

# K<sub>2</sub>O Grades of the Esterhazy Member of the Prairie Formation

## Garrison 100K Sheet, North Dakota

Shaded	Inset	Notes
Partial	Blank	
All Data	None	Mc Check

Adjoining 100K Maps

2017 Magnetic North  
Declination at Center of Sheet

### Ned W. Kruger

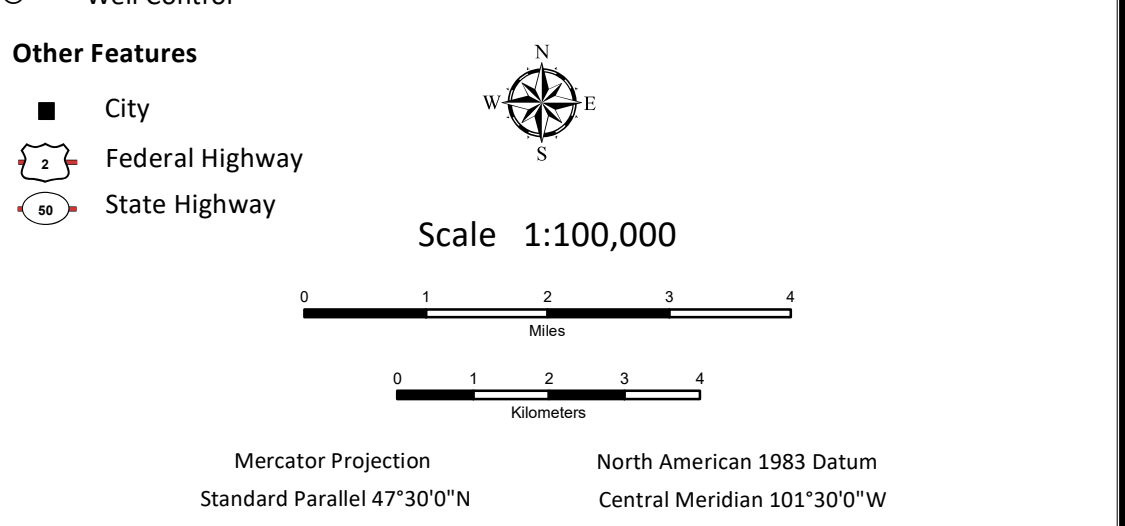
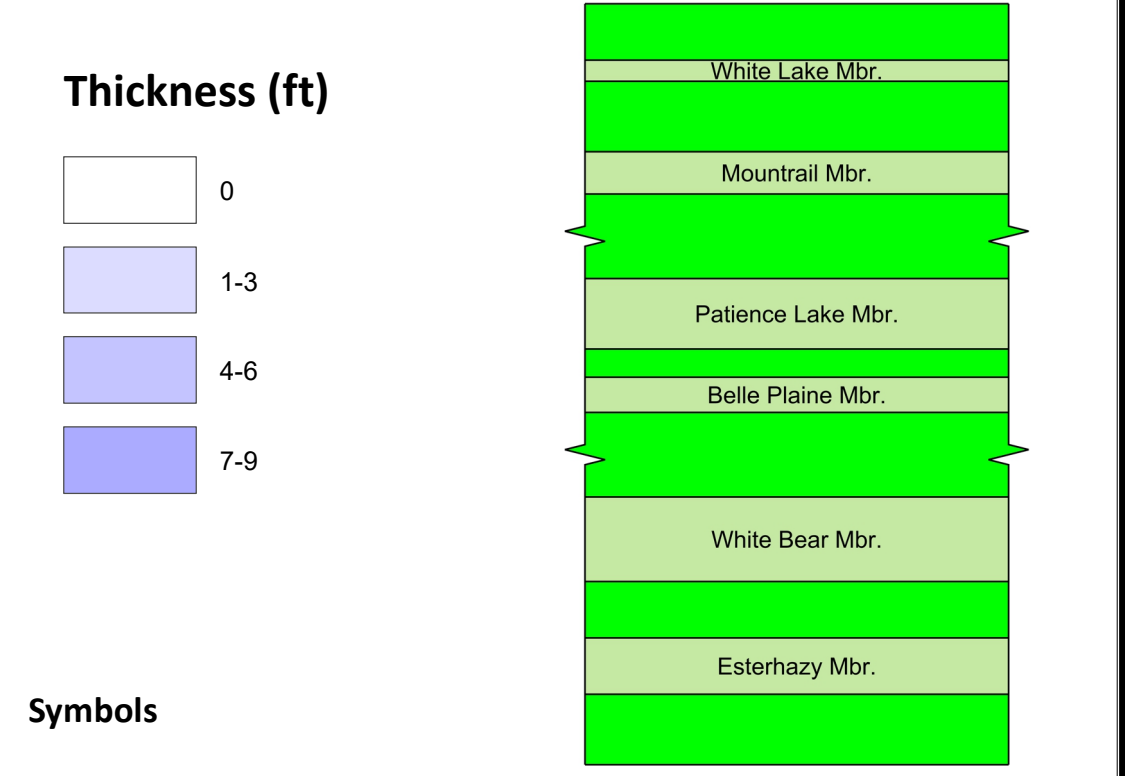
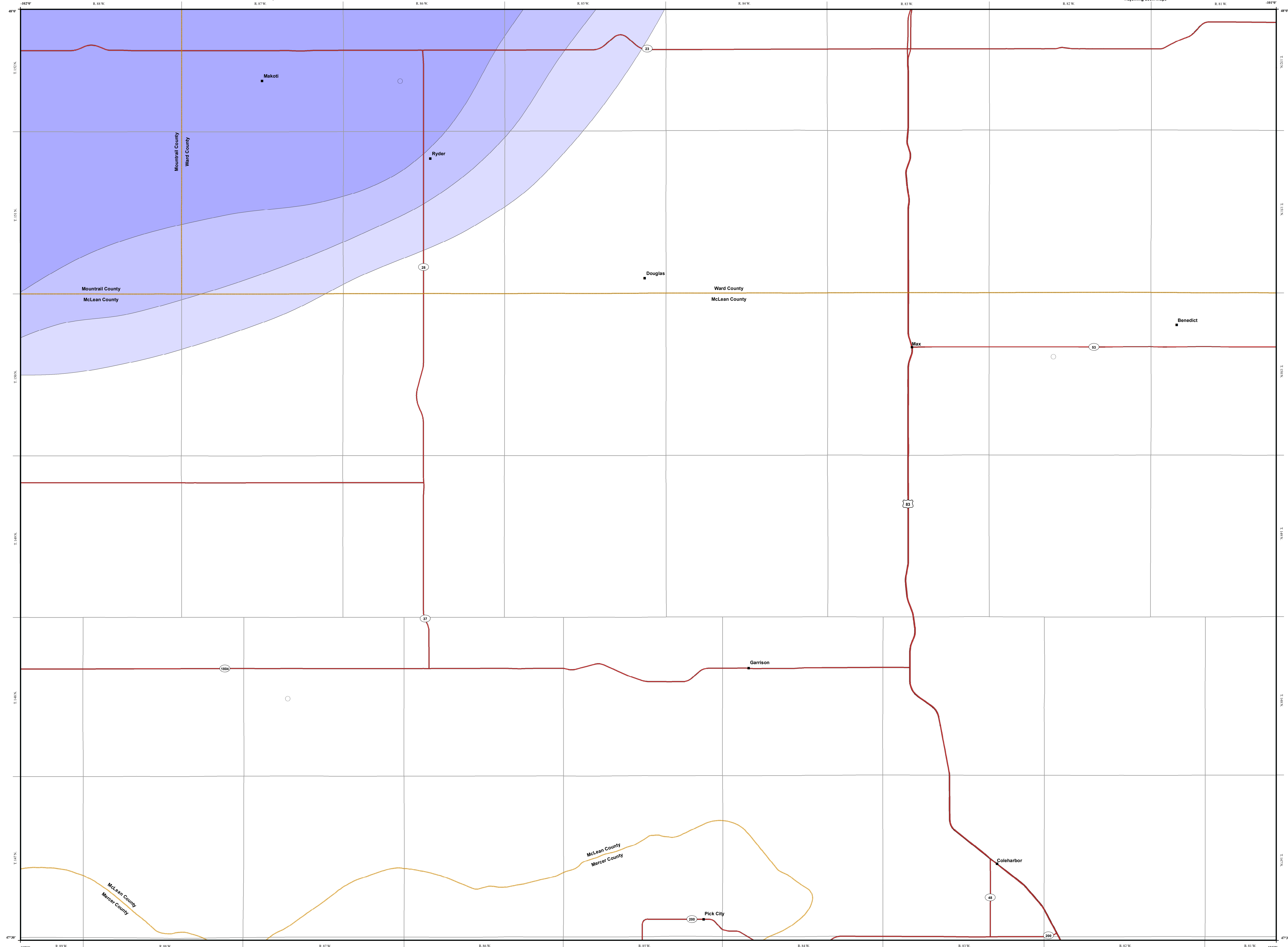
2023

This series of maps of the Garrison 100K Sheet was based on public data from three wells gathered by the North Dakota Industrial Commission – Department of Mineral Resources, Oil & Gas Division. While the Esterhazy Member was identified on the geophysical log of one well, the log was insufficient to determine a potassium oxide concentration. Isopach contours were generated via PETRA (ver. 3.13.5) geological software. The contour lines were computer-generated based on well-control data, with minimal adjustments made by the author. Areas with a geological anomaly may not be accurately portrayed. The potash member thickness for each well, and the isopach contours generated from them, were modified from Kruger (2014).

Where present on adjacent 100K sheets, all calculations were based on gamma-ray log measurements recorded in API units taken at six-inch increments throughout the potash-containing portion of the log. Corrections for borehole size and drilling mud weight as well as removal of the baseline gamma-ray signal were made (Crain, 2014; Crain & Anderson, 1966). The corrected gamma-ray measurements were converted into apparent potassium oxide (K<sub>2</sub>O) concentrations. Average K<sub>2</sub>O concentrations and potash member thicknesses were obtained using the grade-thickness method described in Nelson (2007), where bed thickness is equal to the distance between the elevations at which the gamma-ray response declines to one-half its maximum value.

When a potash member displayed multiple gamma-ray log peaks separated by troughs representing salt or insolubles such as clay or anhydrite, thin potash intervals at the upper or lower boundaries of the member were not included in thickness or average-potash-grade calculations if the corrected gamma-ray measurements were less than 100 API or separated by more than four feet from main body of the potash member.

The total volume of potash-containing salt within the Esterhazy Member as represented on this sheet is approximately 800,000 acre feet.



**References:**

Crain, E. R., 2014, Crain's petrophysical handbook; URL<<http://spec2000.net/17-specpotash.htm>>, accessed 14 January 2014.

Crain, E.R., and Anderson, W.B., 1966, Quantitative log evaluation of the Prairie Evaporite formation in Saskatchewan: Journal of Canadian Petroleum Technology, vol. 5, p. 145-152.

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

Nelson, P.H., 2007, Evaluation of potash grade with gamma-ray logs: U.S. Geological Survey, Open File Report 2007-1292, 14 p.