

Contract No. R-038-047
“Integrated Carbon Capture and Storage for North Dakota Ethanol Production - Phase III”
 Submitted by University of North Dakota Energy & Environmental Research Center (EERC)
 Principal Investigator: Kerryanne M. Leroux

PARTICIPANTS

Sponsor		Cost Share
EERC through Department of Energy Funding (cash)	\$400,000	
Red Trail Energy	<u>\$950,000</u>	
Subtotal Cash Cost Share		\$1,350,000
Red Trail Energy	<u>\$800,000</u>	
Subtotal In-Kind Cost Share		\$ 800,000
North Dakota Industrial Commission		<u>\$ 500,000</u>
Total Project Cost		\$2,650,000

Project Schedule – 18 months
 Contract Date – November 21, 2018
 Start Date – December 1, 2018

Project Deliverables		
Initial Report	January 31, 2019	✓
Quarterly Report	April 30, 2019	✓
Quarterly Report	July 31, 2019	✓
Quarterly Report	October 31, 2019	
Quarterly Report	January 31, 2019	
Quarterly Report	April 30, 2020	
Final Report	May 31, 2020	

OBJECTIVE/STATEMENT OF WORK:

The third phase of a five-phase project, the objective of this phase is to initiate field research plans developed during Phases I & II. Tasks include:

- Prepare CO2 capture process designs to provide the foundation for a formal engineering designs of the CO2 capture system and other CCS infrastructure.
- Initiate monitoring & characterization plans.
 - Near surface monitoring & reservoir characterization.
- Prepare CCS Permit application package.
- Evaluate economic viability by continuing assessment of evolving Low Carbon Fuel (LCF) & other incentive programs.
- Execution of outreach plans created in Phase II.

If successful, this project could help ND ethanol plants capitalize on national low-carbon fuel markets. It will assist in defining the regulatory pathway for Class VI well permitting and provide greater understanding of LCF programs and how they integrate with ND primacy.

STATUS:

The contract has been executed.

January 31, 2019

The accomplishments achieved in the time period of October 31, 2018 – December 31, 2018 include the following:

- Finalized contract with NDIC.
- DOE was notified of the NDIC award, and the process was begun to receive official approval to begin work.
- Drafted formal contracts for RTE and Trimeric.

More details are available in the full report.

April 30, 2019

Some of the accomplishments achieved in the time period of October 31, 2018 – December 31, 2018 include the following:

- Trimeric completed the simulation work for primary CO₂ processing and the secondary ammonia refrigeration system.
- Trimeric completed draft process flow design and heat/material balance documents, which were sent to the EERC for review.
- Determined the specific groundwater wells and soil gas sampling locations to be included in near-surface sampling activities.
- Completed a draft near-surface sampling plan and environmental health & safety plan in preparation for execution of sampling activities next quarter.
- Completed a draft seismic design, which was sent to RTE's general contractor for formal design generation.
- Assisted the seismic acquisition company with the North Dakota permitting process, facilitating communication with the state permitting agent and seismic inspector.
- North Dakota permit manager approved the RTE geophysical exploration permit February 26.
- Received and reviewed final data acquisition plots to ensure no impact to coverage in the reservoir because of limited-access areas, as well as sources moved because of topography and offset requirements.
- Successfully completed RTE seismic survey, with all receivers collected from the project area by March 28.
- Identified one private well in the current projected area as penetrating the Fox Hills (lowest USDW [underground source of drinking water]); one nearby municipal well (outside of projected area) also reaches the Fox Hills aquifer.
- Completed collection of groundwater well data from driller's log files; began verifying well data via comparison to state reports and other literature.
- Completed a plan for collecting and evaluating geomechanical data from a stratigraphic test well (which will provide data necessary to complete a potential ND Class VI permit).
- Reviewed final version of California's CCS Protocol document approved in January 2019 to identify any additional changes since last version was publicized; changes noted were all nontechnical.
- Participated in several discussions with RTE and Renewable Products Marketing Group (i.e., RTE's contracted marketing group) to schedule potential conference call(s) and/or travel to contact California and Oregon LCF program teams for current status on CCS incorporation efforts and discussion of path(s) forward.
- Generated landowner notification letter templates for RTE to finalize and distribute to landowners directly affected by the survey and within a ½-mile buffer, as required by the North Dakota seismic survey permit.
- In compliance for the seismic permit, generated and submitted a public notice of the survey to local/regional newspapers (i.e., Richardton Merchant, Hebron Herald, and Dickinson Press).

- RTE and EERC traveled to Dickinson and Richardton, North Dakota, respectively, to present at the Stark County Commission (February 5) and Richardton City Commission (February 13) meetings, providing information on the planned seismic survey.
- An open house (Figure 2) was held on March 6 in Richardton, North Dakota, with
- ~30 community visitors, including participation by EERC, RTE, and DMR; feedback was generally positive and supportive for the project.
- Completed a sampling FAQ sheet and updated seismic FAQ sheet to reflect survey completion for landowner discussions and Stark County and Richardton City Commission meetings occurring in early April 2019, to provide an update on the completed seismic survey and information on the planned near-surface sampling.

Additional details and photos are available in the full report.

July 2019

Some of the accomplishments achieved in the time period of April 1, 2019 – June 30, 2019 include the following:

- EERC and Trimeric assisted RTE in coordinating a detailed, formal CO₂ stream analysis, conducted by Airborne International April 1–5; results will help refine equipment specifications.
- Trimeric provided PFD, HMB, P&IDs, and utilities documents for team review; upon RTE request, alternative refrigerants to ammonia, such as propane and R507, are being considered.
- The EERC hosted Trimeric and RTE at a May 22 meeting to review the capture system predesign for the bid package; RTE provided a preferred list of instrumentation/equipment brands for inclusion in the bid package.
- As of the June end, two out of three vendor bids have been received for the potential liquefied CO₂ system; the third vendor is expected to respond by early July.
- Finalized internal near-surface sampling plan to include isotope analyses and frequency.
- Conducted on-site reconnaissance to verify GPS (global positioning system) locations of chosen soil gas sampling locations; updated maps for sampling team.
- Completed RTE Sampling Event 1, May 17–29.
- Data processing is about 75% completed from the seismic acquisition survey conducted in March 2019 at the RTE site; regularly discussed data processing results with processing company, including quality and data processor parameter decisions.
- Ensured post-survey reporting was completed to satisfaction, contacting state seismic inspector and assisting RTE with generating draft post-survey reporting affidavit.
- Completed landowner site access agreement letters for sampling activities with accompanying maps and fact sheets.

Additional details and photo are available in the full report.

Updated 9/13/2019