CEGA
Canadian Energy Geoscience Association

Dr. Benjamin J. Rostron and the late Mr. L. Kim Kreis

2025 Patricia J. Lee Trailblazer Award

CEGA individuals or teams who have blazed new trails in the field of energy geoscience

The Canadian Energy Geoscience Association (CEGA) recognizes Dr. Benjamin J. Rostron and the late Mr. Kim Kreis as recipients of the 2025 Patricia J. Lee Trailblazer Award. Their early work in hydrogeology and stratigraphy now underpins lithium-brine exploration in the Western Canadian Sedimentary Basin (WCSB). When much of this work was carried out, produced brine was typically treated as a disposal stream and hydrogeology was rarely used as a primary exploration framework. Using basin-scale fluid-flow analysis together with detailed stratigraphic interpretation, Rostron and Kreis showed that formation waters record basin evolution and can be interpreted directly within exploration workflows. Their work reflects the core pillars of the Trailblazer Award—innovation in applying basin-scale hydrogeology, long-term vision for fluid-focused exploration, and collaboration across academia, government, and industry.

Geological Context: Formation Waters Before Lithium Became Strategic

Through the 1980s, 1990s, and early 2000s, lithium was largely an industrial mineral used in ceramics, glass, lubricating greases, and specialty chemical applications. Formation-water studies were common in petroleum geology but were mainly used to understand basin evolution and hydrocarbon migration. Regional programs were building large datasets on brine chemistry across the Williston Basin, where lithium, bromine, iodine, and other dissolved elements were recognized but rarely treated as exploration targets. Rostron and Kreis combined new and legacy datasets to evaluate formation-water chemistry across the basin within a hydrogeological framework.

Basin-Scale Hydrogeology — Rostron's Contribution

Professor Rostron's hydrogeological mapping of the Williston Basin established a regional framework for understanding fluid migration through Paleozoic aquifer systems. By examining hydraulic gradients, formation connectivity, and brine chemistry, he showed that dissolved elements reflect basin-scale fluid flow and stratigraphic controls. His work demonstrated that formation waters could be interpreted as indicators of basin-scale fluid systems rather than simply as disposal fluids. At a time when most petroleum geoscience emphasized structure and reservoirs, Rostron applied hydrogeology directly to exploration problems.

Stratigraphic Insight and Practical Application — Kreis's Contribution

Building on this basin-scale hydrogeological framework, Mr. Kim Kreis provided the stratigraphic clarity needed to apply these concepts in exploration. Through his work with the Saskatchewan Geological Survey and later as a consulting geologist, Kreis refined interpretations of Paleozoic formations and their associated brine systems. He recognized that co-mingling fluids from multiple

zones often masked formation-specific chemistry and obscured regional trends. Kreis refined the stratigraphic framework required to apply hydrogeological concepts in exploration, linking formation-water chemistry directly to discrete aquifer systems.

Early Collaboration

Discussions at a mid-1990s geological conference led to collaboration between Rostron and Kreis on the hydrogeology and geochemistry of Williston Basin formation waters. Their combined academic, survey, and industry experience allowed regional hydrogeological concepts to be tested against real subsurface datasets and encouraged a more integrated view of stratigraphy, fluid flow, and geochemistry across the basin.

Changing How Produced Brine Was Viewed

One of their key contributions was changing how geoscientists interpret produced water. Formation fluids had often been treated as operational challenges rather than geological datasets. Rostron and Kreis showed that fluid flow, brine chemistry, and aquifer architecture provide primary geological information.

Scientific Work Preceded Market Recognition

As lithium demand increased in the mid-2010s, attention turned toward lithium-bearing formation waters in sedimentary basins. Deep brines in the WCSB, already mapped through earlier hydrogeological and stratigraphic work, became new exploration targets. Lithium-brine concepts were being explored by several groups in Alberta and Saskatchewan during this period. Prairie Lithium has provided one of the earliest field demonstrations of lithium extraction from deep formation waters in Saskatchewan, progressing from pilot testing toward early commercial deployment.

Broader Influence on Energy Geoscience

Recent lithium-brine work in Alberta and Saskatchewan has brought hydrogeology back to the centre of exploration workflows. Their integration of hydrogeology, geochemistry, and stratigraphy helped establish an exploration approach that treats fluid systems as fundamental geological elements rather than secondary observations.

Legacy and Recognition

This recognition highlights how their work changed exploration thinking and demonstrates the lasting impact of innovative geoscience. Mr. Kim Kreis's passing in 2020 adds particular significance to this honour. Professor Rostron's ongoing contributions continue to expand the boundaries of energy geoscience. Their work helped establish a fluid-focused approach to the subsurface that continues to influence lithium-brine exploration across Western Canada.