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Results from a Brine Sampling Project: Investigating the Mineral Potential of Brines in Saskatchewan, Canada, in particular the Lithium Potential

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Abstract

Deep formation brines are a source of a variety of industrial minerals in other basins around the globe, including compounds of bromine, iodine, lithium, magnesium, and potassium. Typically, only major ions analyses are completed and these trace elements are not included in routine oil and gas analysis. The recent surge in lithium carbonate demand has resulted in the need for other sources of lithium to be investigated; one such source could be produced formations waters.

In 2011, the Saskatchewan Geological Survey initiated a well-head sampling project that targeted currently producing wells penetrating Paleozoic strata in Saskatchewan. The objective of this study is to investigate the abundance and stratigraphic distribution of naturally occurring minerals in the produced brines in the province of Saskatchewan. The geochemical analyses from these samples are the first to populate a public “exploratory” database of trace element compositions of brines in the province of Saskatchewan.

Additionally, the application of halogen systematics can be applied to these newly collected samples which could elucidate the history of brine migration. These results are able to provide a better understanding of the fluid migration in the basin and the potential for future hydrocarbon and mineral discoveries. Results indicate that some samples derive their salinity from evaporitic concentration while other samples derive their salinity from halite dissolution.

Another factor that was investigated was the possibility of varying brine composition through time. Wells that displayed high concentrations of lithium were resampled five years apart to determine if the brine composition had varied.

These initial results could foster another industry in the Province of Saskatchewan and lead to a better understanding of fluid migration in the Williston Basin.