

Critical Minerals in Manitoba's Pores Spaces and Sedimentary Strata

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Summary

Manitoba is home to two Phanerozoic sedimentary basins – Williston Basin and Hudson Bay Basin. Often only considered targets for petroleum exploration, these sedimentary basins are host to critical minerals within their pore spaces and sedimentary strata. These include helium, lithium, potash, rare earth elements and high-purity silica sand. Other strategic minerals include hydrogen, gypsum and salt. Examples of pore space and strata resources will be presented for southwestern Manitoba's Williston Basin. In recent years, several targeted new studies, compilations and mapping have highlighted the critical mineral wealth potential in this strata, including (Bamburak et al., 2014; Markstrom, 2024; Nicolas, 2017; Nicolas, 2018, 2024; Nicolas et al., 2023a; Nicolas et al., 2023b, 2024; Nicolas and Yang, 2022). This has resulted an extension to area mapping for potash occurrence to the north, identified active helium systems with helium values > 0.3 mol % and mineral-rich deep saline brine aquifers with potential lithium-enrichment, as well as enrichment of REE (up to 3844 ppm total REE oxides; Bamburak et al., 2014) residing in bioapatite identified as remnant fossil bone material, and a vast resource of high-purity silica sand with SiO₂ values > 95%. This broader understanding and mapping of the mineral potential of sedimentary strata is driving a new exploration wave in Manitoba of looking beyond and within the oil fields to unlock the hidden potential of the pores spaces and strata blanketing the region.

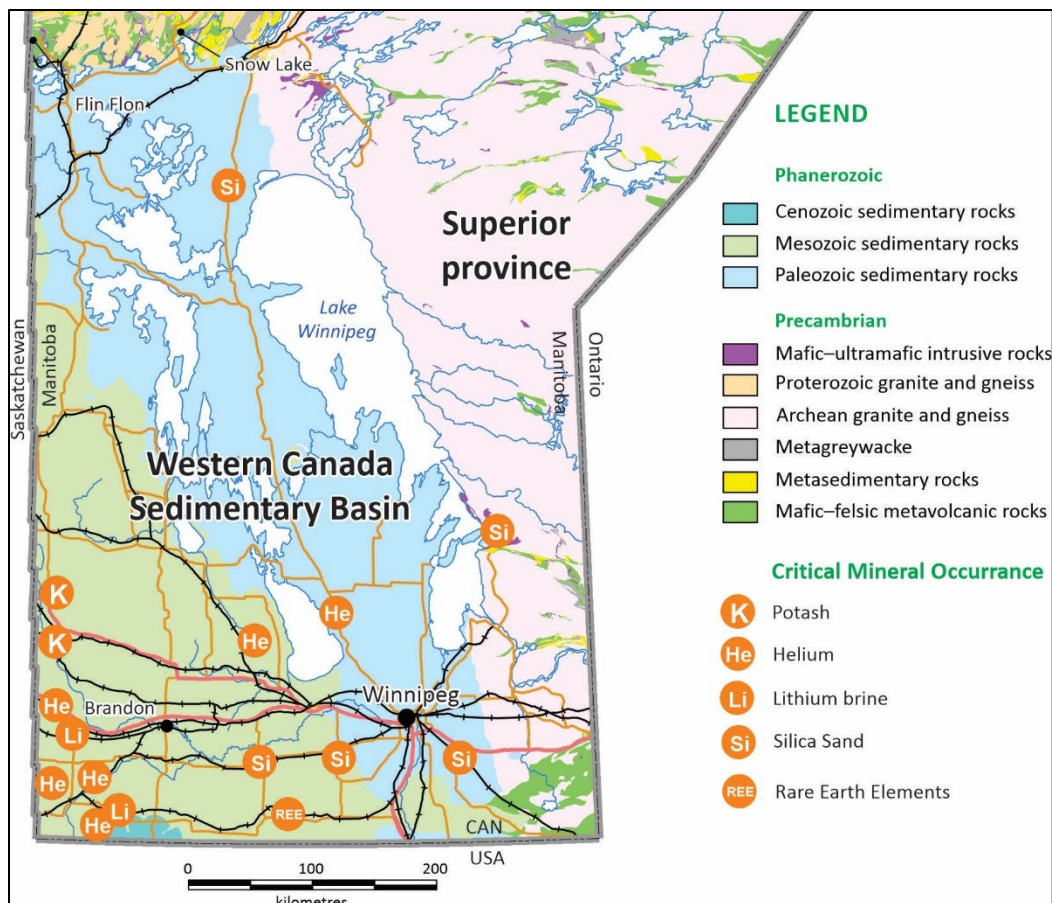


Figure 1: Simplified geological map of southern Manitoba showing key occurrences of critical minerals occurring in the Phanerozoic pore spaces and sedimentary strata.

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