Abstract

Throughout the Delaware Basin, unconventional reservoir performance and development have gained attention due to variable results. The need for understanding the complex nature and heterogeneity of the Leonard play has become of utmost importance as the industry moves through this challenged price environment. To reduce uncertainty and risk, the play must be analyzed in a regional sense by incorporating numerous data by several disciplines. In this paper, the reservoir was characterized through a collaborative effort including the disciplines of geology, geochemistry, petrophysics, geomechanics, geophysics, geomodeling and reservoir modeling.

The Permian-aged Leonard formation is prevalent throughout the Delaware Basin. Recently, drilling activity has been focused in southeastern New Mexico where the Leonard is a light oil to condensate play. In the area of study, the Leonard has been subdivided into three zones, with the primary target being the siliceous cemented mudstone facies. The stratigraphy and complex fluid system vary across the basin making this study critical for appraisal and development success. This paper will demonstrate the integration of core studies, regional fracturing, petrophysical analysis, geophysical attributes, geochemical data, production metrics and a structural framework into a static geomodel.

Geologic Setting of Delaware Basin Leonard (Avalon) Siltstone

The Delaware Basin is the western major structural depression of the greater Permian Basin of west Texas and southeastern New Mexico. During the Permian, the Delaware Basin was a deep-water trough bounded by three major basement uplift features: the Marathon Thrust Belt to the south, the Diablo Platform to the west, and the Central Basin Platform to the east.

The Leonard, or Avalon Shale, is Permian in age and is the youngest member of the Bone Springs Formation and will be referred to as Leonard throughout the paper. It is present in the lower slope to basinal portions of the Delaware Basin, but recent drilling activity has been focused in Lea and Eddy Counties, New Mexico where our area of study is located (Fig. 1).