CAAP Quarterly Report

March 31, 2025

Project Name: **Characterize Expected CO_2 Specification Ranges for Various Product Streams**

Contract Number: **693JK32450003CAAP**

Prime University: **Energy & Environmental Research Center, affiliated with the University of North Dakota**

Primary Investigator:

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Reporting Period: 01/01/2025 – 03/31/2025

Project Activities for Reporting Period:

1) Task 1: Project management, planning, and reporting
   a) Contract activity:
      i. Finalized contract with Pipeline Research Council International (PRCI) (project cost share partner).
   b) Graduate students:
      i. An additional graduate research student at Lamar University hired and actively working on research within project.
   c) Biweekly meetings are held with project members to discuss research efforts being conducted and to summarize activities performed while providing an avenue to coordinate research efforts within project scope and timing.
   d) Biweekly meetings are held with PRCI and DNV to discuss respective projects and to provide collaboration between the Pipeline and Hazardous Materials Safety Administration's (PHMSA's) and PRCI's investigation on impurities within CO_2 streams.
   e) Monthly meetings held with PHMSA personnel and advisors.

2) Task 2: Research into composition of CO_2 streams from industrial sources
   a) Composition of CO_2 streams continue to be found in literature and are included within the research of the project. The compositions may reflect the actual compositions from active projects and are documented as such.

b) Prepared Excel spreadsheet to summarize the compositions to reflect climate and industry for comparing expected and actual (where available) CO_2 stream specifications for the effects on the transportation system.
c) Requesting permission to use information on actual CO_2 stream compositions from various industries. Additional data will continue to be added as information becomes available.

3) Task 3: Integration of CO_2 stream composition
   a) Based on research in Task 2, initialized a summary for the CO_2 stream composition as reported by various industrial groups.
      i) Summarizing the CO_2 stream compositions using a consistent listing of impurities with the CO_2 content.
      ii) Summarizing the maximum and minimums of the impurities.
   b) Lamar University purchased thermodynamic analysis software Reference Fluid Thermodynamic and Transport Properties Database (REFPROP).
      i) REFPROP is being used to predict properties of CO_2 streams over a wide range of compositions.
   c) Kinetic information is being collected on hydrolysis/redox reactions and electrode half reactions that have potential to initiate corrosion to carbon steel (Lamar University).
   d) Project partners are in the process of summarizing pertinent data from the literature to provide a basis for recommending limits to those impurities that are important to the potential corrosion of steel pipelines—both in a singular and mixed (hub) source to sink applications (Stress Engineering and group members).

4) Task 4: Prioritization of emitters
   a) Initiated review of five projects within the Gulf Coast region in the United States.
   b) Reviewed listing of industries from Global CCS Institute (GCI) to highlight the status of carbon capture project as follows: operational, in construction, advanced development, and early development.
      i) Information provided by the listing from GCI will highlight the operational and planned near-term emitters.
   c) Reviewing the additional incentives required for future emitters to undertake carbon capture projects.

5) Task 5: Review of CO_2 standards and development of knowledge base
   a) Work in this task is pending research in Tasks 2, 3, and 4.

Project Financial Activities Incurred during the Reporting Period:

	Total Project Expenses as of 3/25/2025	
	CAAP Funds	**Nonfederal**
Personnel	$34,140	$9632
Fringe Benefits	$15,262	$5645
Travel		–
Equipment		–
Supplies	$99	–
Contractual		–
Construction		–
Other	$691	$79
Total Direct Charges	$50,191	$15,357
Indirect Charges	$25,597	$7832
Totals	**$75,788**	**$23,188**
Total Cost Share %	**76.57%**	**23.43%**

* EERC payroll is 2 weeks behind, so the payroll for 3/16–3/31 will be expensed in April. Our funds do not finish posting for the month until around April 10, so the amount for March could change.
* Please note that these totals are for PHMSA costs and don't include cost share spending.

Project Activities with Cost Share Partners:

Research efforts and information sharing between project partners have been developed and are ongoing.

Project Activities with External Partners:

Discussions with project team members (Lamar University, Stress Engineering, and PRCI) are ongoing with routinely scheduled meetings. Information sharing among project partners has been ongoing.

Potential Project Risks:

None known at this time.

Future Project Work:

1) Continue research efforts on CO_2 streams from industries as information is available.
2) Request CO_2 composition from active projects and include the provided compositions within the documentation of CO_2 stream summary.
3) Review identified stream compositions, differences between capture methods, and identify potential limits to compositions, providing findings to PHMSA and other groups.
4) Provide high-level review of alternative methods for carbon capture from the industries within the scope of the project.

5) Assess the economic feasibility of carbon capture, transportation, and storage by incorporating financial penalties such as capital expenditures and operating expenses for various carbon capture configurations, plant distances to pipelines/injection sites, and incentives, such as 45Q and 45V tax credits for different CO_2 sources with respect to a presumptive impurity specification.

Potential Impacts on Pipeline Safety:

Carbon capture at the various industries results in CO_2 streams that contain impurities. The level and type of impurities are influenced by feedstock used where the carbon capture occurs. Through this investigation, guidelines for limits of various impurities contained within CO_2 streams will be provided. With these guidelines, considerations for the design, operation, and safety of CO_2 pipelines will be enhanced.