

PETROGRAPHIC, HALOKINETIC AND STRUCTURAL ANALYSIS OF PERMIAN AGE CARBONATE CAPROCK AT GYPSUM VALLEY SALT WALL: PARADOX BASIN, COLORADO

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Abstract

Diagenetic carbonate caprock forms on salt diapirs when precursor gypsum/anhydrite caprock is altered to carbonate by sulfate-reducing bacteria present in hydrocarbons. Caprock present in diapir-flanking positions is referred to as lateral caprock. Two very different end-member models have been proposed for the formation of lateral caprock: (1) in situ model requiring deeply circulating undersaturated water or (2) halokinetic drape-fold model, which invokes formation on the diapir crest and subsequent halokinetic drape fold rotation to a flanking position. This study will test the hypothesis that fault-bounded carbonate rocks previously mapped as steeply dipping Lower Permian Honaker Trail Formation along the margin of Gypsum Valley salt wall, Paradox Basin, Colorado are actually highly competent lateral carbonate caprock facies of Lower Permian age that were faulted during the process of halokinetic drape folding associated with passive diapirism. Field data will include detailed mapping, stratigraphy, fault interpretation, and will be combined with petrographic, geochemical, and isotope analysis. The goal of this study aims to (1) predict subsurface lateral caprock and trap geometries at the Cutler/diapir contact at Gypsum Valley salt wall and potentially at the same contact bounding other Paradox Basin salt walls, (2) understand if compartmentalized near-diapir trap elements are affected by syn-halokinetic deformation faulting, (3) identify timing of hydrocarbon generation and migration in the Paradox Basin started by lower Permian time, and (4) attempt to utilize this outcrop as an analog to aid in the pre-drill prediction of lateral carbonate caprock in other salt basins.

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