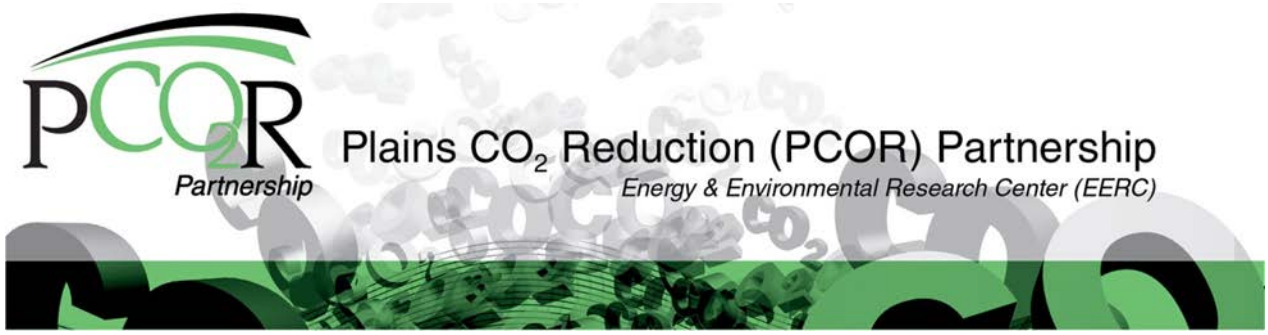

PERMITTING REVIEW – UPDATE 2

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

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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. Not a lot has changed in the United States in the past 2 years since the first permitting review was submitted in September 2013 (Botnen and others, 2013). 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 the Mandatory Reporting of Greenhouse Gases Rule (MRR; 40 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, 2015, 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. These elements include 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)

Additionally, a series of guidance documents have been developed or are being developed to provide information and possible approaches for addressing each of the elements listed above. These guidance documents 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 Well Site Characterization Guidance (May 2013) http://water.epa.gov/type/groundwater/uic/class6/upload/epa816r13004.pdf (accessed August 2015)

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Well Area of Review Evaluation and Corrective Action Guidance (May 2013) http://water.epa.gov/type/groundwater/uic/class6/upload/epa816r13005.pdf (accessed August 2015)

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Well Testing and Monitoring Guidance (March 2013) http://water.epa.gov/type/groundwater/uic/class6/upload/epa816r13001.pdf (accessed August 2015)

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Well Project Plan Development Guidance (August 2012) http://water.epa.gov/type/groundwater/uic/class6/upload/epa816r11017.pdf (accessed August 2015)

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Well Construction Guidance (May 2012) http://water.epa.gov/type/groundwater/uic/class6/upload/epa816r11020.pdf (accessed August 2015)

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class Financial Responsibility Guidance (July 2011) http://water.epa.gov/type/groundwater/uic/class6/upload/uicfinancialresponsibilityguidancefinal072011v.pdf (accessed August 2015)

Since 2013 the following Guidance Documents have been finalized by EPA:

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Primacy Manual for State Directors (April 2014) http://water.epa.gov/type/groundwater/uic/class6/upload/epa816b14003.pdf (accessed August 2015)

Other finalized documentation released by the EPA 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) http://water.epa.gov/type/groundwater/uic/class6/upload/epa816r11002.pdf (accessed August 2015)

- Additional Considerations for UIC Program Directors on Interstate Coordination Requirements for the Class VI Injection Well Permitting Process (June 2011) http://water.epa.gov/type/groundwater/uic/class6/upload/epa816r11003.pdf (accessed August 2015)

- Additional Considerations for UIC Program Directors on the Public Participation Requirements for Class VI Injection Wells (June 2011) http://water.epa.gov/type/groundwater/uic/class6/upload/UIC-Quick-Reference-Guide_Public-Participation_Final-508.pdf (accessed August 2015)

- Underground Injection Control (UIC) Class VI Program: Public Participation Considerations for Geologic Sequestration Projects Fact Sheet (December 2010) http://water.epa.gov/type/groundwater/uic/class6/upload/gspublicparticipationconsiderationsfactsheetdec2010.pdf (accessed August 2015)

The following Guidance Documents have been released and are now closed for public review by EPA but have yet to be finalized (Guidance Documents located here: http://water.epa.gov/type/groundwater/uic/class6/gsguidedoc.cfm [accessed August 2015] and listed below):

- Geologic Sequestration of Carbon Dioxide: Draft Underground Injection Control (UIC) Program on Transitioning Class II Wells to Class VI Wells http://water.epa.gov/type/groundwater/uic/class6/upload/epa816p13004.pdf (accessed August 2015)

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance (accessed June 2015)

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Well Recordkeeping, Reporting, and Data Management Guidance for Owners and Operators (accessed June 2015)

- Geologic Sequestration of Carbon Dioxide: Underground Injection Control (UIC) Program Class VI Well Recordkeeping, Reporting, and Data Management Guidance for Permitting Authorities (accessed June 2015)

Additional Guidance Documents are expected to be forthcoming.

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 will need to submit a permit application to the appropriate EPA regional office. While no owners or operators in the Plains CO_2 Reduction (PCOR) Partnership have applied for or received a permit, six permits were issued by the EPA in Region 5 in the state of Illinois.[1] Two permits were issued for the 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 pulled by the U.S. Department of Energy. States in the PCOR Partnership are divided among three different EPA regions. Table 1 illustrates the appropriate region for each state.

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, Department of Mineral Resources, Oil and Gas Division (North Dakota) submitted its Primacy Application. On July 19, 2013, EPA sent back the MOA with comments requesting changes to the MOA. On August 9, 2013, EPA Region 8 was to publish in the Federal Register and local publications Notice of Receipt of North Dakota Class VI Primacy Application with a 30-day public comment period (August 9, 2013, to September 9, 2013). September 9, 2013, was the end of the 30-day comment period, and no requests for a public hearing were requested. On October 29, 2013, the North Dakota Industrial Commission, Department of Mineral Resources**,** Oil and Gas Division (North Dakota) finalized the MOA with EPA Region 8. The MOA was signed by Lynn Helms, Director of the Department of Mineral Resources, on November 24, 2013, and by EPA's Region 8 Administrator Shaun McGrath on November 29. 2013. It was anticipated to take at least 6 months before North Dakota would know whether or not its application was approved by EPA. As of this writing, the application still awaits approval.

The EPA's Class VI well 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 C. Grevatt, sent a memo on April 23, 2015, titled "Key Principles in EPA's Underground

Table 1. EPA Regional Divisions

EPA Region	State
Region 5	Minnesota, Wisconsin
Region 7	Nebraska, Iowa, Missouri
Region 8	Montana, Wyoming, North Dakota, South Dakota

[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).

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 making 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 EOR operators that several areas of uncertainty still have not been addressed. Some of the clarifications that need to be addressed include the regulatory uncertainty created by the potential of a forced transition from Class II UIC to Class VI UIC and the legal and 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.

Please refer to EPA's Web site for additional information on the UIC Class VI Program: http://water.epa.gov/type/groundwater/uic/class6/gsclass6wells.cfm (accessed August 2015).

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, the EPA's Final Rule (released August 3, 2015) relies heavily on CO_2 enhanced oil recovery and carbon capture and storage (CCS) as part of the best systems of emission reduction (see pages 18 and 19) www.epa.gov/airquality/cpp/cps-final-rule.pdf (accessed August 2015).

Mandatory Reporting of Greenhouse Gases Rule

EPA finalized its MRR, which consists of Subparts A though UU, late 2010. Subpart RR refers to the injection of CO_2 for geologic storage. This subpart 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 an 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 one-half mile. All of the area of the MMA will eventually be covered by one or more AMAs.

For additional information on MRR Subpart RR, please refer to EPA's Web site, 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 and the Clean Power Act 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 progress and are finalized, the PCOR Partnership will continue to provide its members with the latest, most current information.

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