Dakota Bar and Channel Sandstones on the Southern Flank of the San Juan Basin, New Mexico

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Thirty maps were constructed, at ten-foot intervals, from the Lower Cretaceous Burro Canyon Sandstone, through the Upper Cretaceous Dakota Sandstone, and up to the base of the Greenhorn Limestone (Bridge Creek) Member of the Mancos Shale on the south flank of the San Juan Basin to delineate the evolution and location of individual marine bars and possible fluvial channel sandstones and other deltaic deposits. The Dakota Sandstone represents the first incursion of the Western Interior Seaway into the San Juan Basin area in Late Cretaceous (middle Cenomanian) time, about 96 Ma. Arms of this seaway encroached from the north from the Arctic Ocean and from the south from the Gulf of Mexico, ultimately meeting in northern New Mexico. The Dakota Sandstone thus reflects a transition upward from continental, mostly fluvial and overbank deposits in its lower parts, to marine coastal plain and shelf deposits in its upper parts. The western shoreline of the Western Interior Seaway ultimately transgressed nearly to the western border of Arizona and at that time the seaway's maximum width was about 1000 miles. At that time, the Mancos Shale and its various members were being deposited in the San Juan Basin area.

The highest-quality geophysical logs available, showing the Dakota-to-Greenhorn parts of the section, were used to distinguish the cleaner sandstones from mudstone intervals at tenfoot intervals. Marine bars and deltaic channel sands associated with delta-front deposition and long-shore-drift sedimentation are seen evolving through time on the thirty maps as these deposits traversed laterally and vertically. Each map thus represents a snap-shot of depositional relations at thirty successive intervals, and in sequence shows the evolution of the Dakota Sandstone's lithologic components through space and time. When the individual maps are viewed sequentially, bars can be seen to migrate laterally in space, build up, and diminish through time. Implications of these sandstone-body geometries are important in understanding the presence, or lack of, an oil and/or gas charge in the sandstones that are isolated and outside of (south of) the mature "cooking pot" that existed in the deeper parts of the San Juan Basin to the north. Likewise, longrange migration up-dip (to the south) through channel sandstone beds in the lowermost part of the Dakota probably accounts for hydrocarbon accumulations on structural noses south of the "cooking pot".

The technique used in this study to construct and portray a "time lapse" map series has produced an excellent picture of the probable direction of long-shore drift and channel and bar evolution across this part of the basin in Dakota time. The use of this technique to depict a detailed record of potential oil-and-gas reservoir rocks in other depositional basins may provide a powerful exploration tool in less mature provinces.