Sequence-Stratigraphic Subdivision of the Burro Canyon Formation, Dakota Sandstone, and Lower Mancos Shale (Cretaceous) of the San Juan Basin, New Mexico and Colorado

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In the San Juan Basin, the Burro Canyon Formation, Dakota Sandstone, and lower Mancos Shale up to the Greenhorn Limestone Member contain three subaerial-erosional sequence boundaries, five bentonite beds, several molluscan biozones, one obscure correlative conformity, and many coarsening-upward parasequences capped by marine-flooding surfaces (Owen and Head, 2001). Paleoenvironments include braided and meandering fluvial, deltaic, tidal, shoreface and offshore marine. The studied interval may be divided into three depositional sequences.

The lower sequence is coincident with the Burro Canyon Formation, a wedge-shaped, braided-stream, pebbly sandstone body that is bounded by the K-1 and K-2 disconformities. The K-3 unconformity truncates both K-2 and K-1 southwestward. No age-diagnostic fossils have been reported from the lower sequence in the San Juan Basin, but it is generally regarded as Aptian-Albian.

The middle sequence is in the lower Dakota, containing the Encinal Canyon Member, a fluvial, estuarine, and tidal valley-filling sandstone, and the Oak Canyon Member, mostly offshore marine shale with tidal and shoreface sandstones. It is an eastward-thickening, wedge-shaped unit bounded by the K-2 and K-3 unconformities. The K-2 disconformity may pass into a correlative conformity east of the San Juan Basin. The K-3 unconformity passes into an obscure correlative conformity at a hinge-line near the paleoshoreline in the eastern San Juan Basin. Correlation within the middle sequence is aided by the presence of the prominent A bentonite bed in the Oak Canyon. Middle Cenomanian mollusks occur in the middle sequence.

The upper sequence contains the remainder of the Dakota with intertongued marine Mancos Shale above the K-3 unconformity. Regional tilting down to the northeast produced erosional truncation of lower Dakota, Burro Canyon, and Morrison strata below K-3 and onlap of marine upper Dakota members (Cubero, Paguate, and Twowells Sandstone Members) above K-3, which is a low-angle angular unconformity. A meandering fluvial-deltaic complex of sandstones, carbonaceous shales, and local coals, forming the Dakota main body, an informal lithostratigraphic unit, lies on the K-3 unconformity. The upper boundary of the upper sequence is problematic. No regional erosional unconformity was identified above K-3, but erosion surfaces are present locally in the Paguate Sandstone Member, where distributary channel sandstones cut into shoreface sandstones, and in the Twowells Sandstone Member in the southern San Juan Basin, where coarser marine sandstones truncate shoreface sandstones. Correlative conformities prevail elsewhere in place of the local erosion surfaces in the Paguate and Twowells. The B bentonite bed, which may be equivalent to the widespread X bentonite of the Western Interior Basin, is a prominent chronostratigraphic marker a few feet above the marine-flooding surface at the top of the Paguate. The discontinuous C bentonite beds occur in and near the Twowells and the D bentonite occurs above it. The prominent E bentonite marks the base of the Greenhorn Limestone. . Upper Cenomanian mollusks occur in the upper sequence.

Well-developed Dakota sandy parasequences interbedded with marine Mancos Shale characterize the upper sequence. A retrogradational set of three parasequences are associated with the Cubero, only one forms the Paguate in most of the basin, and a progradational set of three characterize the Twowells interval. Although these parasequences are widespread, none are basin-wide. They disappear into their fluvial source strata to the west, and many become silty parasequences eastward away from their source.

The Burro Canyon/Dakota/lower Mancos strata offer an intriguing mixture of useful surfaces to subdivide the strata into genetic units. Multiple unconformities, marine-flooding surfaces, bentonites, and biozone boundaries are all available for use in subdividing strata with a total thickness of less than 400 feet.

Reference

Owen, D.E., and C.F. Head, 2001, Summary of the sequence stratigraphy of the Dakota Sandstone and adjacent units, San Juan Basin, northwestern New Mexico and southwestern Colorado: Proceedings, Low permeability and underdeveloped natural gas reservoirs of New Mexico, Conference and field trip, New Mexico Bureau of Mines and Mineral Resources, p. 2-19.