

## Marten Hills Clearwater Formation – Controls on Oil Quality

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### Summary

The Marten Hills-Nipisi Clearwater heavy oil play has seen rapid growth in production over the last three years, climbing from nearly zero in 2016 to over 21 000 bopd at the end of October 2019. Multi-lateral horizontal drilling has allowed operators to successfully exploit this heavy oil reservoir without thermal or hydraulic fracture stimulation leading to top-ranked economics (CIBC, 2019). Despite the success of the Clearwater and thus increased industry interest, there remains a lack of academic and industry research on the formation within this fairway. The research that does exist tends to focus on the sedimentology and ichnology of the Clearwater (Ross et al., 2019). Such work is crucial as it highlights the reservoir complexities of the Clearwater. Equally important, but missing, is an understanding of oil quality and the variables that have either inhibited or stimulated hydrocarbon biodegradation. This presentation will highlight the geological complexities of the play and provide a synthesis of factors from a hydrogeology prospective to define the potential trends and controls on oil quality.

### Workflow

The study area spans from Jarvie in the southeast (T58, R17W4) to Golden in the northwest (T92 R21W5), encompassing the entirety of current production areas (Marten Hills, Nipisi and Jarvie) and potential exploratory areas (Gift and Golden). Data, including oil analyses, water chemistry, pressure and core for the entire Upper Mannville sequence was collected and assigned to zones based on Canadian Discovery's regional geological framework. The data were quality controlled and the hydrogeology and hydrochemistry of the Clearwater was evaluated within a regional geological and thermal framework leading to a better understanding of the factors responsible for the inhibition or stimulation of hydrocarbon biodegradation.

### Conclusions

The Clearwater Formation is complex and success for operators is dependent on understanding the interplay of reservoir quality, temperature, hydraulic head and formation water chemistry to predict oil quality trends.

### References

- CIBC, 2019. From Ripple to Wave, The Emerging Clearwater Play. CIBC Industry Update. September 23, 2019.
- Ross, C.L., Gingras, M.K., Hadley, S.W., Ranger, M.J. 2019. Facies Analysis of the Clearwater Formation in Marten Hills and Nipisi, north-central Alberta. CSPG GeoConvention 2019.