Estes-Jackson and others, 2001 Data Set 24

Reference: Estes-Jackson, J.E., J.C. Webb, and S.G. Siguaw, 2001, An integrated exploration model for the Muddy Sandstone at Riverton Dome Field, Wyoming, [abs.]: American Association of Petroleum Geologists Annual Convention, Denver, CO, p. A59.

Author's affiliation: consultant

Age: Cretaceous

Formation: Muddy Sandstone

Location: Riverton Dome Field, Wind River Basin, Wyoming

Well: SOCO Tribal 54

Depth range: 10,027-10,068 feet

Depositional environment: "The Muddy Sandstone was deposited as an incised valley-fill sequence above a lowstand surface of erosion. … The basal member was deposited within a meandering fluvial channel belt in the lowermost portion of the valley-fill sequence and is the primary reservoir of Riverton Dome field. It consists of faintly crossbedded to massive, fine- to medium-grained sandstone. A transgressive surface separates the basal member from the overlying middle member. The middle member consists of wavy laminated siltstone coarsening upward to lower very fine sandstone deposited in a bay-head or tidal delta environment. It is separated from the overlying upper member by a second transgressive surface. The upper member consists of a basal bed of bioturbated sandstone overlain by thinly-bedded, wavy-laminated shaly sandstone. It was deposited in a marsh to estuarine channel environment in the final phase of the Muddy marine transgression." (text taken from notes supplied by the authors)

Lithology and alteration: "The upper member is a sublitharenite to litharenite, consisting of subangular to subrounded, very fine- to lower fine-grained sand and silt. Composition is predominantly monocrystalline quartz, with moderate amounts of rock fragments. Siderite and pyrite precipitated during early diagenesis. Ferroan calcite locally filled intergranular pores and also locally replaced plagioclase. Where early calcite was not present, siderite and pyrite were followed by small amounts of pore-lining chlorite and quartz overgrowths. Porosity in the upper member is low (4% to 8%) and consists of quartz-overgrowth-lined, modified primary intergranular mesoporosity and clay-lined or clay-filled intergranular microporosity. It has poor reservoir potential."

Lithology and alteration: "The middle member is very similar to the upper member compositionally. ... Nearly half of the original porosity has been lost to compaction. It has very poor reservoir potential."

Lithology and alteration: "The basal member of the Muddy Sandstone is classified as a quartzarenite, and is composed of fine- to medium-grained, subrounded to rounded, monocrystalline quartz that was derived from a pre-existing quartzose sedimentary rock (possibly the Tensleep Sandstone). This member is predominantly cemented by clay, which occurs as pseudomatrix, detrital, and authigenic varieties. The pseudomatrix formed as a result of compaction and ductile deformation of chloritic mudstone lithoclasts during sediment burial. Detrital clay particles were infiltrated between sand grains during deposition. Authigenic clay, including chlorite, mixed-layer illite-smectite, and kaolinite, were precipitated as pore-lining, mold-filling, or fracture-filling cement. The abundance of this type of clay in this member prevented quartz overgrowths and thus preserved porosity. Measured porosity in this member ranges from 11% to 22%. Consequently, this member has very good reservoir potential."

Production: gas.

Core measurement conditions: not stated.

Data entry: Table of digital data provided by senior author.