

## Helium Development in Western Canada: From Exploration to Commercialization

*W. Steven Donaldson  
Canadian Discovery Ltd.*

### Summary

The Western Canada Sedimentary Basin (WCSB) has been an area of oil and gas exploration and development since the early 20th century. It has generated and continues to generate immense wealth for all Canadians. However, over the past several years, there has been a pivot to develop new types of subsurface resources. These resources include critical or strategic minerals such as helium. This gas is found trapped within deep strata overlying Precambrian structural highs.

Helium is recognized by Canada as a critical mineral that is used in many high-tech, medical, and aerospace applications. A scarce, nonrenewable element on Earth, the dominant isotope of helium is sourced from the radioactive decay of uranium (U) and thorium (Th) in the Earth's crust. Basement rocks and cratons of Proterozoic- and Archean-age in western Canada are predominantly metamorphic or granitic and contain elevated concentrations of U and Th, which provide a helium source. Once generated, the helium migrates from these source rocks into overlying reservoirs, which often drape Precambrian structural closures, and are overlain by tight sealing caprocks.

The ability of existing and planned sources of helium supply to meet future demand is highly uncertain, requiring the development of new resources. Helium found by Canadian operators within Saskatchewan and Alberta (as well as northern Montana) can help to meet this demand, particularly for the expanding North American market. The Canadian industry is in a state of transition, with land positions now established (figure 1) and some of the early movers shifting from the exploration and development phase to successful commercialization.

Helium exploration and development is most advanced in Saskatchewan, where several operators are active across the southern part of the province. These operators include North American Helium, Royal Helium, Canadian Helium, and the Weil Group. North American is the most active driller (over 50 wells) and has the largest helium land position in Canada (9MM ha). The company brought its seventh helium production facility into service in late 2023 and is currently supplying approximately 5% of the helium demand for the North American market.

In Alberta, multiple operators are working in the helium industry. Thor Resources is active at Knappen in the southeast, First Helium is exploring along the northern flank of the Peace River Arch, Royal Helium (formerly Imperial Helium) has drilled three wells in the Princess area of south-central Alberta, and Global Helium has spudded two wells at Manyberries near Medicine Hat. Avanti Helium is successfully developing helium prospects in the Greater Knappen area of Montana and recently licensed a well at Aden in southernmost Alberta.

Figure 1: Western Canada Helium Majority Rights Holders

