

Tectonic Strain Mapping Study in the Montney Formation

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Summary (All headings should be Arial 12pt bold)

- In some regions, operator choice or government regulations requires a large number of DFITs (Diagnostic Fracture Injection Tests) are done which measure current insitu stresses, reservoir pressure, tortuosity, perf friction/limited entry diversion, and other information such as calculating stress anisotropy and overburden stress (horizontal components). When comparing the theoretical stress from logs, the tectonic strain that is acting on the hole vertical column of reservoir can be calculated. The strain is crucial to accurately determining rock properties to aid in any modelling or simulations. Production impact will be matched to the various reservoir properties to indicate which are the most important. 600 wells with 100 DFITs resulted in 35 independent re-interpretations by our team

Theory / Method / Workflow

- initially the field was filtered for only Montney wells, then the general well and completions table information was found. The frac stage dates were listed and the wells that had a frac done one week or more before the subsequent fracturing, especially if the stage was fractured twice. The well test reports as well as the completions reports were obtained including the raw well test data. All of the DFIT raw data was re-interpreted, and log analysis was done to determine the geomechanical rock properties assuming normal pressure and no tectonic strain. Once the reservoir pressure is calculated in the DFIT, the theoretical stress from logs can be adjusted only leaving tectonic strain to calculate. The variance in stress, stress anisotropy, and strain was tracked versus production of the wells. Basic frac database design information was manually collected from several documents to allow for the same frac designs to be compared with the reservoir analysis given by a DFIT.

Results, Observations, Conclusions

- Stress anisotropy had a large impact on production with isotropic leading to better wells
- Frac modelling and optimization is drastically affected by the strain adjustments on geomechanical property inputs to the frac models
- Kh matching from DFITs allows for larger indications of reservoir quality as it is before the large variance in frac designs.

Novel/Additive Information

- Field spanning DFIT data has not be collected and used in this format before. The DFIT data used by industry is normally on a well by well basis for frac modelling/optimization.
- This was work completed by frac engineers and reservoir engineers

Acknowledgements

References

Reference Style (use Arial 9pt normal)