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# Evaluating storage and flow capacity on Devonian carbonates using image logs secondary porosity assessments

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Resistivity borehole images (FMI) were acquired in a series of wells across the Devonian (e.g., Keg River, Slave Point, Firebag Formations) in oil sands leases in NE Alberta.The study focuses on Devonian formations characterization, which are used by oil sands operations as disposal zones. The acquired images are of very good quality in the studied interval, and confident geological information was retrieved.

The borehole image interpretation revealed that the studied Devonian formations exhibit substantial, but varied degree of porosity heterogeneity, attributed to the presence of natural fractures and vugs. The aim of this study is to characterize and quantify this heterogeneity using FMI images and validate the obtained results with core data.

The image interpretation includes structural dip analysis, fracture type classification, fracture trends, dip angle, fracture aperture/porosity, fracture density (number of fractures per volume) and vuggy porosity estimation for each sub-division of the analyzed Devonian formations. The main part of the study is dedicated to evaluating fracture patterns, distribution and trends in 10 wells in Devonian units. Another aspect of this study is to examine if fractures exhibit systematic trends, thus showing a regional character or if they are a localized phenomenon. In addition, fracture connectivity is examined to establish the cross-cutting relationships.

Fractures identified on the images fall into two major categories: natural fractures and induced features such as drilling induced fractures and borehole breakouts. Natural fractures are found as open, partially open and healed fractures. The study identifies two main fracture cluster intervals within Keg River and Firebag formations dominated by discontinuous conductive fractures. Fracture intensity curves show values between 10-20 fractures per meter. In addition, the average total vugular porosity (VISO) estimated from image logs is 2%, with certain discrete depth intervals, either attributed to the presence of connected vuggy areas and/or dissolution seams. The heterogeneity analysis performed suggests a good development of connected vuggy content specifically at the bottom of the Keg River and Slave Point formations.

Final results from this study will be interpreted within regional context of fracture orientation and distribution within the Devonian.