THE PLAINS CO_2 REDUCTION (PCOR) PARTNERSHIP: PHASE II AND III ACTIVITIES

Topic: Regional Partnerships

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ABSTRACT

The Plains CO_2 Reduction (PCOR) Partnership is one of the Regional CO_2 Sequestration Partnerships (RCSP) established by the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL). Over 80 partners from industry, government, and nongovernment organizations contribute time, resources, and expertise to the PCOR Partnership. The PCOR Partnership covers an area of over 1.4 million square miles in the central interior of North America, including all or part of nine states and four Canadian provinces. The 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. Future Phase III activities include two large-scale geologic field demonstration tests (Figure 1).

Apache Canada Limited is hosting a combined enhanced oil recovery (EOR)/sequestration activity that is injecting acid gas (approximately 70% CO_2 and 30% H_2S) from the Zama, Alberta, gas plant for use as a miscible flood agent. Since December 2006, acid gas injection has occurred at a rate of between 400,000 and 1 million cubic feet a day. The total volume injected, as of January 2008, is over 220 million cubic feet (12,000 tons acid gas or approximately 8400 tons of CO_2). The project is focused on examining the effects that high concentrations of H_2S can have on EOR and carbon sequestration operations, particularly with respect to monitoring, mitigation, and verification (MMV). On February 26, 2008, tracer (perfluorocarbon) injection began into the pinnacle to positively identify and locate any leakage.

An EOR project in the North Dakota portion of the Williston Basin has been designed to demonstrate the potential of using CO_2 in a tertiary oil recovery operation at depths of approximately 10,000 feet. The Williston Basin field validation test is developing the geological characterization data as a precursor to the full development of a commercial-scale sequestration demonstration in Phase III. Thus far, significant geological characterization data and models have been developed to help our commercial partners with site selection and preliminary engineering analysis of candidate sites.

The potential for CO_2 sequestration and enhanced coalbed methane production in Williston Basin (Burke County, North Dakota) lignite is being investigated to evaluate the features of fluid transport in lignite, the stability of carbon dioxide stored within a lignite seam, the factors controlling the success of sequestration/methane production operations in lignite, and the economics of the operation. Thus far, the lignite field validation test has drilled a five-spot production/injection well geometry to allow for efficient

Figure 1. PCOR Partnership field validation and demonstration tests.

site characterization, CO_2 injection, and MMV activities. A significant suite of geophysical logging techniques was utilized, and core of the targeted coal was collected for analysis in order to develop an injection and MMV strategy to be employed in the spring of 2008.

A terrestrial field validation test (McPherson County, South Dakota) is under way to develop carbon offsets from alternate management of wetlands in the Prairie Pothole Region (PPR) in partnership with Ducks Unlimited Incorporated. Work thus far has focused on demonstrating optimal practices for sequestering CO_2 through the restoration of PPR wetlands and surrounding grasslands at a site in north-central South Dakota. The project results are intended to serve as a model to promote and implement terrestrial sequestration across the PPR.

Phase III includes a saline formation injection in the Alberta Basin (1.8 million tons per year) and a combined sequestration–EOR project in the Williston Basin (0.5–1.0 million tons per year). The CO_2 source for the Alberta Basin project is an acid gas-processing facility, while a retrofitted conventional coal-fired power plant will provide the CO_2 for the Williston Basin demonstration.

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Ed Steadman is a Senior Research Advisor at the Energy & Environmental Research Center (EERC), where he is responsible for development, marketing, management, and dissemination of commercially oriented research and development of programs focused on the environmental effects of power and natural resource production. He currently serves as the Program Manager for the Plains CO_2 Reduction (PCOR) Partnership, one of seven regional partnerships funded by the U.S. Department of Energy's National Energy Technology Laboratory Regional Carbon Sequestration Partnership Program, to assess the technical and economic feasibility of capturing and storing (sequestering) CO_2 emissions from stationary sources in the northern Great Plains and adjacent area. Mr. Steadman's principal area of expertise is carbon sequestration. He holds an M.A. in Geology from the University of North Dakota and a B.S. in Geology from the University of Pennsylvania–Edinboro.