



Salt Isopach of the Devonian Prairie Formation

Parshall 100K Sheet, North Dakota

Williston	Stassly	Merrill
Ward	City	Carroll
Green	Butte	Kirkham
		Haskell

2017 Magnetic North
Declination at Center of Sheet
E. 30' W.

Ned W. Kruger

2020

General Information on the Prairie Formation

The Prairie Formation consists of a thick sequence of evaporites of mid-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 Parshall Sheet

The isopach contours of this sheet are based upon log interpretations of the tops and bottoms of the main body of salt, excluding the basal clay or anhydrite layer where it is observed, from 154 wells. Well control is tightest where drilling activity targeted structural deformities associated with the Nesson Anticline on the western side of the sheet. The thickest salt deposits of this sheet were mapped near the middle of its northern boundary, underlying a region which includes the town of New Town and where the depth to salt exceeds 11,500 feet (3,505 meters) (Kruger, 2019). Salt thicknesses thin to the southeast, south, and southwest. Measured thicknesses of the Prairie Formation salt within the sheet ranged from 79 to 314 feet (24.1 to 95.7 meters).

Thickness (ft)

26-50	176-200
51-75	201-225
76-100	226-250
101-125	251-275
126-150	276-300
151-175	301-325

Symbols

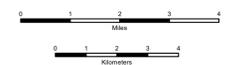
● Well Control

Other Features

- Section Line
- City
- ⦿ Federal Highway
- ⦿ State Highway



Scale 1:100,000



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.