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STORAGE-WELL DRILLING IN THE WESTERN CANADA SEDIMENTARY BASIN, CENTRAL ALBERTA

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Abstract

Storage-well drilling in the Western Canada Sedimentary Basin (WCSB) poses unique challenges to even the most seasoned industry geoscientists and engineers. Ostensibly, geology and modern rotary drilling practices in the WCSB are well understood, especially in the province of Alberta, but the relative lack of storage wells that have been drilled in the basin when compared with “conventional” oil and gas wells must be considered.

Chief among the considerations for the storage-well drilling engineer is the sheer size and depth of the wellbore necessary to accommodate a suitably large-diameter cemented casing for storage operations. Subsequently, the equipment required for drilling and completing such a well, and to a certain extent the costs involved, are outsized with respect to typical oilfield drilling and services. Maximum hook load, mud pump rate and annular velocity, drilling fluid type, drill bit selection, drill pipe diameter and annular space, cement blends and volumes, and directional well design are all parameters that have relatively few parallel examples.

The team operations geologist faces similar challenges, in that there are relatively few salt penetrations throughout the basin from which to obtain petrophysical (i.e., wireline) and geochemical data. Ditch samples collected during drilling to confirm formation tops often include uphole contamination due to multiple trips, high pump rates, and large annular volumes. Sample preparation itself requires a brine solution in which to clean samples. In any case, the crucial top of the target bedded salt horizon is difficult to define with pinpoint accuracy “on the fly.” If casing point is chosen at a depth (e.g., 5–7 metres into the salt), confirmation of the salt top via wireline tools may be problematic: tool configuration and/or bottom-hole detritus may prevent the tool from “seeing” the marker.

Within the context of the WCSB in central Alberta and using recent real-life examples, this paper will focus on a descriptive analysis of storage-well drilling, and scientific applications to provide accommodation space for improvements in this comparatively uncommon field of study.

Keywords: Caverns, Drilling, Storage Wells, Alberta