Meeting Paper

Analyses of Salt Caverns with Granular Wastes

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ABSTRACT

This paper describes a suite of numerical analyses performed in support of a permit application to dispose of wastes in salt caverns located in the Boling Dome, Wharton County, Texas. The application was filed in 1994 by Secured Environmental Management (SEM), Inc., with the Texas Natural Resources Conservation Commission (TNRCC). Wastes would be dehydrated on the ground surface, mixed with cementitious materials, and injected with compressed air into de-watered caverns in the form of a granular media. The caverns would be solution mined over depth intervals of about 2000 to 3000 ft (610 to 915 m), and would have diameters ranging from 100 ft (30 m) at the top, to 165 ft (50 m) at the bottom. Salt cover over the caverns would be about 750 ft (230 m), and pillar thickness between caverns would be 385 ft (117 m).

Numerical models were designed to address issues raised by the TNRCC relative to SEM's application. Two different computer programs, VISCOT and FLAC, were employed to demonstrate consistency of modeling results. Modeling included the "cavern history" for calculating the maximum extent of the "disturbed salt zone" (DSZ) around caverns, as well as the time dependent loss of cavern volume, compaction of fill material, and gas pressure build-up within sealed caverns. Other modeling involved analyzing the effects of anomalous temperature increases in the fill material within a cavern, and determining a conservative bound on surface subsidence over caverns. Results were compared to findings from other salt cavern modeling studies, and found to be generally consistent. The approach of this study could also be used for modeling caverns that are initially brine-filled, and are later back-filled with brine displacing granular media.