

Unconventional Enhanced Oil Recovery Pilot Projects in the Bakken Formation*

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Abstract

Unconventional formations such as the Bakken, Niobrara, and Eagle Ford have made a significant impact on the petroleum industry over the last decade, almost doubling the US domestic oil production. These types of reservoirs contain hundreds of billions of barrels of oil in US and Canada alone, but primary recovery factors are still low, typically less than 10%. The need for enhanced oil recovery (EOR) has been documented, but most studies have focused on simulation models and lab tests. The next logical step includes field trials (aka pilot projects). Over the last 8-9 years, there have been a number of pilot tests for both water and gas injection in the Bakken. Results from these small pilots were reported to state agencies, and the first part of this presentation analyzes the available public data on these pilots. Injectivity of gas or water does not appear to be an issue in the Bakken; however, the projects, in general, show early breakthrough times and poor reservoir sweep efficiencies. There was only minor additional oil recovery, but the pilots were limited in scope and duration. No mitigating procedures were implemented to deal with the problems that occurred. This presentation also proposes methodologies for implementing second generation pilots for unconventional reservoirs. Methods are devised to improve understanding of the near well formation before injection starts, detect where fluids are entering and leaving along the lateral and correct for any associated poor sweep efficiency. We also propose long term information collecting strategies and contingency plans to deal with difficulties that may arise during the pilot. Using EOR to increase recovery from unconventional oil fields is important for the continued success of these plays, and this presentation provides a thorough analysis of implementing pilots to help do just that.

References Cited

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