BAYTEX ENERGY CORP.

Interface FLUIDICS

Interface Enhanced Oil Recovery Optimization

Baytex reduces Polymer concentration by 60% using Interface Fluidics' Enhanced Oil Recovery Optimization solution

> " *The analytical models and microfluidic experiments were able to predict the EUR within the required precision to make investment decisions.* "
>
> **Dullio Raffa,**
> Senior Reservoir Engineer

Abstract

Baytex Energy, a North American oil producer headquartered in Calgary, Alberta, focuses on crude oil and natural gas production in the Western Canadian Sedimentary Basin and the Eagle Ford in the United States.

Baytex approached Interface Fluidics because they had been conducting a tertiary polymer flood in their Lloydminster sandstone formation since 2018. Baytex were seeking a test that could accurately predict incremental oil and water rates and the ultimate recovery factor to de-risk a polymer reduction and a change of polymer suppliers.

Grain Size Distribution
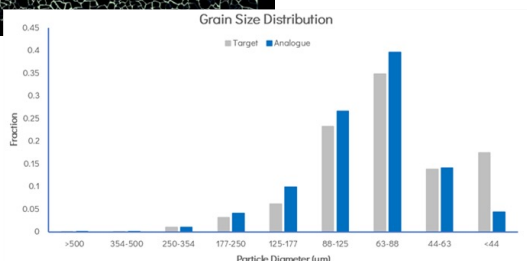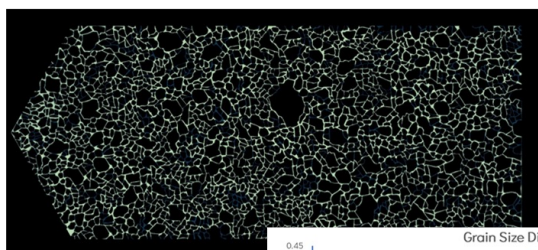
Challenge

· Baytex needed an alternative method to forecast incremental oil and water rates and ultimate recovery factor.
· Baytex required additional data to support the decision to lower polymer viscosity from 50cP to 20cP while maintaining the injected volume.
· Traditional EOR workflows were not available for this formation.

Solution

· Interface and Baytex conducted 13 EOR(investigate) tests with varied polymer viscosity and applied both secondary and tertiary water-to-polymer flood strategies using Interface's EOR Testing.
· Our tools offered a fresh perspective on polymer and waterflood investigation, leading to unique insights. With our data, they felt more confident and refined their model with greater precision.

Results

· Polymer concentration was reduced by 60%. (50cP to 20cP)
· Microfluidic experiments provided data to help tune water/oil relative permeabilities for numerical modeling and give confidence in decision making.
· The project achieved an approximate 16X return on cash invested.

🌐 InterfaceFluidics.com | ✉ Info@InterfaceFluidics.com | 📞 403.816.4315

A Quicker, More Repeatable Alternative To Core-Flooding

Baytex encountered limitations with traditional core flooding due to limited core, unrepeatable data and 7+ tests would take too long. In response, we employed Enhanced Oil Recovery microfluidic tests to precisely replicate the Lloydminster sandstone reservoir's characteristics of wettability, temperature, pressure, grain morphology, permeability, porosity, and more.

Analytical Models Were Predictive of Estimated Ultimate Recovery (EUR)

Interface's EOR testing provided pore-scale visualization demonstrating the polymer flood's effectiveness in both secondary and tertiary modes.
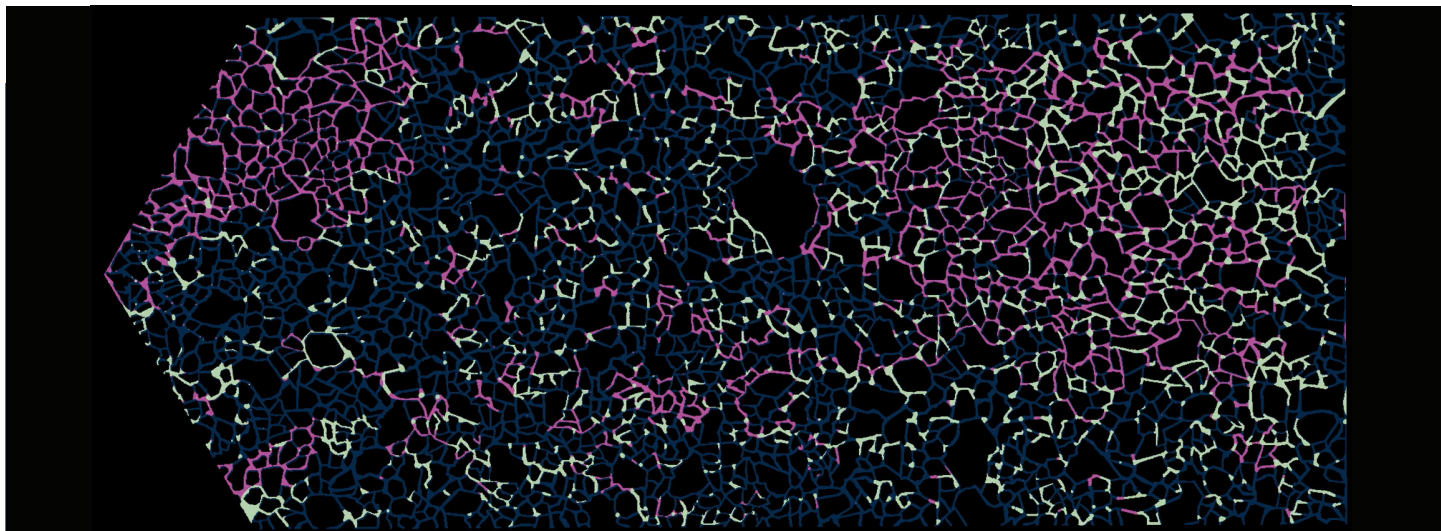
"In this real world example, SaphhireLab enables capturing high-resolution pore-scale images showing the progression of bypassed and trapped oil over time during secondary waterflood, as well as the subsequent recovery of additional oil during tertiary polymer flood. The image utilizes a color-coded system, representing water-displaced oil in blue, polymer-displaced oil in purple, and the remaining residual oil in green."

Ali Abedini
Executive Vice President of Operations - Ph.D. P.Eng.

Field Results : 60% Polymer Reduction and Fine Tuned Water/Oil Relative Permeabilites for Numerical Modelling

Baytex faced challenges with traditional testing. Using microfluidic systems, Interface Fluidics fine-tuned polymer flooding parameters. When implemented in the field Baytex reduced viscosity from 50cP to 20cP without affecting oil production rates. This precise approach ensured efficient oil production and bolstered confidence in investment decisions.

Consequently, Baytex recognized the project as both a technical and economic success.

Relevant findings and methods are detailed in papers SPE-212758-MS and SPE-212760-MS.