

Technical Reviewers' Rating Summary

Proposal Number Application Title Submitted By
 Request For Total Project Costs

Section A. Scoring

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

OVERALL RECOMMENDATION

FUND X X X
 FUNDING TO BE CONSIDERED
 DO NOT FUND

Section B. Ratings and Comments

1. The objectives or goals of the proposed project with respect to clarity and consistency with North Dakota Industrial Commission/Oil and Gas Research Council goals are:

This is a very straightforward project to evaluate controlled placement of CO2 for the purpose of improving tertiary recovery performance in a oil reservoir.

- Reviewer: G-50-05A
- Rating: 5

The work is consistent with the goals of the OGRC

- Reviewer: G-50-05B
- Rating: 5

Good statement of objectives.

- Reviewer: G-50-05C
- Rating: 4

Thank you for the positive comments.

- Applicant

2. With the approach suggested and time and budget available, the objectives are:

The budget and timetable seem reasonable, especially with the cooperation of the project partners.

- Reviewer: G-50-05A

- Rating: 4

No comment

- Reviewer: G-50-05B

- Rating: 4

I understand the five year timeline to evaluate long term reservoir performance. It seems like moving the D2 deliverable earlier than mid 2022 may make sense to insure that innovation can continue based on the performance and experience obtained from the downhole equipment.

- Reviewer: G-50-05C

- Rating: 4

OGRP Deliverable D2 – Interim Field Performance Summary Report – corresponds with our U.S. Department of Energy (DOE) Deliverable D4 – Interim Field Performance Summary Report (8/31/22), which is part of the overall DOE set of deliverables for this project. There are a number of project success criteria throughout the period of performance between the completion of the installation and testing of the ICV system (Milestone M4 – ICV Installation and Initial Testing Complete [1/31/21]) and OGRP Deliverable D2. For example, Milestone M5 – Tracer Study Initiated (10/1/21) and Milestone M6 – Initial Active Control System Design Complete (1/31/22) are project milestones during this period. In addition, we will have to submit quarterly summaries to DOE that must document the project status and progress. Together, these milestones and reporting requirements will provide sufficient success criteria for evaluating the successful outcome of the project, in particular, the performance of the ICV system during the initial stages of the Operation and Monitoring Task.

- Applicant

3. The quality of the methodology displayed in the proposal is:

This project is leading edge technology, and the industry partners are all leaders in their respective areas of expertise and equipment design.

- Reviewer: G-50-05A

- Rating: 5

No comment

- Reviewer: G-50-05B

- Rating: 5

Including the experience and an active operator (Denbury) and a downhole tool specialist (NCS) should increase the potential for a successful outcome of this portion of the project.

- Reviewer: G-50-05C

- Rating: 4

Thank you for the positive comments.

- Applicant

4. The scientific and/or technical contribution of the proposed work to specifically address North Dakota Industrial Commission/Oil and Gas Research Council goals will likely be:

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.

- Reviewer: G-50-05A

- Rating: 4

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

- Reviewer: G-50-05B

- Rating: 5

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 eliminating waste.

Investigating this early in the potential EOR cycle could help eliminate waste and cost associated numerous operators simultaneously implementing similar evaluations.

- Reviewer: G-50-05C

- Rating: 5

Thank you for the positive comments.

- Applicant

5. The background of the principal investigator and the awareness of current research activity and published literature as evidenced by literature referenced and its interpretation and by the reference to unpublished research related to the proposal is:

Primary investigator and the EERC have extensive experience and knowledge in the investigation of EOR using CO₂. This project will be able to build on their extensive work history in this area.

- Reviewer: G-50-05A

- Rating: 4

World class staff available for the work.

- Reviewer: G-50-05B

- Rating: 5

The principal investigator has experience in the area of CO₂ Enhanced Oil Recovery.

- Reviewer: G-50-05C

- Rating: 3

Thank you for the positive comments.

- Applicant

6. The project management plan, including a well-defined milestone chart, schedule, financial plan, and plan for communications among the investigators and subcontractors, if any, is:

Well detailed management plan with task schedules and report points provide. Budget plan is detailed showing cost shares of major partners in both cash and in-kind contributions.

- Reviewer: G-50-05A

- Rating: 5

No comment

- Reviewer: G-50-05B

- Rating: 4

Good summary with Gantt chart. See comments on timing above. I did not see an itemized cost list associated with Denbury's \$2.6 MM field activities.

- Reviewer: G-50-05C

- Rating: 3

Please see our comments under B2 above about the timing of Deliverable D2. The field activities included in the \$2.6MM for Denbury are: 1) mobilization and survey costs, in addition to FMI, multi-arm caliper, and deviation survey for 5,000 horizontal feet in up to 3 wells [\$1MM]; 2) Install NCS Qumulus™ EOR System into an injection well, including incremental rig time and CO2 flow meter and digital WHP/WHT equipment [\$672,825]; 3) Install NCS Qumulus™ EOR System into an offset production well, including incremental rig time and CO2 flow meter and digital WHP/WHT equipment [\$785,380]; 4) Install a multi-phase flow meter and digital WHP/WHT equipment into an offset production well with standard completion [\$40,000]; and 5) Tracer injection and analysis in two offset producers [\$141,450]. Unit costs for field services were estimated by experienced operations staff at Denbury Onshore LLC with consideration for current market conditions and regional operating knowledge. Denbury is an active and experienced operator of multiple oil fields throughout the region and routinely procures similar services. Pricing for installation of the NCS Qumulus EOR Systems was based on price quotes from NCS Multistage.

- Applicant

7. The proposed purchase of equipment and the facilities available is:

Limited amount of purchases involved, with majority of purchased budget items contributed as in-kind cost share from partners.

- Reviewer: G-50-05A

- Rating: 3

Equipment will not be purchased using NDIC funds

- Reviewer: G-50-05B

- Rating: 5

Reasonable proposal.

- Reviewer: G-50-05C

- Rating: 4

Thank you for the positive comments.

- Applicant

8. The proposed budget “value”¹ relative to the outlined work and the commitment from other sources is of:

NDIC OGRP \$500,000 contribution is around 5% of total budget, and total budget of \$10,000,000 is a reasonable cost estimate for this type of research project.

- Reviewer: G-50-05A

- Rating: 4

Currently, oil production in ND is a major factor in the strong economy enjoyed by the state. This work has the potential to significantly enhance the amount and value of oil recovery in the state.

- Reviewer: G-50-05B

- Rating: 5

The value of this work should be significant to the NDIC.

- Reviewer: G-50-05C

- Rating: 4

Thank you for the positive comments.

- Applicant

9. The “financial commitment”² from other sources in terms of “match funding” have been identified:

Minimal 5% NDIC OGRP cash share in the project is an exception value for this very high level of research in EOR conformance. Also, use of existing wellbores and proprietary equipment from vendor is not even listed, but an exceptional value as well. Potentially very big bang for the buck.

- Reviewer: G-50-05A

- Rating: 5

The proposed work included a very high level of matching funds, 20:1

- Reviewer: G-50-05B

- Rating: 5

Good job of obtaining funding from the DOE and industry.

- Reviewer: G-50-05C

- Rating: 5

Thank you for the positive comments.

- Applicant

1 “value” – The value of the projected work and technical outcome for the budgeted amount of the project, based on your estimate of what the work might cost in research settings with which you are familiar. A commitment of support from industry partners equates to a higher value.

2 “financial commitment” from other sources – A minimum of 50% of the total project must come from other sources to meet the program guidelines. Support less than 50% from Industrial Commission sources should be evaluated as favorable to the application; industry partnerships equates to increased favorability.

General Comments

This is an exceptional opportunity for the state of North Dakota, and its oil and gas industry. Research projects of this scale, and potential for great discovery, are not common pitched our way. An opportunity to be in on the ground floor of this research, with continual access to the progress, is well worth the money and time.

- Reviewer: G-50-05A

No comment

- Reviewer: G-50-05B

This 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.

- Reviewer: G-50-05C