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IN SITU STRESS AND PERMEABILITY TESTS IN THE HUTCHINSON SALT AND THE OVERLYING SHALE, KANSAS

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ABSTRACT

This paper presents the results of in situ stress and permeability tests at three natural gas liquid (NGL) storage sites in central Kansas. The geologic integrity of a storage cavern requires that the leakage be within bounds that cannot affect human safety, much less result in significant loss of product. Two factors that affect leakage are the permeability values of the host rocks and the capacity of the rock to fracture under storage pressure conditions. Current regulatory requirements in Kansas call for core testing to address these issues. For the three sites addressed in this paper, the operator and the regulator both agreed to direct testing of exploratory wells. The pulse permeability tests and the hydrofracture tests provide more representative data for in situ conditions than core tests. The testing programs found permeability values that were not uniform but were well within normal ranges for shales and salt. The stress values indicated a fracture gradient that was slightly above to 25 percent above the lithostatic pressure, which was taken as 1 pound per square inch (psi)/foot.

Keywords: Hydraulic Fracturing, Cavern Hydraulics, Well Logging, Bedded Salt Deposits, Kansas