

Salt Isopach of the Devonian Prairie Formation

Minot 100K Sheet, North Dakota

| | | |
|----------|----------|----------|
| Belmont | Belmont | Belmont |
| Staley | Staley | Staley |
| Parshall | Parshall | Parshall |

Adjoining 100K Maps

2017 Magnetic North
Declination at Center of Sheet
83°57'

Ned W. Kruger

2019

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). These potassium-salt bearing intervals include extensions of those currently mined for potash in the Canadian province of Saskatchewan.

The Minot Sheet

The isopach contours of this sheet are based upon 14 well log interpretations of the tops and bottoms of the main body of salt, excluding the basal clay or anhydrite layer where it is observed. Closely spaced contours depict localized thinning of salt overlying flat-topped, steep-sided pinnacle reefs. While the lateral extents of reefs are unknown due to insufficient well control, their extents here are based upon size descriptions of pinnacle reefs in Ehrets and Kissling, 1987. Well control is sparse and dispersed throughout the mapped area. The thickest salt deposits on this sheet were mapped along the northwestern edge, at depths of approximately 9,500 feet (2,895 meters) (Kruger, 2019). In general, salt deposits thin eastward toward a solution edge, and southward toward the depositional limit edge of the Prairie Formation salts. Measured thicknesses of the Prairie salts within the sheet ranged from 20 to 393 feet (30.6 to 165.8 meters).

Thickness (ft)

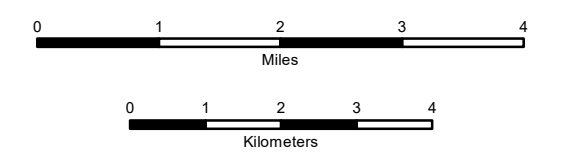
| | |
|---------|---------|
| 0 | 226-250 |
| 1-25 | 251-275 |
| 26-50 | 276-300 |
| 51-75 | 301-325 |
| 76-100 | 326-350 |
| 100-125 | 351-375 |
| 126-150 | 376-400 |
| 151-175 | 401-425 |
| 176-200 | 426-450 |
| 201-225 | |

Symbols

- Well Control
- Section Line
- City
- Federal Highway
- State Highway



Scale 1:100,000



Mercator Projection
Standard Parallel 48°0'0"N
North American 1983 Datum
Central Meridian 101°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.

Ehrets, J.R. and Kissling, D.L., 1987, Winnipegosis Platform Margin and Pinnacle Reef Reservoirs, Northwestern North Dakota: North Dakota Geological Society, Fifth International Williston Basin Symposium, Core Workshop Volume, D.W. Fischer (eds.), p. 1-31.

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.