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1745 Chris Court
Deerfield, Illinois 60015-2079
847-374-0490

Meeting Paper

Log Analysis of Six Boreholes in Conjunction with Geologic Characterization Above and on Top of the Weeks Island Salt Dome

Allan R. Sattler

Sandia National Laboratories
Post Office Box 5800
Albuquerque, New Mexico 87185-0706
USA

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LOG ANALYSIS OF SIX BOREHOLES IN CONJUNCTION WITH GEOLOGIC CHARACTERIZATION ABOVE AND ON TOP OF THE WEEKS ISLAND SALT DOME

Allan R. Sattler
Sandia National Laboratories
Albuquerque, NM 87185-0706

ABSTRACT

Six boreholes were drilled during the geologic characterization and diagnostics of the Weeks Island sinkhole that is over the two-tiered salt mine which was converted for oil storage by the U. S. Strategic Petroleum Reserve. These holes were drilled to provide for geologic characterization of the Weeks Island Salt Dome and its overburden in the immediate vicinity of the sinkhole (mainly through logs and core); to establish a crosswell configuration for seismic tomography; to establish locations for hydrocarbon detection and tracer injection; and to provide direct observations of sinkhole geometry and material properties. Specific objectives of the logging program were to: (1) identify the top of and the physical state of the salt dome; (2) identify the water table; (3) obtain a relative salinity profile in the aquifer within the alluvium, which ranges from the water table directly to the top of the Weeks Island salt dome; and (4) identify a reflecting horizon seen on seismic profiles over this salt dome. Natural gamma, neutron, density, sonic, resistivity and caliper logs were run. Neutron and density logs were run from inside the well casing because of the extremely unstable condition of the deltaic alluvium overburden above the salt dome. The logging program provided important information about the salt dome and the overburden in that (1) the top of the salt dome was identified at ~189 ft bgl (103 ft msl), and the top of the dome contains relatively few fractures; (2) the water table is approximately 1 ft msl, (3) this aquifer appears to become steadily more saline with depth; and (4) the water saturation of much of the alluvium over the salt dome is shown to be influenced by the prevalent heavy rainfall. Drilling data alone could not provide much of the fine detail derived from depth-dependent properties of the salt dome top, the brine, and alluvium above the dome, or detail of hole rugosity. However, strong indications of a seismic reflector (other than possibly the important water table and the salt-alluvium contacts) were not observed. There is an ambiguity in the top of the water table from one of the wells in the immediate vicinity of the sinkhole in that the interpretation of the log data is inconsistent with in-situ permeability data of the alluvium. Nonetheless, this logging program, a part of the sinkhole diagnostics, provides unique information about this salt dome and the overburden.

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