

TECHNICAL REVIEWERS' RATING SUMMARY

G015-C

Plains CO₂ Reduction Partnership Program – Phase III

Submitted by: Energy and Environmental Research Center

Principal Investigators: Edward N. Steadman, John A. Harju, James A. Sorensen,
Steven A. Smith

Request for \$500,000; Total Project Costs \$135,731,052

Rating <u>Category</u>	Weighting <u>Factor</u>	Technical Reviewer		Average Weighted <u>Score</u>
		<u>15C-01</u>	<u>15C-02</u>	
		<u>Rating</u>		
Objective	9	4	4	36.0
Availability	9	4	4	36.0
Methodology	7	4	4	28.0
Contribution	7	4	4	28.0
Awareness	5	4	3	17.5
Background	5	4	4	20.0
Project Management	2	4	5	9.0
Equipment Purchase	2	4	5	9.0
Facilities	2	5	5	10.0
Budget	2	5	5	10.0
Average Weighted Score		204	203	203.5
Maximum Weighted Score				250

OVERALL RECOMMENDATION

FUND	X	X
FUNDING TO BE CONSIDERED		
DO NOT FUND		

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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: 1 – very unclear; 2 – unclear; 3 – clear; 4 – very clear; or 5 – exceptionally clear.

Reviewer 015C-01 (Rating: 4)

Objectives are very clear and consistent with OGRC goals.

Reviewer 015C-02 (Rating: 4)

As stated on page 6, the proposals objectives are: 1) to refine technical and economic analyses of emerging CO₂ capture and compression technologies, 2) match regional CO₂ sources with appropriate geological sinks in ND, and 3) develop market and technical data to establish CO₂ sequestration carbon credits. The proposal could claim the project meets all the statutory goals and purposes set forth in NDIC/OGRC Mission Statement.

The proposed meets the following General Criteria of the North Dakota Industrial Commission Oil and Gas Research Council Policies set forth in OGRC – 5.01: 1) generates information and knowledge to bring new oil and gas companies and industry investment, 2) has the potential for creating new jobs, wealth and tax revenues, 3) educates the public, 4) effect ultimate oil recovery, 5) preserves existing jobs and production, 6) identifies production technologies not currently used in ND, 7) reduces the environmental footprint of the industry, and 8) develops baseline information.

2. With the approach suggested and time and budget available, the objectives are: 1 – not achievable; 2 – possibly achievable; 3 – likely achievable; 4 – most likely achievable; or 5 – certainly achievable.

Reviewer 015C-01 (Rating: 4)

The timetable seems realistic.

Reviewer 015C-02 (Rating: 4)

Given the time and budget, the approach suggested is most likely achievable. The CO₂ capture, sequestration and EOR activities have the highest probability of success. The EOR portion of the proposal is patterned after the existing DGC/CO₂ project and is based on use of the existing infrastructure. The ND reservoir may be significantly unique to present unique challenges.

The CO₂ capture and sequestration activities in the brine saturated geological formation have a lower probability of success. This portion of the project is based on unproven or demonstration sequestration. The brine formation/CO₂ chemistry presents unique challenges.

3. The quality of the methodology displayed in the proposal is: 1 – well below average; 2 – below average; 3 – average; 4 – above average; or 5 – well above average.

Reviewer 015C-01 (Rating: 4)

The methodology, as described in the narrative, seems appropriate.

Reviewer 015C-02 (Rating: 4)

The quality of the methodology in this proposal is above average. The methods and details presented, such as the MMV (Monitoring, Mitigation, and Verification) are above average. There is available information on EOR simulation studies that can be helpful during early EOR and sequestration phases of this project. Supercritical carbon dioxide has been studied extensively and is used routinely in analytical and separation applications. Including this existing body of knowledge into the project methodology is not adequately discussed in the proposal.

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: 1 – extremely small; 2 – small; 3 – significant; 4 – very significant; or 5 – extremely significant.

Reviewer 015C-01 (Rating: 4)

The multi-goal possibilities (disposal of lignite-produced CO₂, CO₂ sequestration, EOR, etc.), potential scientific understandings (integrity of seals, injection of CO₂ into relatively deep horizons, etc.), and the technical problems that need to be overcome are all important potential results that may provide significant benefit to North Dakota. .

Reviewer 015C-02 (Rating: 4)

The scientific and technical contribution of the proposed work to specifically address NDIC/OGRC goals will likely be very significant. The oil and gas industry is being impacted by state regulatory practices and Federal energy legislation. There can be an adverse economic impact on industry production, jobs and tax revenue, if CO₂ emissions are reduced. In the case of reduction in emissions, oil and gas production must be reduced or CO₂ emissions captured and sequestered. The oil and gas industry and the lignite industry face unknown economic challenges. Will laws or regulatory agency require new or existing oil and gas production provide carbon credits? Will governmental regulations require carbon credits and offsets from new or existing coal fired and natural gas fired power plants?

5. The principal investigator's 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: 1 – very limited; 2 – limited; 3 – adequate; 4 – better than average; or 5 – exceptional.

Reviewer 015C-01 (Rating: 4)

The narrative shows a good awareness of the literature and current state of this technology.

Reviewer 015C-02 (Rating: 3)

The PI's awareness of the current research activity and published literature "as evidenced by literature referenced" is adequate. The cited literature and discussion attributable to the PI is limited. However, the information in the supporting documentation adequately addresses this weakness.

6. The background of the investigator(s) as related to the proposed work is: 1 – very limited; 2 – limited; 3 – adequate; 4 – better than average; or 5 – exceptional.

Reviewer 015C-01 (Rating: 4)

Very good. The investigators have been involved in a considerable variety of successful undertakings. Those investigators are certainly competent and enthusiastic scientists. The PI in particular (Steadman) is well positioned to insure good coordination of efforts.

It would be useful to include some information about the people who will be doing much of the actual laboratory and on-the-ground work. It would also be useful to know more about the contract personnel. .

Reviewer 015C-02 (Rating: 4)

The backgrounds of the investigators available in the participant organizations are better than average. The technical expertise available in the participant pool is one of the strengths of this proposal. Including a list of key publications for the key investigators would improve the “background of the investigators” rating.

7. 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: 1 – very inadequate; 2 – inadequate; 3 – adequate; 4 – very good; or 5 – exceptionally good.

Reviewer 015C-01 (Rating: 4)

A project of this scope will likely require periodic revisions along the way.

Reviewer 015C-02 (Rating: 5)

The project management plan is exceptionally good. The supporting documentation in Appendix E provides exceptionally good project management detail. Although, the supporting documentation exceeds the page guidelines for OGRC proposals, the additional information provides extremely beneficial project detail.

8. The proposed purchase of equipment is: 1 – extremely poorly justified; 2 – poorly justified; 3 – justified; 4 – well justified; or 5 – extremely well justified. (Circle 5 if no equipment is to be purchased.)

Reviewer 015C-01 (Rating: 4)

Point load tester

Reviewer 015C-02 (Rating: 5)

No comment.

9. The facilities and equipment available and to be purchased for the proposed research are: 1 – very inadequate; 2 – inadequate; 3 – adequate; 4 – notably good; or 5 – exceptionally good.

Reviewer 015C-01 (Rating: 5)

The EERC facilities are excellent.

Reviewer 015B-02 (Rating: 5)

The facilities and equipment available at the participant locations are exceptionally good. It would be difficult to find “research settings” comparable to those provided by these participants.

10. The proposed budget “value”¹ relative to the outlined work and the financial commitment from other sources is of: 1 – very low value; 2 – low value; 3 – average value; 4 – high value; or 5 – very high value. (See below)

Reviewer 015C-01 (Rating: 5)

The potential exists for very high value relative to investment.

Reviewer 015C-02 (Rating: 5)

The project is of high value because of the existing facilities, multiple participants and the proposal funding request to total project costs.

Section C. Overall Comments and Recommendations:

Please comment in a general way about the merits and flaws of the proposed project and make a recommendation whether or not to fund.

Reviewer 015C-01 (FUND)

This is a project that needs to be done and the current proposal is sound. The plan addresses a variety of issues with the likelihood of learning a lot about how to conduct this kind of operation on a routine basis. I like the integration of several factors; disposal of CO₂ generated during the gasification process, scientifically-sound sequestration, deep injection into saline horizons and other problems. I recommend funding of the project.

Reviewer 015C-02 (FUND)

Three notable flaws are; 1) the proposal fails to adequately reference or discuss existing literature or research concerning CO₂ EOR and sequestration, 2) the proposal fails to adequately explain the potential impact of CO₂ emission reduction standards, rules or treaties on the oil and gas industry, and 3) the proposal exceeds the page guidelines.

Carbon dioxide use in enhanced oil recovery is not new. The use of CO₂ from the Great Plains Gasification Plant in the Weyburn Field in Canada is an example of the EOR technology. The use of water augmented gas sweep, the CO₂ to barrels of incremental oil recovery, breakthrough and CO₂ recycle; these and other technical details are not adequately addressed.

The purpose and goals of the OGRC are to preserve, enhance and grow the oil and gas industry. Global climate change goals to reduce CO₂ emissions can result in dismantling, restricting and reducing oil and gas production and economic activity, jobs and tax revenues to the state. If emissions are to be reduced, the production sector must shrink or CO₂ emissions must be captured and sequestered. This threat presents the need for this proposal, and the threat and need are not adequately discussed. There is a real and pressing need for this program and this project justification is not clearly and loudly stated.

The proposal exceeds the page guidelines. However, this flaw is minor, should be overlooked, and this reviewer found the additional information helpful.

Three merits worthy of mention are: 1) CO₂ EOR can be a non-destructive, successful and sequential step in recovering additional oil, 2) the project builds on existing infrastructure and technology to expand the industry in ND and 3) the strong project team, maximizing the use of research and industry enhances the likelihood of project success.

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.

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.