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Syn-Sedimentary Deformation in the Central Raton Basin, Colorado and New Mexico: A Potential Control on Sandbody Orientation

Structures exposed in outcrops of latest Cretaceous and early Tertiary strata across the Raton basin (northeastern New Mexico and southeastern Colorado) suggest that Laramide thrusting at the western margin of the basin produced horizontal compression and bedding-parallel displacements in the shallow, contemporaneous strata well east of the thrust front. The compressive structures consist of low-angle thrust faults meters to tens of meters in scale that have commonly been interpreted as post-depositional tectonic features. However, soft-sediment rather than brittle deformation textures in the rock and an absence of slickensides along planes of offset suggest that these strata were poorly lithified at the time of thrusting. Moreover, these structures are commonly overlain or truncated by undeformed strata that could only have been deposited after deformation. Smaller, low-angle dip-slip shear planes, common in the interbedded coals, may also be related to this syn-sedimentary, Laramide compression. At least one normal fault, striking perpendicular to the strike of the thrust faults, displays textures that also suggest motion prior to significant lithification. Structural modification of the strata during deposition may have diverted local drainage along the depositional strike and thus may have helped control the orientation of fluvial sandstone reservoirs in the basin.