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Reservoirs in the Abo Formation, Southeastern NM: A Fractured Play within the Perturbed Stress Field at the Termination of Wrench Faults

Production of natural gas from the low-permeability arkoses and sandstones of the Permian Abo Formation, southeastern New Mexico exceeds matrix deliverability capacity, indicating that the reservoirs are fractured. Despite the absence of fractures in the few available cores, the Abo Formation is highly fractured in outcrop. Thus the strata are susceptible to fracturing even in relatively undeformed settings.

Although the Abo Formation was deposited over much of southeastern New Mexico, Abo reservoirs are most productive where the strata are associated with a series of sub-parallel, northeast-trending, deep-seated, right-lateral wrench faults called the Pecos Buckles. The surface strata along these buckles consist of poorly exposed evaporite and carbonate facies. However, better-exposed sandstones along similar wrench faults in the Algerian Sahara have numerous irregular fractures that are commonly formed in the vicinity of such wrench faults. Strata are fractured due to volume constraints at irregularities during lateral offset along the faults. By inference, reservoirs in the Abo Formation were fractured during lateral offset along the Pecos Buckles. Most of the Abo reservoirs are located near the northeastern termination of these wrench faults, therefore fracturing may also have been a response to stresses associated with offsets along fault splays at the ends of the Pecos Buckles.