
Sequence Stratigraphy of the Eagle Ford (Boquillas) Formation in the Subsurface of South Texas and Outcrops of West Texas

Art D. Donovan¹ and Scott Staerker²

¹BP North American Gas, 501 Westlake Park Blvd., Houston, Texas 77079

²BP Exploration & Production Technology, 501 Westlake Park Blvd., Houston, Texas 77079

ABSTRACT*

The Eagle Ford of South Texas is an emerging nonconventional “shale gas” play. In the subsurface of this region the classic Eagle Ford succession is an unconformity-bounded depositional sequence, which is Late Cenomanian to Turonian in age. This sequence overlies the Buda Formation, which is Early Cenomanian in age, and is in turn overlain by the Austin Chalk, which previous data suggests is Coniacian to Santonian in age. The Eagle Ford depositional sequence in the subsurface consists of a retrogradational lower member and a progradational upper member, which are interpreted respectively as transgressive and highstand deposits. The Cenomanian-Turonian stage boundary occurs at or near the maximum flooding surface which separates these members. The nonconventional “shale” reservoirs are primarily associated with organic-rich mudstones within the lower (transgressive) member.

Regional well-log correlations have revealed that the thickness variations of the Eagle Ford, which ranges from less than 40 ft to over 400 ft, can be explained by onlap onto the unconformity at its base and truncation beneath the unconformity its top. From Maverick County in South Texas, which is situated in the Maverick Basin, to Bastrop County in Central Texas, which is situated on the San Marcos Arch, most of the Upper Member of the Eagle Ford is truncated beneath the unconformity at the top of the Eagle Ford.

What makes the Eagle Ford unique in terms of nonconventional reservoirs is that these strata also crop out in spectacular roadcuts and natural drainages along Highway 90, northwest of Del Rio in Val Verde and Terrell counties. In these outcrops, the Eagle Ford, which is also referred to as the Boquillas Formation, overlies the Buda Formation and is overlain by the Austin Chalk. In outcrop, the Eagle Ford is commonly divided into two members, a lower Rock Pens Member and an upper Langtry Member. Stratigraphic and biostratigraphic analysis of these outcrops suggests that, unlike the subsurface which consists of a transgressive lower and regressive upper member, each of the outcrop members represents a transgressive-regressive cycle. The lower Rock Pens Member is dated as Late Cenomanian to Turonian in age with the Cenomanian-Turonian stage boundary occurring at or near the interpreted maximum flooding surface of this cycle. Thick organic-rich mudstones, similar in character to the nonconventional reservoirs in the subsurface, occurs primarily below the interpreted maximum flooding surface. The Langtry Member has a lag at its base and can also be put into a transgressive-regressive succession which grades conformably into the Austin Chalk. This depositional sequence is latest Turonian to Coniacian in age with the interpreted

Donovan, A. D., and S. Staerker, 2010, Sequence stratigraphy of the Eagle Ford (Boquillas) Formation in the subsurface of South Texas and outcrops of West Texas: Gulf Coast Association of Geological Societies Transactions, v. 60, p. 787-788.

maximum flooding surface occurring at or near the Turonian-Coniacian stage boundary. These data suggest that the Eagle Ford, as mapped in the subsurface is equivalent to the Rock Pens Member in outcrop, and the Langtry Member in outcrop is equivalent to the basal portions of the Austin as commonly mapped in the subsurface. Thus the major angular unconformity defined at the top of the Eagle Ford in the subsurface is correlated to the unconformity interpreted at the Rock Pens/Langtry boundary in outcrop and not at the classic lithostratigraphic base Austin contact.

*Due to various circumstances, the full peer-reviewed manuscript was not available for inclusion within the Technical Papers section, but is available in the [Addendum](#).