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Liquids in the Lower Montney: Investigations Using Fluid Dynamics Data

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Summary

Since unconventional development via horizontal drilling and multi-stage hydraulic fracturing began in the Montney Formation around 2005, drilling has largely been focused on Upper and Upper Middle Montney low permeability distal dolomitic siltstones. Over the last few years, economics have dictated targeting the more liquids-rich areas at the expense of the drier gas regions. Operators have started to pursue liquids in the Lower Middle and Lower Montney zones from the same pads that they are developing the upper zones —with interesting results. In some areas, the lower zones appear to be more liquids-rich than the upper zones and are emerging as viable targets.

Background and Theory

The Triassic Montney Formation of Alberta and British Columbia is a mixed siliciclastic-carbonate wedge deposited in shallow marine and shelf environments, and comprises several sedimentary facies, ranging from distal shoreface siltstones with numerous turbidite complexes in the west, to proximal shoreface-associated fine-grained sandstones and coquinas in the east (CDL, 2018). CDL subdivides the Montney regionally into four zones, the Upper, Upper Middle, Lower Middle and Lower Montney. Variable reservoir quality, multiple source rocks and phases of migration, and structural history have all contributed to a complex hydrodynamic system in the Montney: a more conventional system in the east, where hydrocarbon pools are contained within discrete stratigraphic and structural traps; and an unconventional Deep Basin-style hydrocarbon system located in the western part of the Montney, where overpressured gas and liquids fairways grade updip into an underpressured, oil-dominated fairway just west and downdip of the conventional system (Gibbs and Rakhit, 2019). Fluid dynamics data, such as pressure, temperature and gas chemistry are important to understanding the complex distribution of reservoir fluids in the Montney.

Workflow and Conclusions

In this investigation focusing on the Lower Middle and Lower Montney zones, a workflow is introduced for using fluid dynamics data to identify liquids domains and establish analogue areas within the Montney. Production results are examined, and a discussion on how additional data pertaining to subsurface flow properties – such as mobility and heterogeneity – can provide further insight on deliverability within the liquids domains and influence completion design. Case studies from the unconventional Deep Basin system from Kakwa in west-central Alberta and Tower and Blueberry in British Columbia will be examined.

References

Canadian Discovery Ltd. 2019. Montney Regional Hydrodynamics Study Phase III (MRHS-III). Calgary, Alberta, Canada.

Gibbs A. and Rakhit, K. Hydrodynamics, Geothermics and Spatial Variations in Hydrocarbon Fluid Distribution within the Montney Formation, Alberta and British Columbia, Canada. SPE-196101-MS: SPE Annual Technical Conference and Exhibition, Calgary, Alberta, Canada, 30 Sep - 2 Oct 2019.

Horton, J. and Podetz, C. The Rich Underbelly of the Montney Stacked Play. Accessed December 2019. https://digest.canadiandiscovery.com/article/7252

Horton, J. ConocoPhillips Cracks the Lower Montney. Accessed August 2020. https://digest.canadiandiscovery.com/article/8338

Stephenson, B., Bai, T., Huckabee, P., Tolle, J. and Li, R. Empirical Links Between Sub-Surface Drivers and Engineering Levers for Hydraulic Fracture Treatments and the Implications for Well Performance. SPE-194364-MS: SPE Hydraulic Fracturing Technology Conference and Exhibition, Woodlands, Texas, USA, 5-7 February 2019.