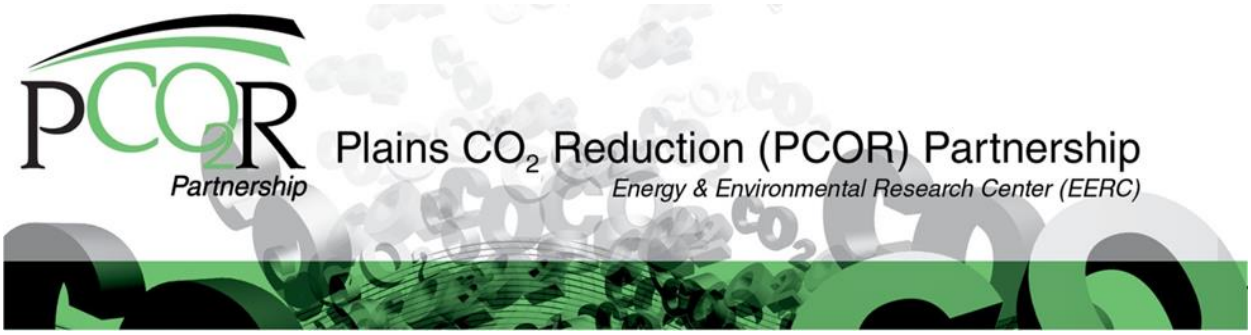

PERMITTING REVIEW – UPDATE 3

Plains CO_2 Reduction (PCOR) Partnership Phase III
Task 3 – Deliverable D8

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PERMITTING REVIEW – UPDATE 3

INTRODUCTION

This document provides a brief update on the requirements to conduct a geologic carbon dioxide (CO_2) storage project in the United States or Canada. Little has changed in the United States since the second permitting review was submitted in September 2015 (Wilson and others, 2015). The information provided herein gives a broad overview of the regulatory requirements and the authorities involved. As of this writing, the U.S. Environmental Protection Agency (EPA) has the authority to permit CO_2 geologic storage wells in all 50 states. Additionally, EPA requires geologic storage projects to comply with Mandatory Greenhouse Gas Reporting (40 Code of Federal Regulations [CFR] 98). In Canada, the provinces have the authority to permit geologic storage projects.

Because of the evolving nature of regulatory frameworks at various levels of government as well as daily changes in congressional reporting, this document is intended to provide general overviews of rules and policies and can be considered to be up to date as of September 30, 2016, unless otherwise noted.

U.S. ENVIRONMENTAL PROTECTION AGENCY

Underground Injection Control

In December 2010, EPA finalized the requirements for a new well class (Class VI) under the authority of the Safe Drinking Water Act's Underground Injection Control (UIC) Program. The rule establishes federal requirements for the underground injection of CO_2 for the purpose of long-term underground storage, or geologic storage.

Numerous elements of the Class VI rule deal with various aspects of permitting and operating a UIC Class VI injection well, including the following:

- Site characterization requirements
- AOR (area of review) delineation and reevaluation
- Well construction and operation requirements
- Testing and monitoring requirements
- Site-specific project plan development
- Financial responsibility for the life of the project
- Postinjection site care monitoring

- Injection depth waiver
- Consideration for wells transitioning from Class II (enhanced resource recovery wells) to Class VI (direct geologic storage wells)

A series of guidance documents have been developed to provide information and possible approaches for addressing each of the elements listed above. Aside from the primacy manual for state directors, the guidance documents below follow the sequence of activities that an owner or operator will perform over time at a proposed and/or permitted geologic storage site. The following are the guidance documents that have been finalized by EPA:

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Primacy Manual for State Directors (April 2014; www.epa.gov/sites/production/files/2015-07/documents/epa816b14003.pdf, accessed September 2016)

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Well Site Characterization Guidance (May 2013; www.epa.gov/sites/production/files/2015-07/documents/epa816r13004.pdf, accessed September 2016)

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Well Area of Review Evaluation and Corrective Action Guidance (May 2013; www.epa.gov/sites/production/files/2015-07/documents/epa816r13005.pdf, accessed September 2016)

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Well Testing and Monitoring Guidance (March 2013; www.epa.gov/sites/production/files/2015-07/documents/epa816r13001.pdf, accessed September 2016)

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Well Project Plan Development Guidance (August 2012; www.epa.gov/sites/production/files/2015-07/documents/epa816r11017.pdf, accessed September 2016)

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Well Construction Guidance (May 2012; www.epa.gov/sites/production/files/2015-07/documents/epa816r11020.pdf, accessed September 2016)

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class Financial Responsibility Requirements and Guidance (July 2011; www.epa.gov/sites/production/files/2015-07/documents/uicclass6reasearchandanalysisupdatedpg84.pdf, accessed September 2016)

EPA also finalized and released documents that are quick reference guides on Class VI program implementation considerations:

- Additional Tools for UIC Program Directors Incorporating Environmental Justice Considerations into the Class VI Injection Well Permitting Process (June 2011; www.epa.gov/sites/production/files/2015-07/documents/epa816r11002.pdf, accessed September 2016)

- Additional Considerations for UIC Program Directors on Interstate Coordination Requirements for the Class VI Injection Well Permitting Process (June 2011; www.epa.gov/sites/production/files/2015-07/documents/epa816r11003.pdf, accessed September 2016)

- Additional Considerations for UIC Program Directors on the Public Participation Requirements for Class VI Injection Wells (June 2011; www.epa.gov/sites/production/files/2015-07/documents/uic-quick-reference-guide_public-participation_final-508.pdf accessed September 2016)

- Underground Injection Control (UIC) Class VI Program: Public Participation Considerations for Geologic Sequestration Projects Fact Sheet (December 2010; www.epa.gov/sites/production/files/2015-07/documents/uic-quick-reference-guide_public-participation_final-508_0.pdf, accessed September 2016)

The remaining EPA draft guidance documents are closed for public review but are yet to be finalized (guidance documents located at www.epa.gov/uic/draft-class-vi-guidance-documents-closed-public-comment [accessed September 2016] are listed below):

- Geologic Sequestration of Carbon Dioxide: Draft Underground Injection Control (UIC) Program on Guidance on Transitioning Class II Wells to Class VI Wells (December 2013; www.epa.gov/sites/production/files/2015-7/documents/epa816p13004.pdf, accessed September 2016).

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Guidance on Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance (April 2013; www.epa.gov/sites/production/files/2015-07/documents/epa816p13005.pdf, accessed September 2016).

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Well Recordkeeping, Reporting, and Data Management Guidance for Owners and Operators (March 2013; www.epa.gov/sites/production/files/2015-09/documents/gs_well_recordkeeping_reporting_and_data_management_guidance_for_owners_and_operators.pdf, accessed September 2016)

In the final rule, EPA gave states a deadline of September 6, 2011, to apply for primary enforcement responsibility, or primacy, over Class VI wells. No states met this deadline; therefore, as of September 7, 2011, EPA directly implemented the Class VI program nationally. As a result, in order to permit a CO_2 geologic storage project, potential owners or operators of a CO_2 geologic storage well must submit a permit application to the appropriate EPA regional office. While no Plains CO_2 Reduction (PCOR) Partnership owners or operators have applied for or received a

permit, six permits were issued by EPA in Region 5 in the state of Illinois.[1] Two permits were issued for an Archer Daniels Midland, Inc. (ADM)[2,3] project in Decatur, Illinois, and four others were issued for the FutureGen 2.0 project near Jacksonville, Illinois, which has had its funding revoked by the U.S. Department of Energy. States in the PCOR Partnership region are divided among three different EPA regions, as shown in Table 1.

Table 1. PCOR Parnership States by EPA Region

State(s)	EPA Region
Minnesota, Wisconsin	Region 5
Nebraska, Iowa, Missouri	Region 7
Montana, Wyoming, north Dakota, South Dakota	Region 8

Direct federal implementation of the Class VI Program will remain in effect until such time that a state-submitted primacy application is approved by EPA. As previously mentioned, any state has the right to apply for primacy if it so chooses.

On June 21, 2013, the North Dakota Industrial Commission (NDIC) Department of Mineral Resources (DMR) Oil and Gas Division submitted its primacy application. On July 19, 2013, EPA returned the memorandum of agreement (MOA), requesting changes. On August 9, 2013, EPA Region 8 was to publish in the Federal Register and local publications Notice of Receipt of the North Dakota Class VI Primacy Application, with a 30-day public comment period (August 9 to September 9, 2013). By September 9, 2013, the end of the 30-day comment period, no requests for a public hearing had been received. On October 29, 2013, the NDIC DMR Oil and Gas Division finalized the MOA with EPA Region 8. The MOA was signed by Lynn Helms, DMR Director, on November 24, 2013, and by EPA Region 8 Administrator Shaun McGrath on November 29, 2013. It was anticipated to take at least 6 months before North Dakota would know whether the application was approved by EPA. EPA has not requested additional primacy information or clarification from North Dakota, and as of this writing, the application still awaits approval.

EPA's Class VI UIC well classification has created many questions among state regulators and EOR operators. To address these concerns, Director of the Office of Ground Water and Drinking Water Peter Grevatt sent a memo on April 23, 2015, entitled "Key Principles in EPA's Underground Injection Control Program Class VI Rule Related to Transition of Class II Enhanced Oil or Gas Recovery (EOR) Wells to Class VI" to the Regional Water Division Director in an effort to clarify the transition of Class II wells to Class VI wells.

While this memo has helped to clarify some of the uncertainty in the EPA guidelines, it is the opinion of many enhanced oil recovery (EOR) operators that several areas of uncertainty remain unaddressed. Clarifications that need to be addressed include the regulatory uncertainty created by the potential of a forced transition from UIC Class II to UIC Class VI and the legal and

[1] http://yosemite.epa.gov/opa/admpress.nsf/a5792a626c8dac098525735900400c2d/28813e70cc4c222a85257d47006ff568!opendocument (accessed August 2015).
[2] www.epa.gov/r5water/uic/adm/pdf/adm-ccs1-compiled-responsiveness-summary-final.pdf (accessed August 2015).
[3] www.epa.gov/region5/water/uic/adm/pdfs/20141201155430396.pdf (accessed August 2015).

regulatory uncertainty as to impacts on existing state mineral law, state rights, pore space ownership, private property rights, mineral rights, and existing and future unitization agreements.

Additional information on the UIC Class VI Program can be found on EPA's Web site at http://water.epa.gov/type/groundwater/uic/class6/gsclass6wells.cfm (accessed September 2016).

On August 8, 2015, the Obama Administration announced the Clean Power Plan, which requires states to reduce carbon pollution from power plants. To meet these carbon pollution standards, EPA's final rule (released August 3, 2015) relies heavily on CO_2 EOR and carbon capture and storage (CCS) as part of the best systems of emission reduction (www.epa.gov/airquality/cpp/cps-final-rule.pdf, p. 18 and 19, accessed September 2016).

Mandatory Greenhouse Gas Reporting

In late 2010, EPA finalized its Mandatory Greenhouse Gas Reporting rule, which consists of Subparts A through UU. Subpart RR refers to the injection of CO_2 for geologic storage, which covers any well or group of wells that injects CO_2 for long-term geologic storage and all wells permitted as Class VI wells (see previous section for more information on this well class). Such facilities are required to report:

- Source(s) of CO_2.
- Mass of CO_2 received.
- Mass of CO_2 produced (i.e., mixed with produced oil, gas, or other fluids).
- Mass of CO_2 emitted from surface leakage.
- Mass of CO_2 equipment leaks and vented CO_2 emissions from sources between the injection flowmeter and the injection wellhead or between the production flowmeter and the production wellhead.
- Mass of CO_2 stored in subsurface geologic formations.

In addition, Subpart RR reporters must also develop and submit a monitoring, reporting, and verification (MRV) plan to EPA, receive an approved MRV plan from EPA, implement the EPA-approved plan, and submit annual reports. Each MRV plan must have the following elements:

- Delineation of the maximum monitoring area (MMA) and active monitoring area (AMA).
- Identification and evaluation of the potential leakage pathways, and assessment of the likelihood, magnitude, and timing of surface leakage of CO_2 through these pathways to the MMA.

- A strategy for detecting and quantifying any surface leakage of CO_2 in the event leakage occurs.

- An approach for establishing the expected baselines for monitoring CO_2 surface leakage.

- A summary of considerations made to calculate site-specific variables for the mass balance equation.

The AMA is the area that will be monitored over a specified time interval chosen by the reporter, which must be greater than 1 year. The MMA includes the extent of the free-phase CO_2 plume over the lifetime of the project plus a buffer zone of ½ mile. All of the area of the MMA will eventually be covered by one or more AMAs.

Additional information on Mandatory Greenhouse Gas Reporting Subpart RR can be found on EPA's Web site at www.epa.gov/climatechange/emissions/subpart/rr.html (accessed August 2015).

SUMMARY

As CCS regulatory and policy development continues to evolve at the state, provincial, and federal levels, the PCOR Partnership will continue to evaluate potential effects on CCS technology development and, where necessary, provide technical input and guidance to regulators and those making policy decisions in areas such as the transition from Class II to Class VI wells as it pertains to EPA's final rule, which relies heavily on CO_2 EOR and CCS as part of the best systems of emission reduction. As new rules and regulations evolve and are finalized, the PCOR Partnership will continue to provide its members with the most up-to-date information.

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