

FACTSHEET FOR PARTNERSHIP FIELD VALIDATION TEST

Partnership Name	Plains CO ₂ Reduction (PCOR) Partnership – Phase II	
Contacts:	Name Organization E-Mail	
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Principal Investigator	Ed Steadman	
Field Test Information:		
Field Test Name	Williston Basin EOR Field Test	
Test Location	Oil field in the North Dakota portion of the Williston Basin	
Amount and Source of CO ₂	Tons	Source
	<5000 per year	To be determined
Field Test Partners (Primary Sponsors)	To be determined	

Summary of Field Test Site and Operations:

The Williston Basin demonstration test will evaluate the potential for geological sequestration of CO₂ in a deep carbonate reservoir for the dual purpose of CO₂ sequestration and enhanced oil recovery (EOR). Phase I and Phase II studies indicated that the oil fields of the Williston Basin Field may have over 1 billion tons of CO₂ storage capacity (see Figure 1). The CO₂ for the field test will be obtained from the Great Plains Synfuels Plant near Beulah, North Dakota, operated by Dakota Gasification Company; from a natural gas-processing plant operated in western North Dakota; or from an ethanol plant operated in western North Dakota. The target injection zone for the project will likely be in either the Devonian Duperow Formation or the Mississippian Madison Group, which are located at depths between 10,000 and 12,000 ft. The Duperow is primarily dolomite, with an average porosity of 13.7%, permeability of 3.6 md, and other reservoir properties that make it a suitable target for CO₂ sequestration. The oil fields of the Madison Group are primarily limestone, with porosities and permeabilities that are typically similar to those of the Duperow.

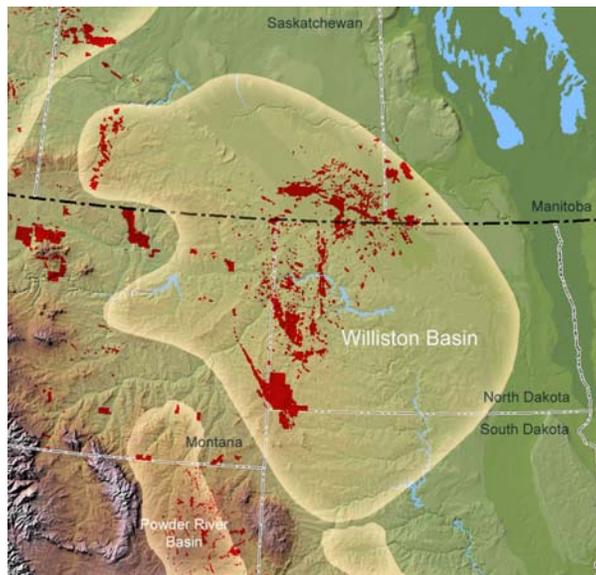


Figure 1. Oil fields of the Williston Basin.

The PCOR Partnership has conducted reconnaissance-level evaluations of several reservoirs in the Williston Basin that may be suitable candidates for the Phase II injection and monitoring, mitigation, and verification (MMV) activities. Evaluations have focused on determining the properties of candidate sites that may be suitable to host the EOR demonstration project, including performing robust

reservoir-modeling activities. PCOR Partnership activities will include additional reservoir modeling based on data collected over the course of the injection operations. Construction requirements will include the installation of CO₂ injection wells and the infrastructure and facilities necessary to transport the CO₂. With respect to injection operations, it is anticipated that CO₂ will be injected into the target zone using a minimum of two injection wells at a rate that is appropriate for pilot-scale EOR operations. Injection is expected to be conducted over about 1 year of the project.

Research Objectives:

The objectives of this demonstration are to 1) test the accuracy with which CO₂ storage capacity can be predicted, 2) demonstrate cost-effective MMV technologies and protocols in a working oil field production environment, and 3) provide field validation testing of sequestration technologies and infrastructure approaches that can lead to wide-scale deployment in the region.

Summary of Modeling and MMV Efforts: (Use the table provided for MMV)

MMV equipment will be installed and operations conducted to monitor pressure, temperature, pH, and resistivity as well as changes in bulk fluid density and volume within the reservoir. Microseismic monitors may be used to monitor potential movement of caprock because of CO₂ injection. Monitoring of CO₂ via natural stable isotopes and/or other tracers will be considered. Current production wells in units both overlying and underlying the target injection formation may allow for fluid sampling to evaluate potential CO₂ migration into those units.

Measurement Technique	Measurement Parameters	Application
Introduced and Natural Tracers	Travel time Partitioning of CO ₂ into brine or oil Identification sources of CO ₂	Tracing movement of CO ₂ in the storage formation Quantifying solubility trapping Tracing leakage
Water Composition	CO ₂ , HCO ₃ ⁻ , CO ₃ ²⁻ Major ions Trace elements Salinity	Quantifying solubility and mineral trapping Quantifying CO ₂ -water-rock interactions Detecting leakage into shallow groundwater aquifers
Subsurface Pressure	Formation pressure Annulus pressure Groundwater aquifer pressure	Control of formation pressure below fracture gradient Wellbore and injection tubing condition Leakage out of the storage formation
Well Logs	Brine salinity Sonic velocity CO ₂ saturation	Tracking CO ₂ movement in and above storage formation Tracking migration of brine into shallow aquifers Calibrating seismic velocities for 3D seismic surveys

Accomplishments to Date:

Activities related to the Williston Basin demonstration in Years 1 and 2 of Phase II have been primarily focused on gathering background and baseline geological and hydrogeological information. Injection of CO₂ is currently scheduled to begin in mid-2008.

Summarize Target Sink Storage Opportunities and Benefits to the Region:

The sedimentary basins of the PCOR Partnership region typically include widespread, thick sequences of carbonate rocks, many of which contain oil reservoirs. Many of these carbonate-based oil reservoirs are located at depths greater than 10,000 ft. The results from the deep Williston Basin test will be compared to those generated by research activities at other shallower carbonate reservoirs in the region, including the Zama test in Alberta, Canada, and the International Energy Agency project at

Weyburn, Canada. Results will provide insight regarding the nature and magnitude of technical challenges associated with CO₂ injection under the pressure (4900 psi) and temperature (250°F) conditions found at depths greater than 10,000 ft. Sampling protocols developed for this activity will be applicable to other high-pressure/temperature reservoir environments.

Cost:

Total Field Project Cost: \$3,226,122

DOE Share: \$ 1,008,421 31%

Non-DOE Share: \$ 2,217,701 69%

Field Project Key Dates:

Baseline Completed: August 30, 2008

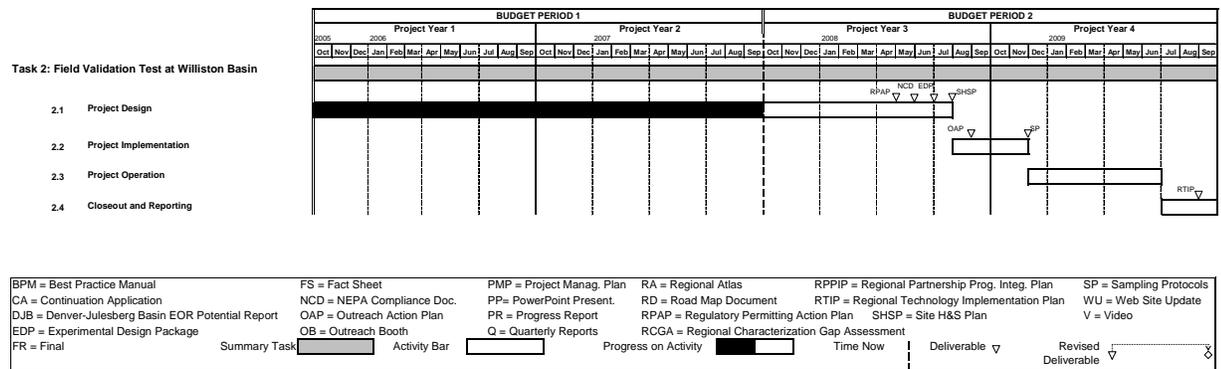
Drilling Operations Begin: Not Applicable (we anticipated that existing wells will be used).

Injection Operations Begin: September 30, 2008

MMV Events: To be determined.

Field Test Schedule and Milestones (Gantt Chart):

- Regulatory Permitting Action Plan due April 30, 2008.
- National Environmental Policy Act compliance document due May 31, 2008.
- Experimental design package due June 30, 2008.
- Site Health and Safety Plan due July 31, 2008.
- Outreach Action Plan due August 31, 2008.
- Sampling protocols due November 30, 2008.
- Infrastructure construction to be conducted during the second and third quarters of Year 3.
- Installation of MMV equipment during the second and third quarters of Year 3.
- Injection to be initiated during the fourth quarter of Year 3 and conducted for 9 months.
- Regional Technology Implementation Plan due August 31, 2009.



Additional Information

NA