

Back to the Future: Lithium Analyses of Devonian Brines

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E3 Lithium¹

Summary

Formation water geochemistry analyses, taken as early as the 1980's (Hitchon, 1984; Connolly et al., 1990; Hitchon et al., 1993; Bachu et al., 1995; Eccles and Jean, 2010; Eccles and Berhane, 2011; Huff et al., 2011 and 2012; Huff, 2016 and 2019;) provide baseline legacy datasets for the recognition of elevated (50+ mg/L) Lithium in Devonian brines across the Western Canadian Sedimentary Basin (WCSB). A continuum of new analyses, either taken by brine-hosted mineral permit holders, inclusive of E3 Lithium, along with the Alberta Geological Survey (Reimert, et al. 2023) has since been added to the publicly accessible formation waters database, including isotopic compositions, and cation ratios that can be interpreted to reflect potential depositional models for lithium sourcing and lithium brine fluid migration. Since the inception of E3 Lithium (formerly known as E3 Metals Corporation) back in 2016, eight years of knowledge has accumulated within the company, for formation water collection and analysis type, which is coupled with advancements in technology and techniques; to further develop the legacy data and provide further context to latest models on lithium sourcing and emplacement in the WCSB. In addition, new learnings have been captured that can provide context to the variation in results measured over the years, with specific examples of how brine chemistry, such as certain cations, anions and precipitates can influence analyses such as induced coupled plasma- optical emission spectrometry, and mass spectrometry (ICP-OES and ICP-MS).

The E3 Lithium Lab, located in the University of Calgary- Research Park, works very closely with the E3 Subsurface team, in validating duplicate samples that are also analyzed at third party accredited laboratories. This extra step of authentication provides another level of assurance, particularly for measuring lithium grade concentrations for subsequent resource volume calculations. This talk provides: (1) an overview of all of the datasets that substantiate formation water geochemistry measurements specifically in the Leduc formation in the Alberta Basin since the 1980's, (2) what the current state of understanding is around advancements, knowledgebase specific to measuring lithium, and (3) a high-level overview of how we measure lithium with our inhouse ICP-OES machine.

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