

Spatial Distribution Of Lithium In Saline Brines (Duperow Aquifer) In Southeast Saskatchewan.

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Summary

There is currently an enormous exploration interest in brine-hosted lithium from the Duperow/Leduc Aquifer in Western Canada. Published concentrations of lithium up to 190 mg/L from southeast Saskatchewan are significantly higher than those currently being reported further west in west central Saskatchewan and Alberta. Yet, the origin of this difference within a single formation has received little attention in the open literature. The question remains: what controls the distribution of lithium in subsurface brines? A second question is why are there extreme variations in lithium concentrations found close together.

An exploration and testing program was undertaken through 2020-2022 in order to better understand the origin and distribution of lithium in the Duperow Aquifer in Southeast Saskatchewan (T1 to T22, R30W1 to R30W2). First, a refined lithostratigraphy was developed subdividing the Duperow Formation into 24 mappable units across the area [Figure 1].

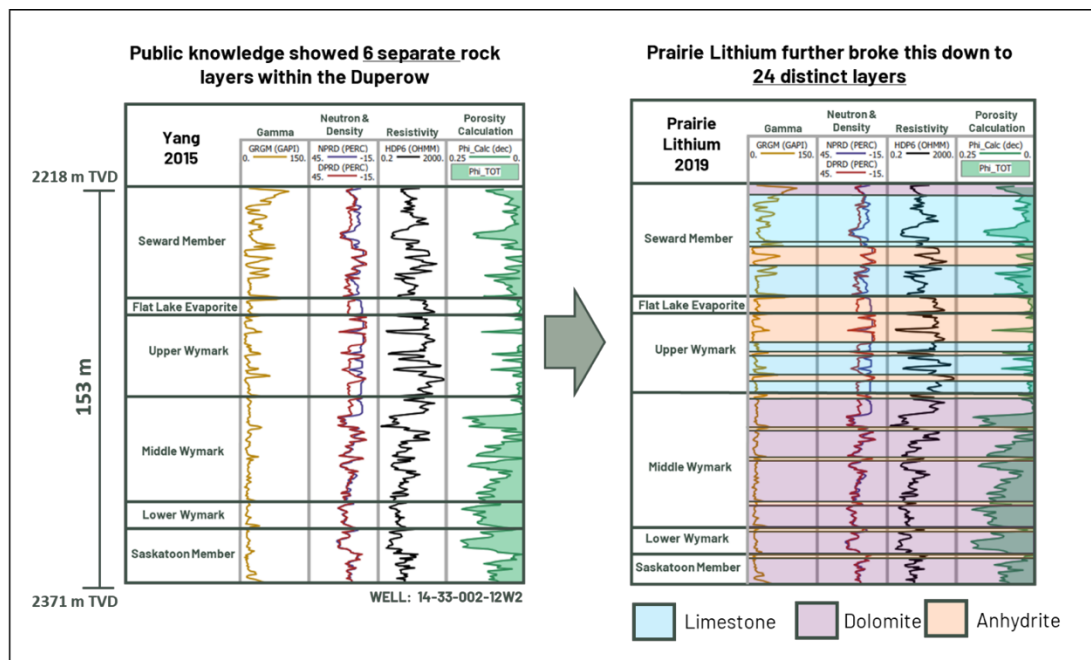


Figure 1. Comparison of: 1a) the published stratigraphy of the Duperow Formation in southeast Saskatchewan (Yang, 2015) left; and 1b) the new detailed stratigraphy, right.

Second, lithium concentration data were inserted into this refined lithostratigraphy. This led to the identification of widespread continuous zones with correlatable lithium concentrations across the area. Furthermore, putting multiple measurements from a single well (or nearby wells), in their correct stratigraphic position explains the origin of some of the large differences in concentration measurements from the same well: different zones in the Duperow Aquifer in the same location can have different lithium concentrations.

Next, our exploration program included drilling a new well (14-33-002-12 W2M), re-completing a nearby well (01-02-001-12 W2M), and re-entering and deepening a third well (16-20-3-12 W2M). Representative fluid samples were collected from eight separate zones in the 14-33 well, and three separate zones in the 01-02 and 16-20 wells. In addition to collecting fluid samples, the 14-33 and 16-20 wells were flow-tested for overall productivity.

In the 14-33 well, lithium concentrations within the individual zones of the Duperow Aquifer ranged from 48 mg/L in the lowest concentrated zone, to 173 mg/L in the highest zone [Figure 2a]. The same individual zones were tested approximately 20 km away in the 01-02 well and results were 53 mg/L in the lowest concentrated zone to 170 mg/L in the highest zone [Figure 2b]. Zonal concentrations correlated between the wells, over a distance of approximately 20 km.

These results support a newly-developed exploration model of a widespread layered distribution of lithium in the Duperow Aquifer.

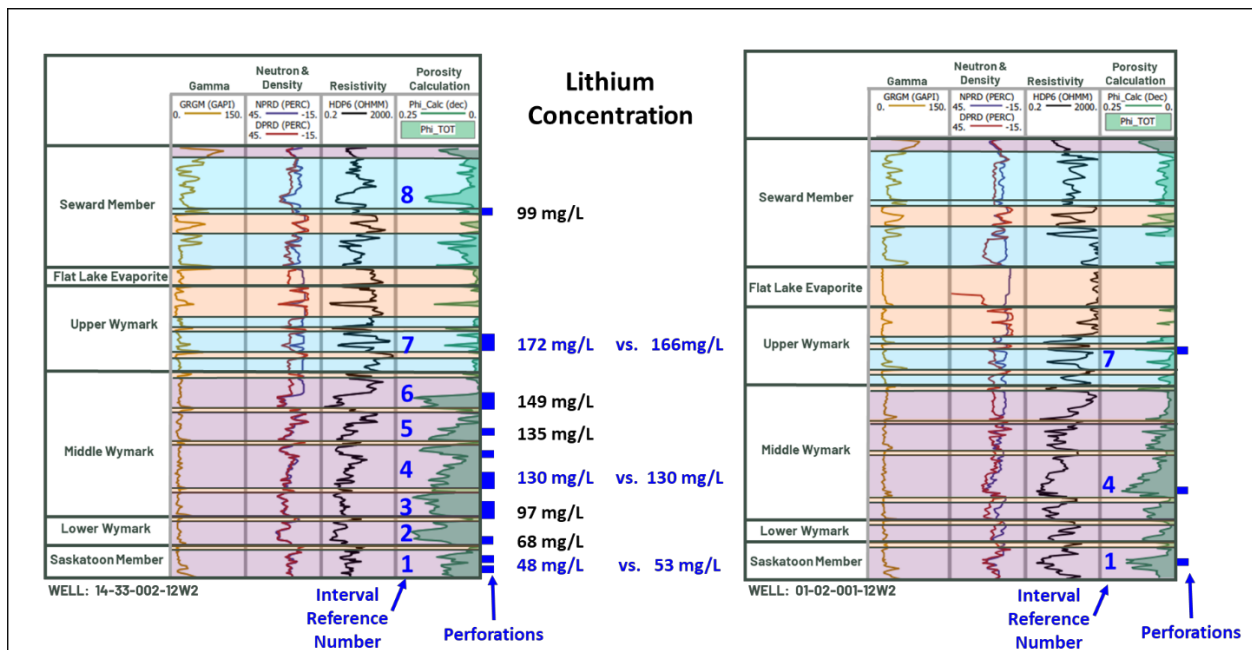


Figure 2. Comparison of Lithium concentrations in geological intervals within the Duperow Aquifer from two wells: a) 14-33-02-12W2M (left); and b) 01-02-01-12W2M (right). Wells are approximately 20 km apart.

Reference:

Yang, C., 2015. Stratigraphy and Reservoir Characterization of the Upper Devonian Duperow Formation, Southeastern Saskatchewan; in Summary of Investigations 2015, v. 1, Saskatchewan Geological Survey, Miscellaneous Report 2015-4.1, Paper A-4.