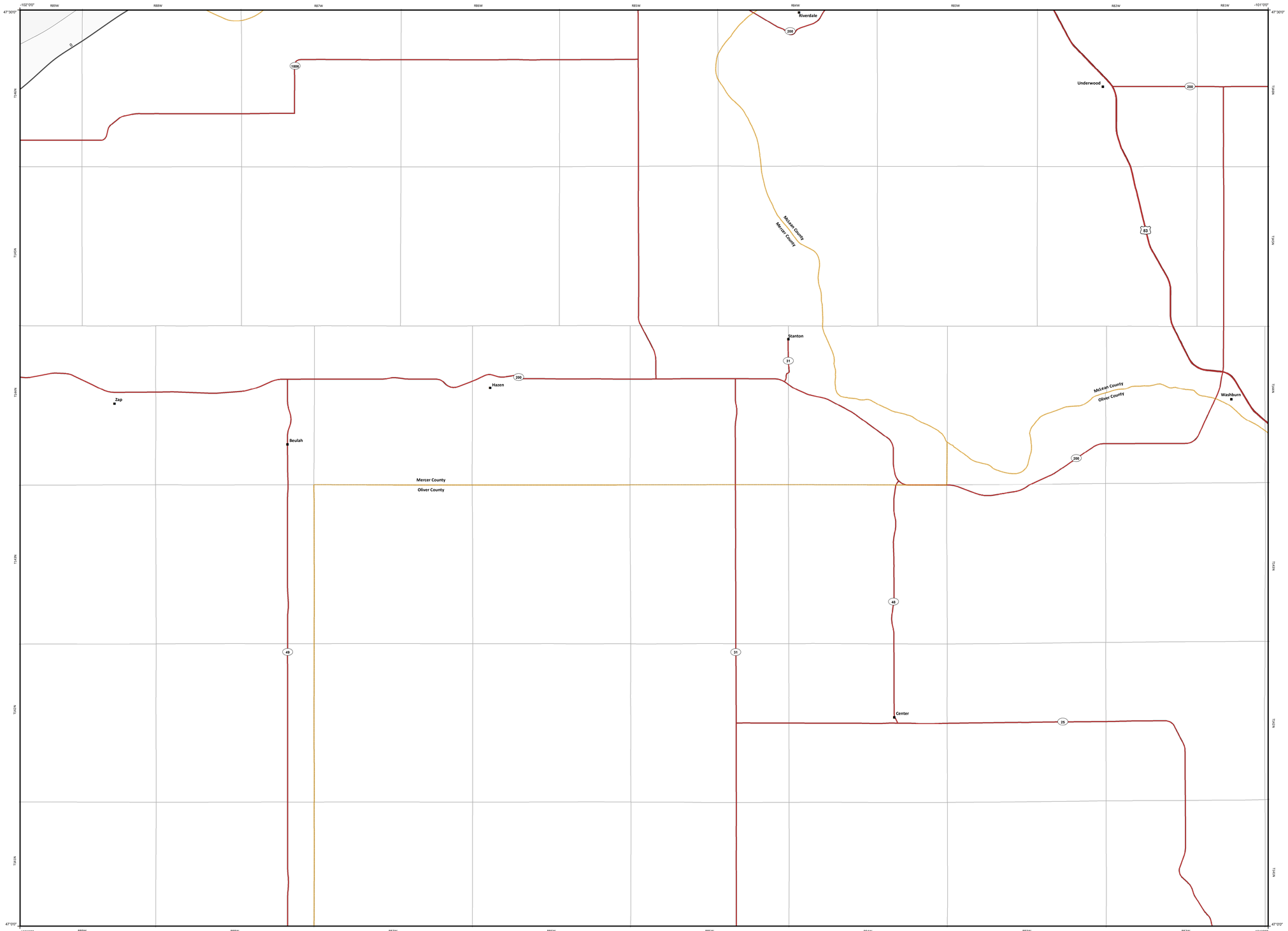
Hazen 100K Sheet, North Dakota



Adjoining 100K Maps

6°24'
2019 Magnetic North
Declination at Center of Sheet

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



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General Information on the Prairie Formation

The Prairie Formation consists of a thick sequence of evaporites of middle Devonian age. At the time of deposition, open ocean water, at what is now the southern Northwest Territories of Canada, flowed through the interior of Canada via a corridor referred to as the Elk Point Basin. Water became increasingly concentrated with solutes as reefs restricted inflow from the open sea and as circulation was impeded by additional reefs forming on structural divides within the basin (Holter, 1969). The resulting brines deposited horizontally bedded salts over large areas including parts of Saskatchewan, southwestern Manitoba, northwestern North Dakota, and northeastern Montana. The deposition followed a typical progression of gypsum or anhydrite, followed by halite, sylvite, and carnallite. Alternating beds of halite, sylvite, and carnallite occurred when the introduction of fresh water into the system reversed the depositional sequence (Anderson and Swinehart, 1979; Kruger, 2014).

There are six potash-containing members identified in the Prairie Formation salts of North Dakota. From lowest to highest they are the Esterhazy, White Bear, Belle Plaine, Patience Lake, Mountrail, and White Lake members (Kruger, 2014). These potassium-salt bearing intervals include extensions of those currently mined for potash in the Canadian province of Saskatchewan.

The Hazen Sheet

The isopach contours of this sheet are based upon well log interpretations of the tops and bottoms of the main body of salt from wells located on adjacent sheets and exclude the basal clay or anhydrite layer where observed. The salt deposits of this sheet are located at the northwestern corner and are projected to only extend several miles into the sheet before thinning to zero at the depositional limit. Well control for the Hazen Sheet and adjacent areas are absent to sparse. Where salt is projected to occur, the depth to salt is estimated to be approximately 10,500 feet (3,200 meters) (Kruger, 2019).

Thickness (ft)

- 0-25
- 26-50

Symbols

- Well Control

Other Features

- Section Line
- City
- Federal Highway
- State Highway

N
W E
S

Scale 1:100,000

0 1 2 3 4
Miles

0 1 2 3 4
Kilometers

Mercator Projection
Standard Parallel 47°30'0"N

North American 1983 Datum
Central Meridian 102°30'0"W

References

Anderson, S.B. and Swinehart, R.P., 1979, Potash Salts in the Williston Basin: Economic Geology, v. 74, no. 2, p. 358 -376.

Holter, M.E., 1969, The Middle Devonian Prairie Evaporate of Saskatchewan: Saskatchewan Department of Mineral Resources, Rep. 123, 134p.

Kruger, N.W., 2014, The Potash Members of the Prairie Formation in North Dakota: North Dakota Geological Survey, Report of Investigation no. 113, 39p.

Kruger, N.W., 2019, Measured Depths to the Prairie Formation Salt: North Dakota Geological Survey, Geological Investigation no. 221, Plate II.

Cartographic Compilation: Navin Thapa