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Transgressive Estuarine Fill of an Incised Paleovalley, Upper Mississippian Chesterian Series, Shuck Field Area, Seward County, Kansas

A regional disconformity surface exists at the base of the Upper Mississippian Chesterian Series of the Hugoton Embayment of the Anadarko Basin in southwestern Kansas and northwestern Oklahoma. Associated with this sequence boundary is a paleovalley system eroded into the underlying limestones of the Ste. Genevieve and St. Louis formations. In the Shuck Field area, at a depth of 6300 ft. (1920m), in township T33S-R34W of Seward County, Kansas, this incised paleovalley system is overlain by sedimentary strata deposited during the first recognizable lowstand to transgressive systems tract of the Chesterian Series. Modern three-dimensional reflection seismic data surveys have been utilized successfully in delineating the paleovalley; however, recognition of facies changes remains beyond the limits of seismic resolution. Based on core analyses as well as the seismic, the proposed environment of deposition for the basal Chesterian strata of Shuck Field is a tidally influenced estuarine system. Interpreted facies therein include fossiliferous limestone and mudstone clast conglomerates, tidal sand wave sandstones up to 150 ft. (45m) thick, tidal creek sandstones, mixed bedding tidal flat deposits, coaly deposits, and marine/estuarine mudstones. Facies changes commonly occur over lateral distances of less than 100 ft. (30m), increasing the difficulty of locating reservoir quality rock. Diagenetic changes affecting the basal Chesterian in the Shuck Field include compaction, quartz overgrowths, clay mineral authigenesis, calcite and dolomite precipitation, leaching and alteration of labile minerals, and bitumen pore-filling. These diagenetic changes have detrimental effects on reservoir quality and production characteristics.