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Diagenetic patterns and reservoir development in the Woodbine Formation, Tyler County, Texas

The Upper Cretaceous Gulfian Woodbine Formation of Tyler County, Texas, developed in a shelf to slope environment. The sandstones produce hydrocarbons from several fields, including Double A Wells and Damascus fields. This study focuses on diagenetic patterns and reservoir development of the Woodbine Formation in the Hunt Oil Tapscott 1, the Humble Oil Howell 1, the Standard Longbell 2, and the Cities Service B-1 Sutton at burial depths of 11,200-14,816 ft (3,414-4,516 m). The shale-rich section contains isolated very fine- to fine-grained sand bodies comprised predominantly of detrital quartz with minor calcite fossil fragments and feldspar grains. Common secondary minerals include quartz overgrowths, chlorite, calcite, and iron-rich dolomite. Diagenetic alteration was limited in portions of the Longbell and Tapscott sands due to a high matrix-to-grain ratio and early calcite cementation. The diagenetic history of the sandstones in the other wells is similar. Quartz overgrowth development prior to and partly contemporaneous with chlorite growth dominated the early diagenetic history. This was followed by a period of carbonate cementation and localized later dissolution. Authigenic kaolinite filled some of the remaining pore space. Where present, relatively early quartz overgrowths and/or calcite cement prevents extensive compaction and related porosity loss in matrix-free sandstones. Intergranular primary porosity is preserved in the Howell and Sutton wells where quartz overgrowths and cementation are limited. Authigenic chlorite in primary intergranular pores is common, and its locally-abundant presence results in extensive microporosity. The dissolution of unstable detrital grains and carbonate cement also produced significant secondary porosity in both wells.