

## **Re-drill into a High Pressure Cavern to Re-establish Brine Production**

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### **Abstract**

In the North of the Netherlands, near the town of Veendam, magnesium salts are being solution mined by NEDMAG. Mainly the magnesium salts carnallite and bischofite are mined at an average depth of approximately 1700 m. Both the preferential dissolution of carnallite and bischofite compared to halite and the slanting stratification have major influence on the mining process.

In 2013 the tubing of one of the production wells was damaged. An operation was set up with the objective to re-establish production with the planned production point at the original depth.

As a result of the project the broken 5" x 4½" completion was removed and the well was recompleted with a 5" x 4½" drill-in completion. The drill-in completion drilled 200 m at high lithostatic brine pressure. Once the planned depth was reached the drilling BHA was cut off, a 3½" dilution string installed and the well was brought back into production.

A Snubbing Unit was chosen to do the drilling operation under constant, high wellhead pressure (approx. 120 bars). The main requirement was that the unit could withstand the pressures and be equipped to drill. An additional requirement was that the entire equipment (e.g. BHA's, and completion) was able to be run and installed in the well under the same, constant high pressure.

This paper discusses the design and operation of this highly unique project, including the identification of the required services, equipment and materials. The operation itself is presented according to the different steps that were taken. Finally the paper reviews the actual performed operation and the learning points will be presented.

**Key words:** Cavern Operation, High Brine Pressure, Well Design, Snubbing Operation, Drill-in Completion, Netherlands