

Improving Montney completions in a structurally complex area of Alberta

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Throughout the last 10 years of developing the Montney in West-Central Alberta, NuVista has periodically encountered challenging stages resulting in lower frac efficiency and higher costs. Issues in the most challenging stages included pipe ovality, stuck gun and plug runs, difficult stage initiation, and high magnitudes of inter-well pressure communication. For some time the technical team was unsuccessful in identifying geologic predictive variables and an associated remedy, however through novel data collection, integration of both new and old ideas and observations, and an informed execution plan; the issues on offset follow up locations with similar complexity were alleviated almost entirely.

Execution goals were met and costs materially decreased without compromising on production. The talk will highlight data collected and the strategies the team undertook in a chronological order to weave an interesting and comparative Montney story.

Theory / Method / Workflow

We use updated 3D seismic structural attributes to effectively predict the location and characteristics of Montney faulting. This is confirmed with several overlapping and independent data sources, both from engineering and geologic data. The project intended to improve the economic outcome of a follow up Montney pad, by characterizing geologic complexity and heterogeneity. This is compared to a neighboring pad with little to no characterization performed beforehand, and the team struggled with execution of completions. With a better plan and data, the follow up pad in an identical setting was executed smoothly and set a new precedent for NuVista's strategy in the area.

Results, Observations, Conclusions

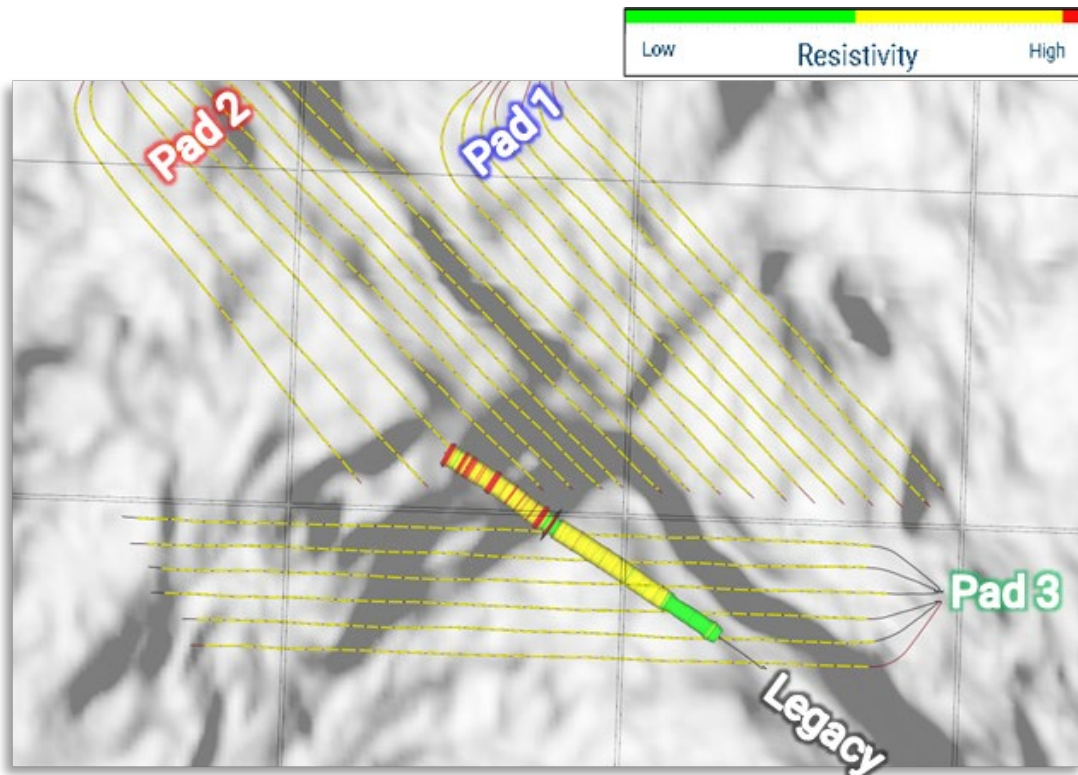
We will share stage level completions observations compared to 3D seismic attributes, horizontal logs, surface seismicity event locations, and H₂S variations along the lateral. Additionally, we will share the experience and difficulties experienced executing in a relatively structurally complex area, such as casing ovality, and stuck tools. The observations form a compelling strategy for reservoir characterization and how to inform business decisions with geologic interpretation.

Conclusions of the study indicate the importance of collecting the correct data to inform a plan and de-risk investment. We also informally conclude the nature of stress relationships while fracturing, and how those relationships intensify and overlap in a structurally complex area.

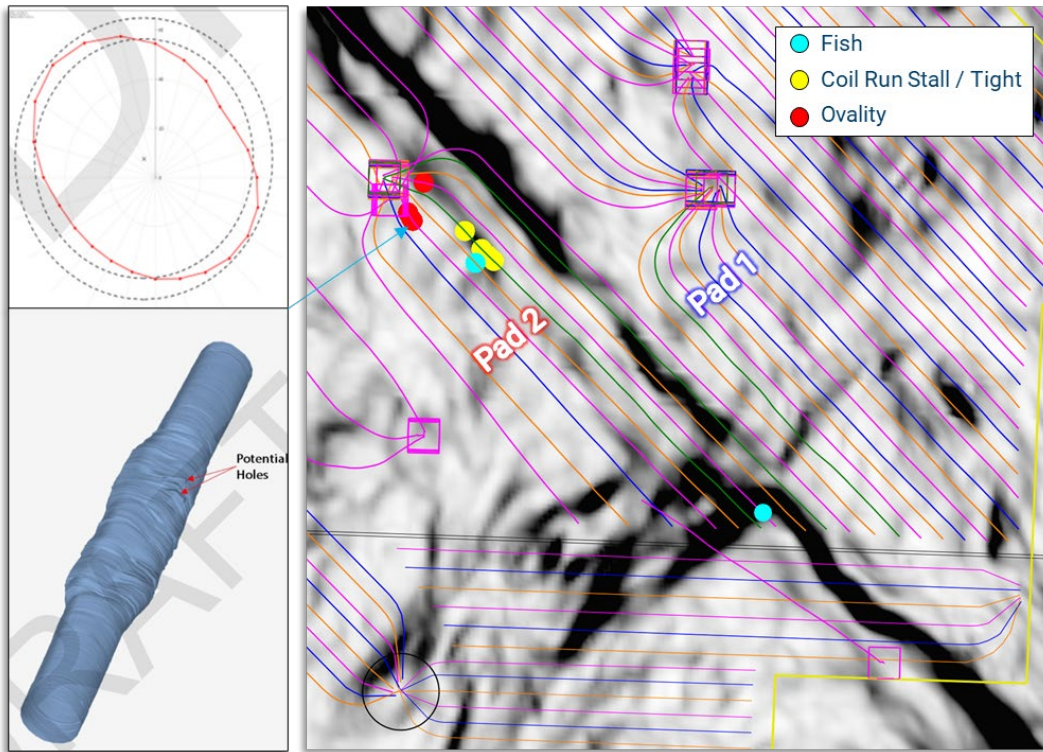
Novel/Additive Information

The case study and approach are somewhat novel, it is also a key demonstration of Alberta structural complexity in the Montney, which is traditionally considered to be very simplistic. We intend to have permission in place to show all seismic cross sections and attributes to demonstrate the predictive nature and use of seismic in unconventional.

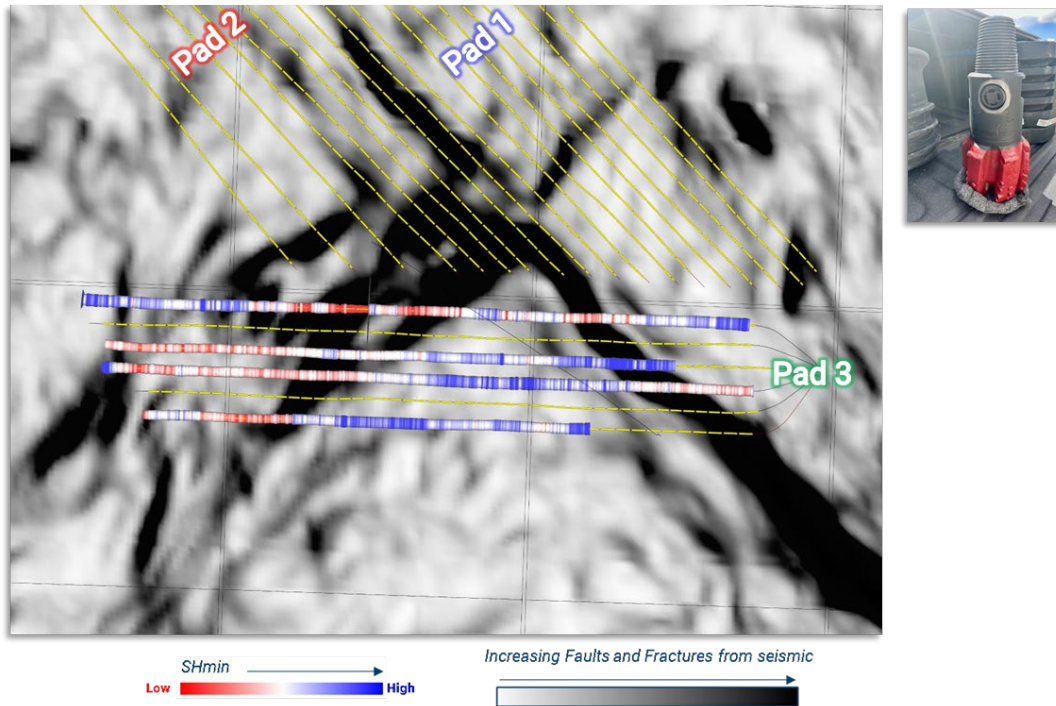
Images intended to be used in the talk.



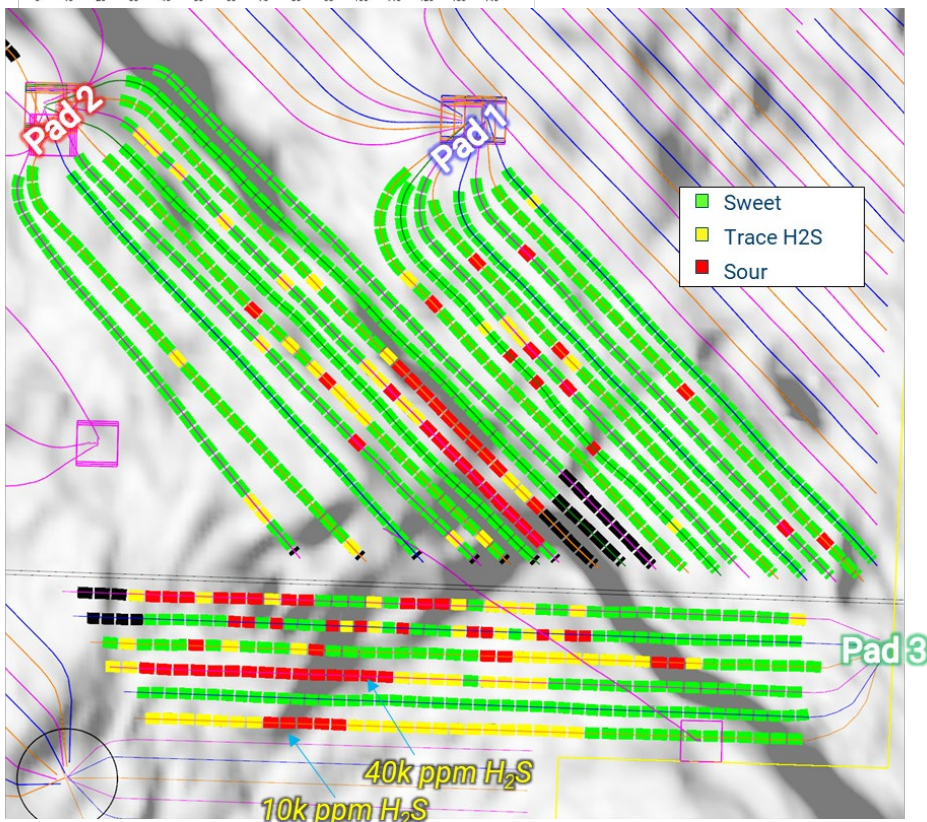
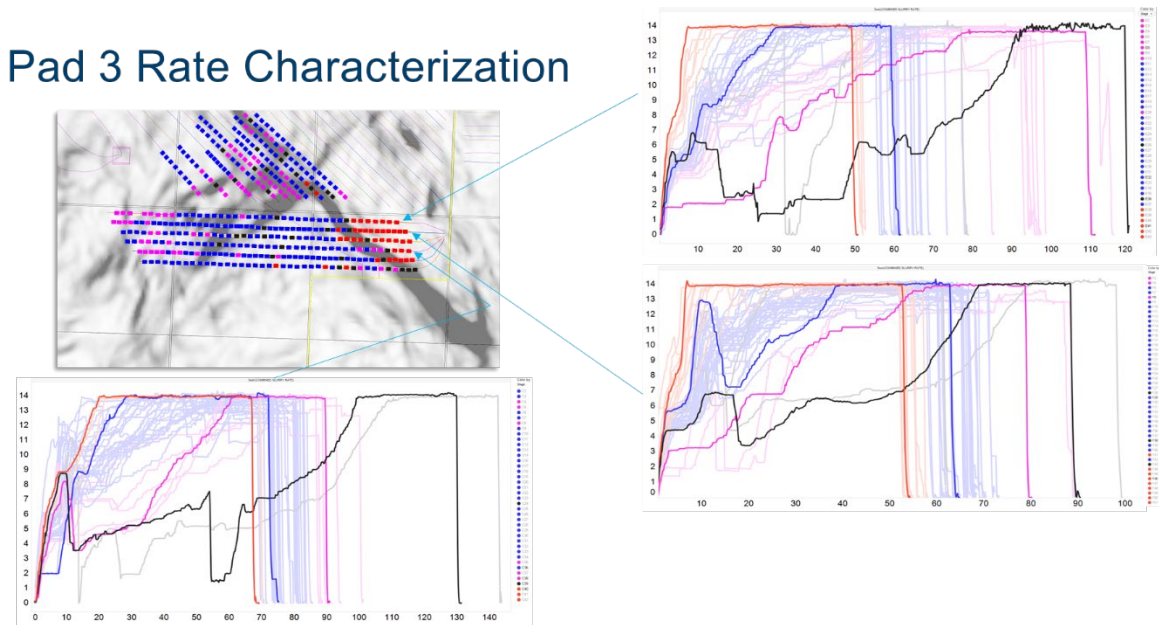
Resistivity open hole log on Legacy Montney well



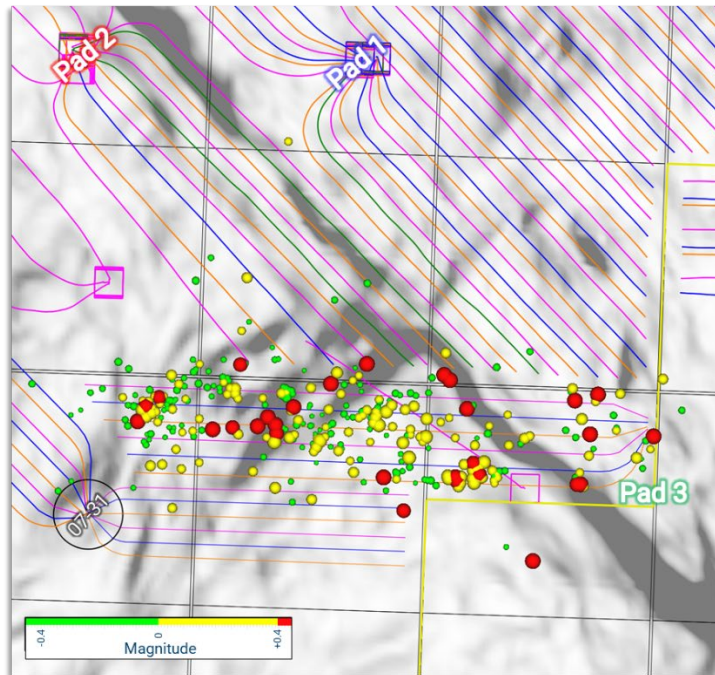
Wellbore ovality encountered on Pad 2



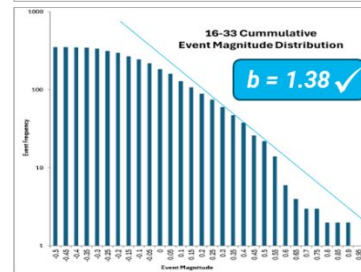
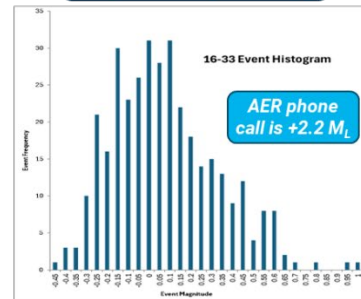
Pad 3 Rate Characterization



H₂S gas detection on plug mill out



353 events detected
{-0.47M_L, 0.96M_L}
Array sensitivity to -0.7M_L



Acknowledgements

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References

Yonghe Sun, Lu Liu, Structural evolution of thrust-related folds and associated fault systems in the eastern portion of the deep-water Niger Delta, Marine and Petroleum Geology, Volume 92, 2018, Pages 285-307, ISSN 0264-8172, <https://doi.org/10.1016/j.marpetgeo.2017.12.012>