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Applications of Sequence Stratigraphy to Hydrocarbon Exploration in the Middle and Upper Pennsylvanian Siliciclastic Depositional Systems of North-Central Texas: Abstract

Arthur W. Cleaves[1]

ABSTRACT

Over the last ten years sequence stratigraphy has developed into a major tool for hydrocarbon exploration in the Tertiary siliciclastic section of the northwest Gulf Coast. Unfortunately, sequence stratigraphic principles have not been widely or systematically applied to the Pennsylvanian producing units of North-Central Texas. Such concepts require consideration of the regional distribution of systems tracts, as well as basinwide correlation of eustatically-produced genetic units. Geographic exploration horizons of independent companies commonly encompass single counties or even smaller areas, thus giving rise to a major impediment for applying the new principles to Strawn, Canyon, and Cisco Group reservoirs on the Eastern Shelf of the Midland basin.

Identification of the appropriate eustatically-controlled genetic units for subsurface map construction constitutes the critical step for locating productive systems tracts. With the old format method, genetic units were defined in terms of the lithologic content contained between two transgressive limestone markers. It was assumed that no unconformities were present in the interval and that widespread deltaic progradation accounted for a unit's distribution across the shelf. With the new Galloway genetic stratigraphic sequence method, maximum flooding intervals as demonstrated by phosphatic black shales serve as the boundaries for eustatically-congruent, mappable units. One such genetic interval would contain highstand delta systems (either incised or unincised), an internal disconformity, shelf-interior incised-valley complexes or age-equivalent soil zones developed in marine shale, and unincised lowstand delta systems. Galloway sequences and their contained siliciclastic systems tracts thus defined can be applied to intervals less than 100 ft (30 m) thick.

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1 School of Geology, Oklahoma State University, Stillwater, OK