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Patrice C. Chauvin¹, Michael R. Hudec² (1) ExxonMobil Exploration Company, Houston, TX (2) Bureau of Economic Geology, Jackson School of Geosciences, The University of Texas at Austin, Austin, TX

Structural Style of a Normal Fault System Above the Salt Valley Salt Wall, Paradox Basin, Utah

Extension and salt movement produced a normal fault system investigated in the northeastern Paradox Basin, Utah. Strata over the crest of Salt Valley salt wall are arched, and have collapsed along a complex system of normal faults. Most faults trend parallel to the strike of the underlying salt wall, and interact in complex patterns. Three patterns have been mapped in the study area: horsetail splay, overlap, and cross-trending. Differences in the fault patterns allow the study area to be subdivided into Northern, Southern, and Central Regions.

A 1:20,000 geologic map, two cross-sections, and a table of spatial relationships were compiled to: a) compare length/throw data with data from non-salt regimes, and b) investigate the structural history of the mapped area. Three conclusions were made. First, numerical analysis of field measurements suggests that fault displacement and length are related by a power-law function with an exponent between -1.0 and -1.5 . Secondly, qualitative relay ramp analysis determined that the Salt Valley relay patterns identified in map view do not exhibit the displacement pattern typically displayed by isolated relay ramps. Lastly, bed dips, fault map patterns, and variations in extension along strike suggest that extension oblique to trend of the Salt Valley salt structure was simultaneous with salt withdrawal.