

I'll huff and I'll Puff and I'll - Recover More Oil? Part 2 The Fluids

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Summary

For the past decade operators have targeted the liquids rich areas of the Montney and the Duvernay and other low permeability reservoirs. Primary recoveries in most cases have been very low, there is interest in the potential for enhanced liquids recovery, so the question is how can we increase recovery. Conventional enhanced oil recovery (EOR) methods are not suitable for these tight reservoir with ultra low permeabilities. Recent advances in EOR methods to specifically handle these ultra-low permeability reservoirs are coming to fruition with lab and field testing being refined by the day. Gas Cycling or 'Huff and Puff' EOR is proving successful with operators seeing anywhere between ~10-60% increase in OOIP.

Recent advances in phase behavior assessment have allowed for better understanding of insitu reservoir fluid character within tight formations. This presentation will focus on a laboratory based look at the different fluids that come from a variety of rock fabrics in the Montney, Duvernay and other tight rock formations. We will show examples of the fluids being produced from the specific rock fabrics with the potential for EOR.

The capture and characterization of oil and gas condensates from tight formations will be discussed. Techniques for sample collection have been modified to help overcome some of the challenges associated with the character of the liquids that may be encountered over a three kilometer lateral leg in these tight formations. Once the reservoir separator samples have been evaluated a specific sample set will be selected and recombined to reservoir conditions matching any or all of the following: saturation pressure, composition or gas liquid ratio. The basic phase behavior testing needed to begin the evaluation of the EOR potential for a given reservoir are, a differential liberation for oil and a constant volume depletion (CVD) for a gas condensate system. It has been suggested that miscibility of the injection gas is an important parameter for evaluation into the extent of EOR upside that might be realized. A look into miscibility through swelling tests, slim tube testing and multi-contact testing will be discussed. Examples of the tools and techniques and data generated that are used for the evaluation of enhanced oil recovery potential in these tight reservoirs will be shown.

We also need to understand the reservoir rock fabric and what role it plays in the success or failure of an EOR scheme. To that end, recent experiment and equipment design modifications have been made to better assess the recovery from Huff and Puff gas cycling. Examples of the tools and techniques and data generated that are used for the evaluation of enhanced oil recovery potential in these tight reservoirs will be shown.