



Seismic to Production: Optimizing Well Trajectories in the Montney using Seismic Attributes

Farhan Alimahomed

Objectives/Scope

The Montney is the most successfully exploited unconventional reservoir in Western Canada with over seven thousand horizontal wells drilled thus far. Reservoir properties such as porosity, permeability, facies, and reservoir pressure vary across the Montney that leads to variation in well performance. Variations in production are further amplified by the variations in landing depths, steering in and out of zone, completion design and flowback strategies. This study will focus on production performance of horizontal wells in the Montney by comparing seismic inversion and geomodelling to landing targets and wellbore trajectories.

Methods/Procedures/Process

Full 3D wide azimuth seismic data was processed through pre-stack time and pre-stack depth migration. The depth imaging provided better fidelity, truer depths, and the best possible inputs into the reservoir characterization workflows. Advanced inversion work was performed to extract reservoir properties such as acoustic impedance, V_p/V_s ratio, poisson's ratio, density and other attributes. Ant tracking was used for fault and fracture characterization, and facies modelling was performed to understand variations in rock quality across the Montney. Geomodelling was done to build a 3D model that can be used as an input for further hydraulic fracture modelling and reservoir simulations. Wellbore surveys for 100 horizontal wells were imported into the model to compare seismic attributes to parameters such as landing depths and wells drilled in zone. No completion parameters were used for this comparison.

Results/Observations/Conclusions

Seismic data over several wells show minor faults that effect reservoir properties. Wellbores drilled through faulted areas show lower production. Ant tracking features show big continuous features across the Montney, both laterally and vertically. Wells landed in the best reservoir quality rock have better production than the wells that are drilled out of zone. Several wells are drilled in and out of zone, and the impact of that is observed with lower production. The observations are purely based on the quality of the reservoir which is an important factor during the planning phase of a pad.

Novel/Additive Information

As the Montney continues to develop, the industry will continue to observe a high variation in well performance due to varying reservoir properties. Using seismic data as a starting point for characterizing the sub-surface, and using seismic inversion to guide the drill bit, will in turn lead to higher and more consistent well results.