SOLUTION MINING RESEARCH INSTITUTE
105 Apple Valley Circle
Clarks Summit, Pennsylvania, USA

Telephone: 570-585-8092 ◆ Fax: 570-585-8091
www.solutionmining.org ◆ smri@solutionmining.org

Technical Conference Paper

Test and Analysis of New York Brine Disposal Formations

Ehgartner, B.[1]
Lee, M. [1]
Bauer, S. [1]
Smith, L. [2]
Lugert, C.[2]
Nyahay, R.[2]

Sandia National Laboratories
Albuquerque, NM, USA[1]

New York State Museum, Albana, NY, USA[1]

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Test and Analysis of New York Brine Disposal Formations

B. Ehgartner, M. Lee, and S. Bauer, Sandia National Laboratories, Albuquerque, NM 87185[1]

L. Smith, C. Lugert, and R. Nyahay, New York State Museum, Albany, NY 12230[2]

Abstract

The market for natural gas in North-Eastern United States favors development of solution mined storage caverns in salt. However, brine disposal remains an issue. Potential disposal formations are typically tight or low permeability and in the past the successful permitting of wells has not been possible for the disposal rates needed for economical cavern development.

A number of different injection techniques were evaluated for brine disposal. The injection analyses required not only information regarding the permeability and porosity of candidate rocks, but an understanding of formation depth, geometry, fluid saturation, and in situ stress state in areas located near potential storage sites. The injection formations must have sufficient storage volume to handle the large quantities of brine produced in leaching salt storage caverns as well as sufficient permeability to accept the brine at economic cavern development rates.

As part of the New York State Museum geological study[2] to find and evaluate potential disposal horizons, candidate horizons were selected from the Queenston Formation and Beekmantown Group. Tests were conducted on core from Queenston sandstone and Beekmantown limestone. The measured permeabilities and porosities were compared to previous test results on similar rocks.

In order to complete the study, a standard vertical injection well with and without stimulation was modeled. Stimulation or enhanced injection in this case was achieved through the creation of a large fracture extending radially from the well. The amount of stimulation through fracturing was varied in the modeling, but extensive fracturing can be problematic in tight formations, as the potential for earthquakes exists. Horizontal well injection rates were also simulated. These results are coupled with recent industry experience in the Queenston Formation and Trenton-Black River Group to suggest a promising outlook.

Key Words: Brine Disposal, Laboratory Testing, Computer Modeling, Horizontal Drilling

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[2] The Systematic Technical Innovations Initiative for Brine Disposal in the NE (DE-FC26-01NT41298) was conducted by The New York State Museum, Center for Stratigraphy and Paleontology along with Sandia National Laboratories.