

## The Complete Bakken History of Refracs and Re-completes in the North Dakota: Determining Detailed Type of Refrac and Incremental Production

*Tim Leshchyshyn*

*FracKnowledge*

### Summary (All headings should be Arial 12pt bold)

- The North Dakota Bakken is one of the main formations exploited in the USA. We have compiled the list of wells fractured twice and fractured after wells were put on production. The wells fractured twice would be either in the originally produced reservoir or re-completed by adding a new reservoir or only stimulating a new reservoir by abandoning the initially produced reservoir. When it comes to refracs, there is uncertainty as to what methods work best, how certain success in terms of production will be for ROI, and the strategy for the design of the refrac. There were 256 wells in North Dakota that were fractured twice and every single well file was reviewed thoroughly, and the incremental EUR calculated for refracs.

### Theory / Method / Workflow

- All the detailed wells files, production information, and Frac Focus information were downloaded. Initially, a few searches revealed that 256 wells were fractured twice, or after a long period of production, a single fracture was done. Although it is optional to report the second frac, often enough information was reported to provide a valuable summary of the successes or not. The next step determined if it was a refrac into the same reservoir only or adding other reservoirs as a re-complete. Looking at only the refracs, several things were used to categorize the refrac types and sub-types from stimulating all of the open perfs/ports versus adding new perfs/ports versus stimulating only the new perfs/ports, mechanical diversion versus chemical diversion versus both, the initial and second use of frac fluid type/volume and proppant type/volume, etc. The production was analyzed primarily for the incremental EUR, risk of not getting any incremental EUR, and for statistical interest, the initial and second IP, decline, and GOR restoration which is one indication of exposure to new reservoir..

○

### Results, Observations, Conclusions

- 81% of the second fracs were refracs compared to re-completes.
- 34.2% incremental EUR was achieved in the refracs.
- Refrac volumes were 122% compared to the initial fracs
- The open hole nature of the Bakken completions favored chemical diversion
- Mechanical diversion had 35.3% more success in terms of incremental EUR compared to chemical diversions.
- 91% of the time incremental reservoir recovery was achieved from refracturing.

- The previous marketed trend for refracs happening at low commodity prices, and less at high commodity prices due to favoring new drills, was disproven as refracs trended linearly proportional to the WTI oil price

### **Novel/Additive Information**

- No one has compiled the whole state history previously.
- Most engineers don't combine frac focus with other information like detailed well files as well as production.
- This work was done with frac engineers, petrophysicists, reservoir engineers, and operations experts

### **Acknowledgements**

#### **References**

Reference Style (use Arial 9pt normal)