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Abstract Submission

**CARBON MANAGEMENT: CO₂ SEQUESTRATION (MONITORING, MITIGATION, AND VERIFICATION;
STORAGE: DEPLETED OIL/GAS RESERVOIRS, AQUIFERS, BASALT, COAL BED METHANE**

THE PLAINS CO₂ REDUCTION (PCOR) PARTNERSHIP: PHASE II AND III ACTIVITIES

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Abstract:

Since its inception in 2003, the PCOR Partnership has brought together over 90 public and private sector groups working to lay the groundwork for practical and environmentally sound CO₂ sequestration in the heartland of North America. Covering a region of nine states and four Canadian provinces, the PCOR Partnership is one of seven regional partnerships in the U.S. Department of Energy's (DOE's) Regional Carbon Sequestration Partnership Initiative. The program partners contribute time, resources, and expertise in an effort to determine the best solutions to the safe, effective, and efficient management of CO₂ emissions.

Several means for geological storage of CO₂ are available in the PCOR Partnership region, including depleted oil and gas reservoirs, deep saline aquifers, enhanced oil recovery (EOR) and enhanced coalbed methane recovery. Studies into CO₂ capture; transportation; storage; and monitoring, mitigation, and verification (MMV) have been, and continue to be, pursued to allow for the deployment of large-scale demonstrations. Understanding the fate of the injected CO₂ is an important aspect of the emerging CCS technology. MMV activities are critical components of geological storage locations for two key reasons. First, the public must be assured that CO₂ geological storage is a safe operation. Second, markets need assurance that credits are properly assigned, traded, and accounted for. Integrated geological and hydrogeological characterization and geochemical sampling and analysis programs are technologies that can document the movement of the injected gases and detect potential leakage from the storage unit. The PCOR Partnership region contains vast energy, agricultural, forest, and water resources and offers significant opportunities for both geologic and terrestrial sequestration. Three geologic field validation tests and one terrestrial test are now under way in Phase II. Each test explores a unique aspect of CO₂ sequestration including enhanced oil recovery using a mixture of CO₂ and H₂S, utilization of low-grade lignite coals for enhanced gas production and sequestration, and the evaluation of land management practices to increase CO₂ uptake by plants and wetlands characteristic of the northern Great Plains.

The Zama Acid Gas EOR, CO₂ Sequestration, and Monitoring Project is a Phase II effort that will endeavor to implement a cost-effective approach for measuring, monitoring, and verification (MMV) for sequestration of a CO₂-rich acid gas stream. Since December 2006, a stream of acid gas has been injected into a Devonian pinnacle reef structure for the simultaneous purpose of disposal, sequestration of CO₂, and EOR at the Zama oil field in northwestern Alberta, Canada. The project includes a variety of efforts focused on examining the effects that high concentrations of H₂S can have on EOR and carbon sequestration operations, particularly with respect to MMV. Research activities are being conducted at multiple scales of investigation in an effort to predict and, ultimately, verify the fate of the injected gas. Geological, geomechanical, geochemical, and engineering data are being used to fully describe the injection zone, overlying seals, and other potentially affected strata. Validating the integrity of the anhydrite sealing formation and determining the nature of potential geochemical and geomechanical changes that may occur because of acid gas exposure are the primary goals of the research.

Future activities include two large-scale geologic field demonstration tests that will apply the lessons learned in earlier phases of the program to projects that use greater than 500,000 tons of CO₂ a year.