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PAPER



HYDROLOGY OF BRINE DISPOSAL IN CAPROCK OF BARBERS
HILL SALT DOME, CHAMBERS COUNTY, TEXAS

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HYDROLOGY OF BRINE DISPOSAL IN CAPROCK OF BARBERS HILL SALT DOME, CHAMBERS COUNTY, TEXAS

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Abstract

The Barbers Hill salt dome in Chambers County, Texas is the largest LPG storage facility in the world with 137 solution-mined chambers and a total storage capacity of 155,522,000 bbl (24,726,000 m³). These storage operations require an efficient system to dispose of the excess brines. A method of disposal has been developed whereby brines flow by gravity into lost circulation zones in a 1,000 ft (305 m) thick caprock at the top of the salt dome. The cumulative disposal volume is well over a billion barrels. An investigation of the hydraulic properties of this caprock disposal system was carried out using interference tests. These tests reveal that the remarkable effectiveness of this system depends upon an inner circular region within the caprock of very high transmissibility, 3.1×10^4 d ft (9.45×10^3 d m). This inner region is hydraulically connected through a leaky boundary at a radial distance of 8,000 ft (2,438 m) to an outer series of formations whose transmissibility is one-tenth that of the inner region. These results have been confirmed in a 50-day injection test affecting the whole field. The 8,000-foot (2,438-meter) radius to the leaky boundary is an important finding because this distance places the location where brines leave the caprock far out on the steep flanks of the structure. Depth below the surface at this point is well below the Burkeville, a confining layer that separates shallow fresh water aquifers from deeper salt water sands. Future operation of the disposal system will require that brine levels in caprock wells be monitored on a continual basis. Such monitoring and the very favorable hydraulic characteristics of the lost

circulation zones in the caprock will make it possible to adjust disposal rates as necessary to maintain a safe mode of operation.

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