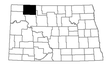
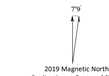
North Dakota Geological Survey
Geologic Investigation No. 253

Salt Isopach of the Devonian Prairie Formation

Kenmare 100K Sheet, North Dakota



Adjoining 100K Maps



Edward C. Murphy, State Geologist
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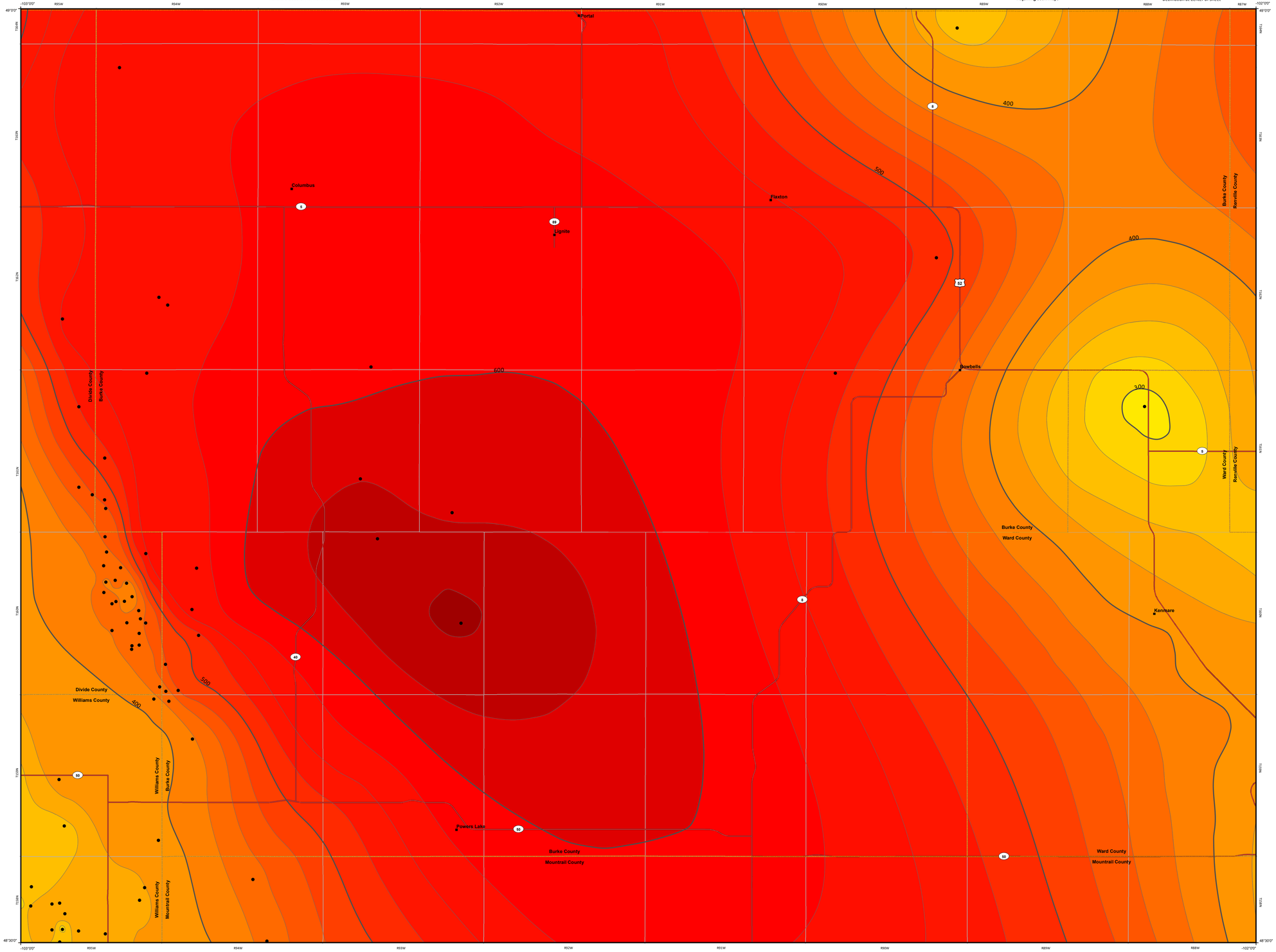

Ned W. Kruger

2021

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 Kenmare Sheet

The isopach contours of this sheet are based upon 69 well log interpretations of the tops and bottoms of the main body of salt, excluding the basal clay or anhydrite layer where observed. Well control is concentrated along the Nessen Anticline in the western and southwestern portions of the sheet. Well control is very limited in the northwest portion of the sheet and absent in remaining areas. A salt thickness of 653 feet (199.0 meters), the thickest observed in the state, is located approximately 7.5 miles (12.1 kilometers) north of the town of Powers Lake at a depth of approximately 10,250 feet (3,124.2 meters) from the surface (Kruger, 2019). From there, salt thicknesses thin westward toward the eastern flank of the Nessen Anticline and south and eastward toward the depositional limits. Measured thicknesses of the Prairie Formation salt within the sheet ranged from 297 to 653 feet (90.5 to 199.0 meters).

Thickness (ft)

276-300	476-500
301-325	501-525
326-350	526-550
351-375	551-575
376-400	576-600
401-425	600-625
426-450	625-650
451-475	650-675

Symbols

- Well Control

Other Features

- Section Line
- City
- Federal Highway
- State Highway

Scale 1:100,000

Miles: 0 1 2 3 4

Kilometers: 0 1 2 3 4

Mercator Projection
Standard Parallel 48°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