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SHALLOW STRATIGRAPHY, STRUCTURE, AND SALT-RELATED FEATURES, YATES OIL FIELD AREA, PECOS AND CROCKETT COUNTIES, TEXAS

by

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ABSTRACT

The Yates oil field is situated at the southern tip of the Central Basin platform, a Late Pennsylvanian to Late Permian structural and paleotopographic high separating the Midland and Delaware basins in west Texas and southeastern New Mexico. During Leonardian and early Guadalupian times, carbonate sedimentation occurred in a bank environment on the platform edge. Latest Guadalupian sedimentation consisted largely of anhydrite, probably deposited in sabkha and salina environments. Later Ochoan evaporite deposition filled the remaining basins with halite (the Salado Formation), but may have failed to cover the Central Basin platform entirely. Permian sedimentation ended with the deposition of a thin sequence of anhydrites and siltstones.

Upper Triassic(?) siltstones and shales were deposited disconformably over the area. Minor erosion during the Jurassic was followed by a major marine transgression during the Early Cretaceous. Trinity Group shales and sandstones, deposited as marine and nonmarine facies, were overlain by carbonates of the Ft. Terrett, Ft. Lancaster, and Buda Formations.

Surface exposures in the study area are limited to the upper Trinity Group and the overlying Cretaceous carbon-

ates. North, east, and south of the Yates field, these rocks are intensely fractured with several sets of near-vertical joints, all locally uni-directional and roughly parallel to the edge of the Central Basin platform and the present pinch-out of the Salado halite.

Surface mapping combined with well information led to the discovery that upper Trinity Group sediments are significantly thinner in areas of intense fracturing. Where not affected by dissolution, overthickened Salado salt is also present, possibly forming anticlines that parallel the edge of the Central Basin platform.

Differential loading of basin-center versus basin-edge sediments apparently produced minor salt movement during the time of deposition of the upper Trinity Group, resulting in associated thinning of the Trinity Group near the pinch-out of the Salado salt. Carbonate deposition during the Early Cretaceous may have slowed anticline development, but minor post-carbonate salt movement extensionally fractured the brittle carbonates and produced some of the joints visible today.

The joint sets became sites of enhanced ground water flow and subsequent salt dissolution. The present Pecos River became entrenched along the joint sets, possibly during the Eocene. Additional salt and overburden removal

led to extensive collapse, fracturing, and faulting, which masked the presence of the salt anticlines.

Features associated with salt movement, dissolution, and collapse in the southern Permian basin have not previously been described in detail. While salt dissolution and collapse commonly occur in the region, structures similar to the proposed salt anticlines probably exist only where edge effects are developed at pinch-outs or substantial thinnings of the Salado halite. Geologists and engineers using surface data to infer subsurface conditions in this area need to consider complications introduced by salt movement and removal.

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