INTEGRATION OF MONTNEY MICROSEISMIC INFORMATION INTO A RESERVOIR SIMULATOR TO ANALYZE A HORIZONTAL WELLBORE WITH MULTIPLE FRACTURE STAGES

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ABSTRACT
In order to get a clear picture of the effectiveness of a multi-stage stimulation treatment pumped into the horizontal wellbore of a tight gas reservoir, one must integrate data from a number of different sources. This will provide a more complete forecast of the reservoir’s development.

The Montney formation straddles the British Columbia / Alberta border in the Western Canadian Sedimentary Basin. There is significant variability in the formation’s properties across its area, but even so, we have seen a multitude of horizontal wellbores lined up within the formation in recent years. Many involved have questions about fracture spacing along a horizontal wellbore, and ultimately, the spacing of the horizontal wells in a field. The answers to these questions can lead to improved recovery factors and better economics for the resource play.

In this case study, seven stages of Basal Doig / Upper Montney microseismic data are integrated with fracture pumping information, and finally incorporated into a reservoir simulator. Two years of production history from the Montney horizontal is matched to “calibrate” the four layer reservoir model and make it a predictive tool. This provides the basis for understanding of drainage radiiuses around the fractures, and for recommendations on fracture spacing in order to optimize completions in subsequent wells.

The calibrated reservoir model is then used as a predictive tool to understand drainage radius and productivity differences when the number of fracture stages in the wellbore is increased to reduce fracture spacing. Predictably, the cumulative production from the tight gas well with more stages is greater than the same well with fewer stages. Ultimately, there is an economic trade-off between completing the well with more stages and increased well productivity, and an optimal combination that differs from one region to the next.

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