FACIES AND PALEOCURRENTS OF GALLUP SANDSTONE: MODEL FOR ALTERNATING DELTAIC AND STRAND-PLAIN PROGRADATION

By D.G. McCubbin, Marathon Oil Co., Littleton, Colo.

Abstract

The Upper Cretaceous Gallup Sandstone of northwestern New Mexico, is a regressive, shallow-marine to alluvial sequence up to 140 ft. thick. Vertical and lateral facies sequence and orientation of current- and wave-produced structures show that the shoreline advanced by episodes of delta progradation, followed by minor erosional transgression and subsequent seaward accretion of surf-zone and beach deposits. Each episode is thought to be a reaction to stream positions on a broad coastal plain. In a 200-sq. mi. area, 2 delta progradations and 3 strand plains are recognized, each with some important variations.

The deltaic deposits consist of: (1) distributary-channel sandstones, entrenched in older beach deposits; and (2) more widespread marine sandstones, thinning and grading seaward. The marine deltaic sandstones are in tabular beds deposited from short-duration currents; these beds vary in thickness and bioturbation, depending upon distance from dispersal centers. There is little evidence of sand transport or reworking by waves.

The strandplain units consist of: (1) coarser sandstones with high-angle cross-strata in trough-shaped sets and minor interbeds of siltstone, overlain by (2) finer sandstones with low-angle cross-strata in wedge-shaped sets and local seaward-sloping heavy mineral placers. The coarser sandstones rest on a basal scour surface cut on older deltaic deposits, probably representing adjustment of profile with decrease in sand supply and increased effectiveness of wave action. Cross-strata dip directions record sand transport parallel with shore but in frequently reversing directions, suggesting the influence of surf generated by seasonal or more frequent weather changes. Upward gradation to sandstones with the characteristics of beach foreshore deposits indicates beach progradation.

CHARACTERISTICS OF THE TRINIDAD SANDSTONE, SOUTHERN RATON BASIN, NEW MEXICO[1]

By John O. Maberry and Charles L. Pillmore
U.S. Geological Survey, Denver, Colo.

Abstract

The Trinidad Sandstone, a correlative of the lower Fox Hills of the Western Interior and the Pictured Cliffs Sandstone of the San Juan Basin area, was deposited in Late Cretaceous time on an eastward-prograding shoreline. Depositional framework was in shallow neritic and beach environments during the final transition from marine to continental conditions as the Cretaceous sea retreated from New Mexico and Colorado. The Trinidad conformably overlies the Pierre Shale, and is successively overlain by the coal-bearing Vermejo (Cretaceous) and Raton (Cretaceous-Paleocene) Formations. The Trinidad intertongues with the Vermejo Formation along the southern margin of the Raton Basin between Dawson and Cimarron, New Mexico. This intertonguing represents local transgressions during the withdrawal of the sea. The Trinidad ranges from 0-130 feet thick in the New Mexico portion of the Raton Basin and consists mostly of very fine- to medium-grained sandstone. Linear inorganic sedimentary structures include ripple marks, crossbedding, channel-fill structures, parting lineation, and crumpled and contorted bedding.

Ophiomorpha is the most abundant organic sedimentary structure (trace fossil) in the Trinidad. *Aulichnites, Asterosoma, Teichichnus, Diplocraterion, Desmograpton,* and other unidentified tracks and trails are common throughout the formation in outcrops from Cimarron to Raton, New Mexico. These trace fossils are unique to the Trinidad in rocks younger than Pierre Shale in this area, and serve to distinguish sandstones of the Trinidad from lithologically similar continental sandstones of overlying formations both at the outcrop and in drill cores.

[1]Publication authorized by the Director, U.S. Geological Survey.