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Estimating Lithium Resources and Reserves in Groundwater Brines

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Summary

The intensifying demand for battery metals used in decarbonization technologies has prompted a surge in their exploration from different natural sources. Lithium has been identified by numerous nations as a critical mineral essential for these battery applications which occurs in three primary deposit types: (1) hard rock deposits, (2) brines and (3) clay deposits. This talk will focus on lithium deposits that exist in the dissolved phase within groundwater brines. As mining and other companies explore for and advance new projects, there is a need to efficiently quantify these dissolved lithium resources and arrive at producible reserves for each site. This presentation presents a methodology for estimating lithium resources and reserves. The workflow has been developed through experience at several sites in both South and North America.

Lithium Resources and Reserves

When describing mineral deposits, a *resource* is defined as how much of the mineral exists in the ground. In the case of lithium brines, estimating the lithium resource requires an understanding of both the stratigraphy of the site (including thickness, extent, material properties of aquifers and aquitards) and the distribution of lithium in the brines on site. The resource can be divided into three categories (from low certainty to high): *indicated*, *inferred*, *measured* resources. Geostatistical techniques are used to distinguish between each of these three resource categories.

A reserve is defined as the amount of lithium that can be extracted from a site. Because the deposits exist in the dissolved phase within groundwater brine, hydrogeological understanding of the site is required. Numerical models are valuable tools used to estimate the volume of brine that can be produced as well as the anticipated dissolved concentrations of lithium at the well head.

Methodology

Using advanced software and techniques, a workflow for estimating and classifying lithium resources in brines will be discussed. Specific tasks involve three-dimensional geomodelling, visualization and geostatistical analysis. We will also discuss the development of three-dimensional groundwater flow/transport models to estimate lithium reserves and inform production considerations based on the geomodel and the interpolated distribution of dissolved lithium in the subsurface.