Transregional Sequence-Stratigraphic Correlation of the Maastrichtian Fox Hills Sandstone: Colorado, Wyoming, South Dakota, North Dakota, and Montana

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ABSTRACT

The Campanian to Maastrichtian Fox Hills Sandstone records the terminal retreat of the Western Interior Seaway (WIS) in which shoreline sandstones were forced to regress >1300 km. This regressive sandstone is important for clarifying paleogeographic interpretations for the WIS and the source-to-sink processes that produce large-scale regressive sequences that can form important reservoir intervals. Despite numerous local studies of the Fox Hills Sandstone, the transregional source-to-sink connection of the fluvial-to-marginal marine depositional systems is poorly understood. This study correlates three main unconformities, using biostratigraphic data and geochronologic data to develop a transregional sequence-stratigraphic framework of the Fox Hills Sandstone from Colorado to Montana. This framework will elucidate the fluvial feeder systems, shoreline orientations, and architectural elements of regressive shoreline sandstones. Seventeen facies define eleven depositional environments within the Fox Hills Sandstone including: offshore marine, lower shoreface, middle shoreface, upper shoreface, pro-delta, delta front, delta plain, distributary channel, fluvial channel, estuary, and flood plain. Shifts in these facies highlight two transregional unconformities (i.e., sequence boundaries) that define two incised valley systems responsible for providing sediment to regressive shorelines of the Fox Hills Sandstone. The oldest incised valley system in Casper, Wyoming, feeds three parasequences that form a SE–prograding, flat-to-falling, progradational parasequence set. By contrast, the youngest incised valley system feeds five parasequences that form a NE–prograding, more vertically-stacked progradational parasequence set in Glendive, Montana; NE to E of Glendive, Montana, the number of parasequences increases up to eight. In general, parasequencess are more numerous and more vertically stacked from SW–W to NE–E, indicating a NE–E increase in the ratio of accommodation to sediment supply. Accommodation in the Fox Hills system could be driven by eustasy, Sevier and Laramide tectonics, and/or dynamic subsidence migration, as suggested by previous workers. We infer a main control of

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migrating dynamic subsidence because: (1) the Fox Hills Sandstone progrades a distance far greater than any Sevier- or Laramide-related flexural subsidence and (2) Fox Hills shorelines generally parallel dynamic basin-margins.