Applying 3D Seismic Technology to Better Understand the Mechanical Variability of the Lower Barnett Shale in Southern Montague and Northern Wise Counties, Fort Worth Basin.

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Summary

This paper will explore recent advances in understanding that have occurred for Pioneer Natural Resources in the “Combo Play” portion of the Barnett Shale in northern Wise and southern Montague counties, as a direct result of the acquisition and interpretation of modern, wide azimuth, 3D seismic data. From clearer definition of the structural compartments, through incorporation of modern petrophysical logs to produce inverted mechanical property volumes, to horizon and volume based attribute analysis to provide information on fracture development, this paper will document an increasing focus on factors that appear to influence well production within the Pioneer area of interest (AOI).

The first part of this paper will show that the Lower Barnett Shale exhibits both vertical and areal variability of relatively high frequency making it difficult to predict mechanical properties using well log data alone. The Author will show that through integrating the high quality, proprietary 3D seismic data with pilot well information, including comprehensive petrophysical log suites, we can identify localized mechanical property “sweet-spots” within the AOI.

The second part of this paper will detail the preliminary results of a fracture characterization program using surface attributes derived from interpretation of 3D seismic data. The Author will compare the predictions from the 3D seismic data against observations made on high-resolution resistivity and micro-seismic data acquired in a test horizontal well program. The results appear to challenge existing dogma on the preferred horizontal orientation for the Barnett Shale.

Introduction

Pioneer Natural Resources first became involved in the Barnett Play of the Fort Worth Basin in 2007. The initial entry was in the “Core” area of the play in Denton, Parker and Southern Wise counties. Here the Lower Barnett is considered over-mature and is gas prone. In 2009 with weakening natural gas prices and developing engineering technology, Pioneer refocused its leasing efforts northward in the basin, where the Lower Barnett Shale was known to be less mature and significantly higher yields of oil and Natural Gas Liquids (NGL’s) were expected. This area, in southern Montague, southwestern Cooke and northern Wise counties has become known as the “Combo Play” Area. Pioneer began leasing in this area in August of 2009 and received the first fast-track