

Waterflooding a Multi-Layered Tight Oil Reservoir Developed with Hydraulically Fractured Horizontal Wells

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Summary

A successful waterflood can be implemented in a multi-layered tight oil reservoir developed with horizontal multi-fractured wells. This paper forecasts the recovery factor that can be achieved in such a reservoir as well as discusses the challenges of analyzing and modelling tight oil reservoirs developed with multi-fractured horizontal wells.

The Bakken/Three Forks reservoir is composed of low permeability multi-layered silts/shales. With some unconventional reservoirs that are hydraulically fractured, a phenomenon exists whereby material balance and simulation indicate pressure support from a water source that is not always obvious. This phenomenon is believed to be related to the multi-layered silts/shales in the reservoir and is not typically seen in simulation of conventional higher permeability reservoirs ($K_{air} > 10$ mD). Although, the exact petrophysical nature of the silts/shale reservoir layers in this project are not well defined at this time, a successful production history match can be achieved by incorporating their input into a simulation model.