



Excess Pressure, A New Concept for Mapping Liquids Recovery Potential in Unconventional Plays. Example From The Montney Formation (Western Canada)

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Summary

Two of the primary challenges facing operators in ‘Unconventional’ plays is identifying regions with high Liquids-In-Place and the potential for low production fractionation. It is recognized that the key to achieving these goals is producing from reservoirs in single-phase conditions. Key data such as source rock analysis and PVT tests are, unfortunately, relatively rare and inadequately distributed to directly map these results.

Theory / Method / Workflow

The authors applied a multi-disciplinary approach incorporating detailed stratigraphic well assignment, structural mapping, gas geochemistry, equations of state derived from PVT tests, initial GORs (GOR) from production tests and hydrodynamic evaluation to develop a workflow to allow mapping of the Liquids-In-Place and degree of production fractionation in the Montney formation of northeastern British Columbia, Canada.

Results, Observations, Conclusions

The workflow established allowed for the identification of locations containing excess methane resulting from gas migration (expressed as a Dryness Index) and other localities richer in liquids. Interpreting the hydrodynamic data in conjunction with the structural and stratigraphic setting has allowed for the identification of significant pressure compartmentalization within the Montney. The illustration of production fractionation is also possible using these tools. The workflow also expressed the Bubble- and Dew-Point curves as a function of initial GOR and Reservoir Pressure allowing the estimation of Saturation Pressure. The concept of “Excess Pressure” (difference between Reservoir Pressure and Saturation Pressure). The Excess Pressure allows for an estimate of the allowable total pressure drop in the reservoir before the onset of two-phase flow. Localized variations of Excess Pressure due to pressure compartmentalization are also observed.

Novel/Additive Information

This workflow is currently being applied in the Montney play in Alberta and British Columbia as a successful example of multi-disciplinary collaboration. The authors expect this methodology is applicable to other low permeability liquids rich plays besides the Montney.

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