

Montney Machine Learning Evaluating Clay Control, Surfactant and Scale Inhibitors: Optimal Additives Types and Concentrations

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Summary

The details of the fracturing chemistry design and its impact on the reservoir rock is often ignored in the Montney and was addressed in this study. While some types of additives have a +53% impact on production with large economic impacts, other additives have a negative return on investment of -11% at a higher well cost. One of the most prevalent items overlooked in the Montney is the use of specialized surfactants and clay control, but also the concentration and subtypes of each of these chemicals is shown in the study. Furthermore, no work by industry has been shown until this study of the specific blends and key chemical ingredients that polarize the comparisons including comparing the results to conventional surfactants and clay control methods.

Theory / Method / Workflow

The methodology was to combine the hourly completions reports from the field with the chemical submissions for the fracs which were much more detailed. In addition we collected the well production information, and distilled the reports for the fracturing fluid general type and volume, proppant type and volume, number of stages, type of completion, lateral length, stage spacing, etc. Several clusters of wells with identical completions methods were identified minus that some were using clay control, surfactant(s), and scale inhibitor. Each of these optional chemical additives were evaluated if used individually or in combination as to their incremental production impact, and also if they resulted in a positive or negative ROI. The second layer was to evaluate the subtypes of each optional additive. A third layer of analysis revealed the chemical concentrations that were optimal in each case.

Results, Observations, Conclusions

Clay control as an optional additive to slickwater fracs had an average of increment 5 year production impact of 42%. KCl had a higher production impact compared to the other subtypes.

The surfactants had the most significant impact of 61% incremental 5 year production. The subtypes of microemulsion, also known nano-surfactant had the most profound results, where conventional surfactant had less than a 9.8% impact.

Scale inhibitor did not have a significant enough of an effect to be observed, and thus the chemical concentration variance could also not be observed. There was only one subtype of chemistry used.

The chemical concentration variance of the surfactants had the largest effect on production, where the clay control had a strong but lesser effect. The scale inhibitor had only one type, and did not have a noticeable effect.

Novel/Additive Information

No previous work has been done in determining the optimal concentration of optional additives, and the subtypes of each additive that are most effective.

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