

## **The Effectiveness of Seismic Fracture Detection Techniques in Tight Reservoirs – Examples from WCSB**

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### **Summary**

Unconventional gas resources, including tight sands and carbonates, coalbed methane, and gas shales, constitute some of the largest components of remaining natural gas resources in North America. The main challenge in producing gas from tight rocks is generally their low permeability however, these unconventional reservoirs can exhibit significant permeability variations due to local compositional heterogeneity and distribution of fracture networks. Knowledge about the occurrence of natural fractures can help delineate permeability fairways (sweet spots) for optimum placement of the wells.

In the last decade, different seismic techniques were developed to identify enhanced fractured zones in tight reservoirs. Generally, these methods are based on structural interpretation, P-wave amplitude and velocity variation with azimuth (AVAZ & VVAZ) analysis and shear-wave splitting of three-component converted-wave data due to velocity anisotropy.

Recently, we reprocessed 3D seismic data sets which were acquired for conventional Lower Cretaceous fluvial reservoirs and Paleozoic carbonate plays to test some of the available fracture detection techniques applicable for tight reservoirs. Different seismic structural attributes were generated to map fracture networks, and AVAZ and shear wave splitting analysis were employed to detect anisotropy due to natural fractures or local stress variation.

This paper will summarize the results of these analyses and how they correlate with subsequent drilling information.