

Injection Testing with Propane to Inform Future Bakken CO2 EOR Pilot

Submitted by:

University of North Dakota Energy &
Environmental Research Center (EERC)
Principal Investigator: James A. Sorenson

- ☐ Total Funding Request - \$1,800,000**
- Total Project Costs - \$4,000,000**
- Project Duration: 12 months**

PROJECT DESCRIPTION

Objective: The Energy and Environmental Research Center (EERC) proposes to investigate the response of a Bakken reservoir to injecting propane or another readily available natural gas liquid (NGL) as a means of informing the design and operation of a future larger-scale CO₂ enhanced oil recovery (EOR) pilot test in the Bakken. This will be accomplished by completing a suite of activities, which include laboratory-based propane-rock interaction, propane-oil phase behavior and miscibility investigations, an injection test into a Bakken well, reservoir surveillance efforts to determine injectivity and reservoir response, and modeling-based activities to determine optimal injection scheme and operational strategies for the future CO₂ EOR pilot.

A propane injection test into a Bakken reservoir will generate data that can provide invaluable insight regarding the detailed design and operation of the injection scheme for a future largescale CO₂ EOR pilot. Specific data developed by the propane injection test that will be critical to planning the future CO₂ EOR pilot include bottomhole reservoir pressure data, injectivity data, pressure buildup and dissipation rates, evidence of communication with offset wells (i.e., injection conformance within the target reservoir), and fluid flowback rate (oil, gas, water, injectate). Aspects of the larger-scale CO₂ EOR pilot design that will be informed by the propane injection test include the sizing and design of compression, sizing and design of flowback management units, and design of an effective reservoir surveillance system. Modeling activities that incorporate the results of the propane injection test, when calibrated with data on CO₂ interactions with Bakken oil and rocks, will facilitate and accelerate the design of a large-scale CO₂ EOR pilot test anticipated to be performed in late 2026 or early 2027 under the Bakken CO₂ Evaluation of Rock and Fluid Properties.

TECHNICAL REVIEWERS' RATING SUMMARY

Statement	Weighting Factor	<u>TR G-61-04A</u>	<u>TR G-61-04B</u>	<u>TR G-61-04C</u>	<u>Average Weighted Score</u>
Objectives	9	4	5	4	36
Achievability	7	4	5	3	28
Methodology	8	4	4	4	32
Contribution	8	4	5	4	32
Awareness/ Background	5	5	4	4	20
Project Management	3	4	4	4	12
Equipment / Facilities	2	3	4	4	6
Value/Industry- Budget	4	4	4	4	16
Financial Match – Budget	4	4	4	3	12
<i>Average Weighted Score</i>		203	224	189	205
<i>Maximum Weighted Score</i>				250 possible points	

TECHNICAL REVIEWER TOTALS

- G-61-04A

Average Weighted Score: **203 out of 250**

FUND

- G-61-04B

Average Weighted Score: **224 out of 250**

FUND

- G-61-04C

Average Weighted Score: **189 out of 250**

FUND

TECHNICAL REVIEWER COMMENTS

Reviewer G-61-04A

The proposed work could provide significant economic and strategic value for North Dakota's oil industry, and I recommend funding the application in full. The next five to ten years will be critical for North Dakota's oil industry as thousands of wells approach the end of their economic primary recovery phase, necessitating strategies to extend their productive life and maximize ultimate recovery. Given that current federal tax incentives favor CO2 sequestration for at least twelve years, research into alternative working fluids, as proposed in this application, is particularly urgent. While previous EOR efforts in the Bakken have predominantly focused on lighter NGLs (ethane), wet field gas, or dry/residue gas, research and company data from other U.S. oilfields suggest that propane or heavier NGLs may serve as highly effective working fluids in unconventional resource plays. This application offers to further explore such alternatives, taking important steps forward towards unlocking effective enhanced recovery methods for the Bakken/Three Forks.

Recommendation: FUND

Reviewer G-61-04B

EOR is a topic that has been in conversation literally since the beginning of the success of the extraction of the resource from Bakken Shale. It was known that technological advancement was key to being able to extract a larger proportion of oil and gas from the shale. While the industry has been increasing its extraction efficiencies over time, they are still at or below being able to extract 20% of the resource, EOR is key to getting that efficiency up to 50%.

Recommendation: FUND

Reviewer G-61-04C

This project will contribute significantly to the understanding of reservoir properties in the Bakken/Three Forks Formations with respect to further EOR operations.

Recommendation: FUND

Director's Recommendation:

- ☐ Fund in the amount of \$1,800,000**