Identifying Critically Stressed Fractures Using Borehole GeoMechanics: A Case Study in the Nikanassin

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Summary

The Nikanassin is a thick sandstone reservoir exhibiting 3-9% porosity with multiple large successions. The optimum production mechanism is believed to be a combination of primary porosity and natural fractures.

An application of Borehole Geomechanics was under taken in an attempt to better understand the optimum production mechanism by identifying the critically stressed or hydraulically conductive fractures - those open to flow.

The primary components of the Geomechanical model are: the *Rock Model* – defining the mechanical rock properties of the formation and the *Stress Tensor* – defining the interplay between the Vertical Stress Sv and the Minimum and Maximum horizontal far field stresses. Once the Rock Model and Stress Tensor have been defined, the natural fractures as picked from the borehole image logs can be analyzed and the *Critically Stressed* fractures identified using the Mohr-Coulomb failure criteria.

This presentation will focus on the process used to build the rock model, define the stress tensor and identify the critically stressed fractures. The image log is used to constrain the minimum and maximum stress values by analyzing the borehole breakout and it's relationship to pore pressure, mud pressure, rock properties and wellbore trajectory.

After the process of identifying the Critically Stressed fractures is defined, a detailed look at a Cadomin-Nikanassin well in NE BC is presented to validate the process. The example will focus on the geological and petrophysical analysis of the formation with production logs confirming the productive intervals and their relationship to the critically stressed fractures.