

Interpretation of Hydraulic Fracture Parameters, Horizontal Well Interference and Interaction Utilizing Microseismic Data in the Midland Basin Wolfcamp Shale Play

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Pioneer Natural Resources in Texas' Eagleford, Barnett and Wolfcamp unconventional shale plays have monitored microseismic from over 30 hydraulically fractured wellbores. This data has allowed us to better understand the interactions of our completions with the original geomechanical properties, tectonics and stress regime of our shale plays. In addition, the data has allowed us to see interactions with previous hydraulic fractures and has subsequently impacted our lateral wellbore spacing. In Pioneer's Midland Basin Permian age reservoirs we have observed differences in fracture height, overlap of stages, magnitudes of events, number of events, as well as significant fracture azimuth variation. Microseismic data over twelve jobs in Upton and Reagan County comprising 386 stages were collected using one contractor using downhole geophones in vertical and horizontal well bores. This has allowed for comparison of hydraulic fractures between various horizons within the Permian and also to compare different completion parameters. As a result we have adjusted landing zones and completion styles in certain horizons. The Microseismic data also appears to respond to the local pressure field controlled by multiple factors including completion practices, geologic structure, adjacent production and completions. We have been able to relate the lithological characteristics of the formations, predominately shale and carbonate sequences, to potential pressure seals as well as drivers controlling the extent of the stimulation. Pioneer's microseismic data have subsequently been combined with fracture and reservoir modeling to further refine our understanding of this resource and ultimately maximize the economic return on our shale assets.