

Salt-Sediment Interaction in Lower Triassic Moenkopi Formation Near the
Castle Valley Salt Wall, Paradox Basin, Utah

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Abstract

Stratigraphic, sedimentologic and compositional data from the Moenkopi Formation near Moab, Utah, indicate that the Castle Valley salt anticline of the Paradox basin was a diapiric salt wall with well developed topography and exposed salt during the early Triassic. Strata within the salt anticline region have long been known to thin adjacent to salt anticlines and thicken away from them, indicating control of sedimentation by salt generated topography. Sedimentology and compositional aspects of the Moenkopi Formation adjacent to the Castle Valley salt wall further supports this assertion. The world's oldest gypsum paleosols are found in overbank strata interbedded with high width/depth ratio sandstone bodies deposited by ephemeral rivers. In combination, these features indicate an arid, wadi depositional environment. Paleocurrents in sandstone units are generally parallel to the long axis of the salt wall, suggesting that large drainage systems were controlled by synclinal topography. Local gypsum sheet sandstones and thin debris-flow beds containing clasts of gypsum and dolostone derived from the diapiric Paradox Formation of Pennsylvanian age provide evidence for significant topography and exposed evaporite during Moenkopi deposition. The salt diapir itself is therefore interpreted to have provided the sulfate source for both gypsic paleosols and gypsum sandstone sheets in the Moenkopi. These observations demonstrate strong control of Moenkopi deposystems by salt-generated topography adjacent to an exposed salt wall. Recognition of similar sedimentologic and pedogenic phenomena in salt basins elsewhere may serve as important indicators of diapir activity and proximity in petroleum exploration.