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Technical Conference Paper

Utilizing Wireless Acoustic Monitoring for Optimizing Brine Extraction Operations

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Abstract

Accurate real-time monitoring of cavern parameters is key to ensuring optimized extraction operations and to assure long-term cavern integrity. This study reviews how downhole pressure and temperature data transmitted using an acoustic communication system can ensure caverns develop as planned, both from an economic and operational perspective.

The first section introduces the potential of downhole pressure monitoring in a solution mining situation which, in combination with accurate pressure measurement of the blanket annulus at the wellhead, will theoretically give the blanket-brine interface depth. Existing blanket-brine interface measurements have all specific drawbacks regarding flexibility, live data, or accuracy. The paper will then outline a recent trial of this approach at Nobian's Twenthe-Rijn brine field located near Hengelo, The Netherlands. The specific technical challenges presented by the cavern utilized for the pilot are reviewed and the rationale for why the SonicGauge technology was selected and how the downhole installation was designed.

The second part of the paper details the results of the trial, with the cavern under both static and operating conditions. The trial includes a start-up phase, where various blanket depths were set to calibrate the system and check the results. The cavern was then put into production using its normal blanket control system, allowing direct comparison of measured blanket depths and those calculated from the SonicGauge and wellhead pressure sensors.

The paper concludes with the results of the trial, which are very promising, and the steps required to refine the live brine-blanket interface measurement. The revised methodology will be put into practice in the coming months and if successful will allow us to use this technique for future cavern development.

Key words: Cavern Development, Cavern Testing, Computer Modeling, Instrumentation and Monitoring, Well Logging