

## **Recognizing Variations in the Relationship Between the Mechanical and Fracture Stratigraphies of the Pennsylvanian-Permian Section, Midland Basin**

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This study describes the relationship between the mechanical stratigraphy and the fracture stratigraphy of the upper Pennsylvanian and lower-middle Permian intervals in the Midland Basin in an effort to predict the presence of fracture prone intervals in the subsurface. 12 mechanical subdivisions are recognized from core analysis, wellbore stability and acoustic wellbore data. These discrete units are defined by changes in brittleness, elastic stiffness, and tensile strength. The mechanical stratigraphy was compared with the natural fracture stratigraphy determined by core studies, wellbore formation imaging, and correlation with macro-scale seismic discontinuities. Observations from this comparison suggest a complex and coincident mechanical and fracture stratigraphy in the late Pennsylvanian - early Permian intervals while the Leonardian mechanical stratigraphy appears to have evolved into essentially one mechanical unit that does not coincide with the fracture stratigraphy.