

LITHIUM EXTRACTION FROM OILFIELD BRINE

Pamela J. Daitch

ABSTRACT

Lithium production through atmospheric evaporation of saline brine is generally the most economically efficient method of extraction. As global demand for lithium increases, production technology has evolved to reduce processing time of lithium from brine. The resulting technology invites the opportunity to consider lithium production from lower concentration petroleum brines, a long-overlooked lithium-rich resource. Capitalizing on advanced filtration technology and existing petroleum well infrastructure, the petroleum-producing geologic formations in the U.S. were evaluated for their lithium production potential.

The U.S. Geological Survey National Produced Waters Geochemical Database was utilized to identify lithium-rich brine from wells across the U.S. The volume and concentration potential of the most promising lithium-enriched geologic formation were calculated. Historical and current well production data were compiled and used to estimate the expected lithium production for the geologic formation. This data was then applied to a financial model to determine the method of brine production under which extracting lithium from oilfield brine would be profitable.

Advanced technology offers the advantage of recovering Li from concentrations as low as 70 mg/L. Of the produced water samples, only 344 samples had Li concentrations greater than or equal to 70 mg/L. The majority of the high Li concentration samples were identified in the Smackover Formation. The Smackover was selected to analyze for lithium extraction and production. Lithium-enriched brine can be gathered from the Smackover by collecting produced water from active wells in the formation or by drilling a purpose-designed well to access brine.

Results from the financial analysis indicate that the profitability of lithium extraction from Smackover oilfield brine is dependent on the volume of brine that is processed by the facility. Profit can be further enhanced by using economies of scale to increase the brine processing capacity of the facility. In this analysis, drilling a purpose-designed well resulted in the only profitable endeavor. When utilizing existing infrastructure to collect brine, the profitability is highly dependent on the number of active wells that produce from the Smackover Formation. This analysis indicates that a standalone lithium extraction company is best positioned to capitalize on lithium extraction from oilfield brine.

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Advisor: **Richard Chuchla**