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Advances in Reservoir Characterization of the Montney Tight Gas Play

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Summary

Tight gas reservoirs are notoriously difficult to characterize; routine methods developed for conventional reservoirs are not appropriate for tight gas reservoirs. A detailed reservoir characterization study was performed for a small area of the Montney tight gas play where reservoir properties were obtained from core and hydraulic fracture and reservoir properties were obtained from rate-transient analysis (RTA) of vertical and horizontal wells. Probe (profile) permeameter measurements were performed on core to assess fine-scale heterogeneities in permeability – these measurements were corrected to *in-situ* stress conditions by cutting core plugs at select probe measurement points and measuring permeability using the pulse-decay technique at confining pressure. Running averages of the corrected probe permeabilities were used to calibrate logs. N_2 adsorption/desorption isotherms were used to derive pore size distributions, and infer pore shape and dominant pore sizes. The combination of corrected probe permeability measurements, estimated pore sizes from N_2 adsorption and porosity estimates from the density log were used to identify flow units, which are useful for quantifying layering effects. Lastly, detailed rate-transient analysis of vertical and horizontal wells offsetting the core were used to independently estimate permeability-thickness product, from which an average permeability for the reservoir interval was inferred. Comparisons between matrix permeability from core and system permeability from production analysis were thus possible and add to the uniqueness to the study. Further, estimates of hydraulic fracture properties (producing half-length and conductivity) were possible from RTA and were compared to independent estimates from microseismic and post-fracture hydraulic fracture modeling. This study thus demonstrates a fully-integrated procedure for characterization of the Montney tight gas play using core, log, production and post-fracture surveillance data.