Improving Enhanced Oil Recovery (EOR) Performance Through Data Analytics and Next- Generation Controllable Completions

Submitted by:

Energy & Environmental Research Center (EERC)

- **Funding Request - $500,000**
  Total Project Costs - $10,000,000
  Project Duration: 5 years

Project Description

- The Energy & Environmental Research Center (EERC) was selected by the U.S. Department of Energy (DOE) to field-test controllable completions (interval control valves [ICVs]) for active (smart) well control during CO2 enhanced oil recovery (EOR) (Award DE-FE0031790). The goals of this field test are to 1) implement controllable completions in horizontal wells through a rigorously monitored field test in a reservoir undergoing new tertiary recovery, 2) apply data analytics and machine learning to evaluate the test performance and develop a semiautonomous active control system, and 3) assess various business case scenarios to accelerate the development and application for commercial EOR.

- The outcomes of this project will be to 1) evaluate perceived risks of deploying semiautonomous controllable completions technology in horizontal wells; 2) quantify the lowered net CO2 utilization and increased oil recovery with fewer wells, which lower infrastructure costs and improve overall EOR project economics; and 3) develop economic (business) cases for implementation of this approach applicable to a wider range of reservoirs and fields, including potential application for conformance control for Bakken EOR. These outcomes will reduce the uncertainty in CO2 EOR performance for a range of reservoir types, accelerating adoption of the approach across existing operations and expansion of CO2 EOR into other locations where current marginal economic outlook or conformance control issues deter investment.
- In addition to OGRP and DOE, the EERC is partnering with Denbury Onshore LLC (Denbury), NCS Multistage LLC (NCS), North Dakota Geologic Survey (NDGS), Schlumberger, and CMG.

TECHNICAL REVIEWERS' RATING SUMMARY

		Technical Reviewer			
Statement	**Weighting Factor**	**G-50-05A**	**G-50-05B**	**G-50-05C**	**Average Weighted Score**
Objectives	**9**	5	5	4	36
Achievability	**7**	4	4	4	28
Methodology	**8**	5	5	4	32
Contribution	**8**	4	5	5	32
Awareness / Background	**5**	4	5	3	20
Project Management	**3**	5	4	3	12
Equipment / Facilities	**2**	3	5	4	8
Value / Industry-Budget	**4**	4	5	4	16
Financial Match – Budget	**4**	5	5	5	20
Average Weighted Score		222	240	204	222
Maximum Weighted Score				**250 possible points**	

Technical Reviewer Totals

- G-50-05A

Average Weighted Score: **222 out of 250**

FUND

- G-50-05B

Average Weighted Score: **240 out of 250**

FUND

- G-50-05C

Average Weighted Score: **204 out of 250**

FUND

Technical Reviewer Comments

Reviewer G-50-05A

Further advancing the tertiary recovery placement control technologies for CO2 has the potential to greatly increase oil and gas recovery from existing reservoirs in North Dakota, as well as continue to keep North Dakota at the leading edge of research and development for unconventional oil and gas. This data will also be useful for injection conformance control in tertiary recovery using other liquids and gases.

Recommendation: Fund

Reviewer G-50-05B

The proposed work will provide critical information that has the potential to greatly enhance the economic value of unconventional wells in ND (Bakken).

Recommendation: Fund

Reviewer G-50-05C

The proposed technology to efficiently apply EOR (CO2 injection) in the Bakken could be extremely significant to NDIC goals. Effective control, evaluation and simulation of complex full-field EOR projects will be critical to increased recovery and eliminate waste and cost associated numerous operators simultaneously implementing similar evaluations.

The project is targeted at advancing technology related to efficient EOR, a very significant future opportunity for the Bakken hydrocarbon system in North Dakota and Montana. The deliverables from this project will help advance the technology required to successfully realize the EOR potential.

Recommendation: Fund

Director's Recommendation:

Fund in the amount of $500,000