



# Federal and State Regulation of Geologic Storage

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Presented to the Midwestern Governor's Association, Midwestern  
Delegation to the Gulf Coast

September 28, 2011

# Federal Regulations

- ▶ GHG Permitting Guidance – March 11, 2011
- ▶ EPA’s UIC Class VI Rule – November 22, 2010
- ▶ Mandatory GHG Reporting Rule
  - Subpart PP – December 17, 2010
  - Subpart RR – November 22, 2010
  - Subpart UU – November 22, 2010
- ▶ Proposed Resource Conservation Recovery Act (RCRA) Rule – August 8, 2011

# GHG Permitting Guidance November 2010



# GHG Permitting Guidance

- ▶ EPA issued GHG BACT Guidance November 10 2010
  - The “Guidance” is “non-binding”
  - Comment period closed December 1, 2010
  - Over 100 comments received
  - EPA released revised document March 2011
- ▶ BACT and CCS
  - Applies to New Sources and Major Modifications
  - Will lead to significant litigation

# GHG Permitting Guidance

- ▶ BACT and CCS under the Guidance
  - Step 1: CCS is “available”
  - Step 2: CCS may be “technically infeasible” if capture, transportation and storage are not all feasible for a specific project
    - e.g., no space available for CO<sub>2</sub> capture equipment; right of ways prevent building pipeline infrastructure; no access to suitable geology for sequestration or other storage options
  - Step 3: Rank remaining options by effectiveness
  - Step 4: Currently CCS may be too expensive and ∴ likely to be eliminated as an option

“There are now cases where the economics of CCS are more favorable, e.g. enhanced oil recovery”

*–From GHG Permitting Guidance*

# GHG Permitting Guidance

## ▶ Conclusions

- Currently CCS is considered an expensive technology, potentially making price of electricity for a given facility uncompetitive
- Therefore, CCS will often be eliminated from consideration in Step 4 of the BACT analysis based on cost
- CCS may become less costly and warrant greater consideration in Step 4 in the future
  - As capital and parasitic costs decrease
  - Value of CO<sub>2</sub> increases

# EPA's Final UIC Class VI Rule



# Class VI Rule Background

- ▶ Final rule builds on the existing UIC Program criteria and standards to address GS
  - The final Class VI rule requires owners or operators that choose to inject CO<sub>2</sub> for the purpose of GS to comply with tailored requirements to ensure USDW protection from injection-related activities.
- ▶ Proposed Rule for GS of CO<sub>2</sub>
  - Published: July 25, 2008
  - 150 day public comment period ended: December 24, 2008
  - EPA received 400 comment letters
- ▶ Notice of Data Availability and Request for Comment
  - Published: August 31, 2009
  - 45 day public comment period ended: October 15, 2009
  - EPA received 67 comment letters
- ▶ Final Rule Signed: November 22, 2010



# Goals of the Class VI Rulemaking Process



- ▶ **Ensure protection of USDWs**
- ▶ Tailor existing UIC Program Requirements for GS of CO<sub>2</sub>
- ▶ Use a clear and transparent process
- ▶ Use an adaptive approach to incorporate new data and project information
- ▶ Capitalize on existing EPA, State and industry injection experience
- ▶ Involve, inform, and educate the public

# EPA's Approach to Class VI Rulemaking

## Special Considerations for GS

Large Volumes  
Buoyancy  
Viscosity (mobility)  
Corrosivity

## UIC Program Elements

- Site Characterization
- Area of Review
- Well Construction
- Well Operation
- Site monitoring
- Public Participation
- Financial Responsibility
- Site Closure

Established a new well class -  
Class VI

# Final Class VI Requirements

- ▶ *Permit valid for the life of the well*
- ▶ Site characterization and Class VI well permitting
- ▶ AoR delineation and reevaluation
- ▶ Class VI well construction and operation
- ▶ Testing and monitoring of the Class VI injection project
- ▶ Site-specific project plan development
- ▶ Financial responsibility for the life of the Class VI project
- ▶ *Post-injection site care monitoring - 50 yr default*
- ▶ Injection depth waiver
- ▶ *Consideration for wells transitioning from Class II ER to Class VI injection of CO<sub>2</sub>*

# State Primacy Considerations

- ▶ Section 1422 of the SDWA
  - Primacy for well Classes I, III, IV, V and VI
  - State regulations must meet or exceed minimum federal requirements
  - States allowed Independent Class VI Primacy **New!**
- ▶ Section 1425 of the SDWA
  - Regulations must be effective in protecting USDWs
  - Primacy standard for Class II
- ▶ During “transitional period” prior to Sept. 6, 2011
  - States (Texas) with existing UIC primacy under 1422 may issue permits under existing authority – Class I or Class V; can be re-permitted later as Class VI
  - States without existing UIC primacy must submit any Class VI GS permit application to the EPA Region.

# State Primacy cont'd

- ▶ September 7, 2011 EPA Federal Class VI program established (*76 Fed. Reg. 56982*)
  - States may still apply for primacy
  - All GS permits must be directed to appropriate EPA Regions
  - Transitional period allowing use of existing state Class I or V programs has ended

# GS and the Mandatory GHG Reporting Rule

- » Subpart PP
- Subpart RR
- Subpart UU

# Mandatory GHG Reporting Rule – Subpart PP



- ▶ **Finalized December 17, 2010**

- ▶ **Who Must Report?**

Under the GHG Reporting Program suppliers of CO<sub>2</sub> must report CO<sub>2</sub> emissions that would result from the complete release of the product that they place into commerce.

- Capture Facilities – i.e. facilities that capture for commercial use or sequestration
- CO<sub>2</sub> production wells
- Importers of CO<sub>2</sub> ≥ 25,000 metric tons
- Exporter of CO<sub>2</sub> ≥ 25,000 metric tons

- ▶ **What must be reported? Mass of CO<sub>2</sub> ...**

- Captured from production process units
- Extracted from production wells
- Imported or exported
- End uses, if known
  - i.e. long-term storage, EOR, R&D, in a greenhouse, pulp and paper, etc.

# Mandatory GHG Reporting Rule – Overview Subpart RR/UU

- ▶ EPA has finalized GHG reporting mechanisms for facilities that conduct **geologic sequestration (subpart RR)** and all other facilities that inject carbon dioxide (CO<sub>2</sub>) underground for **enhanced oil recovery or any other purpose (subpart UU)**
  - Proposal signed on March 22, 2010
  - Final rule signed on November 22, 2010
  - Effective December 31, 2011
- ▶ This rule is complementary to and builds on the EPA's UIC program
  - Recognizes EOR as storage
  - Designed to minimize impact on EOR business as usual



# Geologic Sequestration of Carbon Dioxide – Subpart RR

- ▶ Subpart RR source categories includes:
  - Any well or group of wells that inject CO<sub>2</sub> for long-term geologic storage
  - **All wells permitted as UIC Class VI wells**
  - Facilities that conduct EOR are not required to report under Subpart RR, unless
    - The owner or operator “opts-in” or,
    - The facility holds a UIC class VI permit for the well or group of Wells
- ▶ What must be reported
  - Report basic information on CO<sub>2</sub> received
  - Develop and implement an EPA approved site-specific monitoring, reporting, and verification (MRV) plan
  - Report the amount of CO<sub>2</sub> geologically sequestered using a mass balance approach and annual monitoring activities
- ▶ When does reporting begin
  - All facilities reporting under subpart RR must submit annual reports to the EPA by March 31, 2012 reporting basic information on CO<sub>2</sub> received in 2011
    - These facilities will add data to their annual reports on the amount of CO<sub>2</sub> stored and annual monitoring activities once their EPA approved MRV plans are implemented

# Injection of Carbon Dioxide – Subpart UU

- ▶ Subpart UU source category includes:
  - Any well or group of wells that inject CO<sub>2</sub> stream into the subsurface that does not report under Subpart RR (i.e. EOR business as usual)
  - R&D projects receiving a Subpart RR exemption
- ▶ Must report basic information on CO<sub>2</sub> received for injection
  - Not required to report CO<sub>2</sub> injected, lost or leaked
- ▶ Must submit annual reports by March 31, 2012 on CO<sub>2</sub> received in 2011

# Reporting Requirements

	<b>GHGs Reported</b>	<b>Subpart RR</b>	<b>Subpart UU</b>
1	Mass of CO2 received	X	X
2	Mass of CO2 injected	X	
3	Mass of CO2 produced and recycled	X	
4	Mass of CO2 emitted by surface leakage	X	
5	Onsite CO2 from equipment leakage and vented CO2 emissions	X	
6	CO2 sequestered in subsurface formations	X	
7	Cumulative CO2 sequestered in all years since facility required to report under subpart RR	X	

# CO<sub>2</sub> Received – Source

- ▶ Under both subparts RR and UU the source of the CO<sub>2</sub> received must be recorded, if known
- ▶ Source categories include:
  1. CO<sub>2</sub> production wells
  2. Electric generating units
  3. Ethanol plants
  4. Pulp and paper mills
  5. Natural gas processing
  6. Gasification operations
  7. Other anthropogenic sources
  8. Discontinued EOR project
  9. Unknown

# Subpart RR MRV Plan

- ▶ For facilities conducting GS on or before December 31, 2010, MRV plans required by June 30, 2011 (180 day extension allowed)
- ▶ Otherwise within 180 days of receiving UIC Class VI permit
- ▶ Contents of MRV Plan include
  - Delineation of maximum and active monitoring areas
  - ID potential leakage pathways
  - Strategy for detecting and quantifying surface leakage
  - Strategy for establishing surface monitoring baseline
  - Proposed date to collect data for determining total amount sequestered
- ▶ UIC Class VI reporting satisfies some of the MRV plan requirements

# RCRA Conditional Exemption



# Proposed RCRA Conditional Exemption

- ▶ After 2008 publication of proposed GS Rule, EPA received numerous comments asking for clarification on applicability of RCRA requirements
- ▶ In response to those comments, EPA published RCRA Conditional Exemption proposal, August 8, 2011 (*76 Fed. Reg. 48073*)
  - EPA believes that CO<sub>2</sub> streams are solid wastes and potentially hazardous wastes, therefore subject to RCRA requirements
  - Proposed rule excludes CO<sub>2</sub> streams from definition of “hazardous waste”
    - Injection in a UIC Class VI well
    - Compliance with regulations governing CO<sub>2</sub> transport
- ▶ Comments due October 7, 2011



# State CCS Policy

»» The Texas Experience



# State CCS Policy

- ▶ Southern States Energy Board
  - *CCS Legislation in the United States of America*
    - <http://www.sseb.org/files/ccs-legislation-full-version.pdf>.
  
- ▶ Interstate Oil and Gas Compact Commission
  - <http://groundwork.iogcc.org/topics-index/carbon-sequestration>.
  
- ▶ CCSReg Project
  - <http://www.ccsreg.org/bills.php>.

# Texas CCS Policy: Guiding Principles



- Protect EOR
- Preserve Primacy
- Prepare Regulatory Framework
- Prefer Railroad Commission

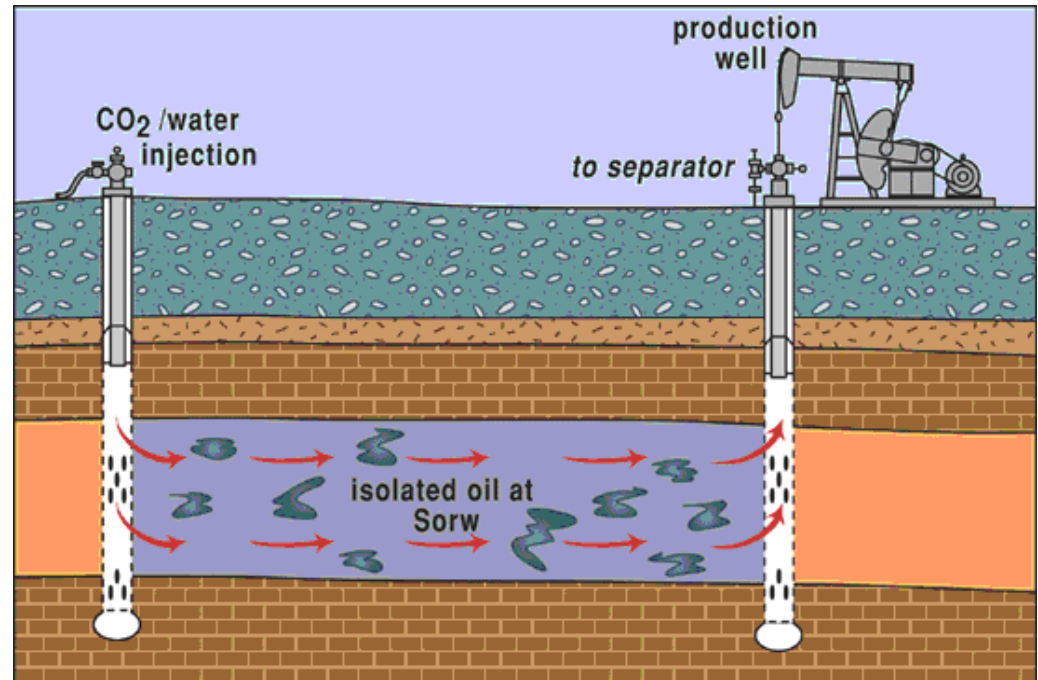


"You've got to be very careful if you don't know where you are going because you might not get there."

# Protect Enhanced Oil Recovery



- ▶ Do no harm
  - Protect EOR business as usual
- ▶ Allow conversion
  - After operations
  - During operations
- ▶ Concurrent EOR & storage
  - Avoid creating artificial barriers



# Guiding Principles

## ▶ Prepare Regulatory Framework

- Give sources/utilities a method of meeting “future” compliance obligations
- Establish regulatory framework to govern injection and storage of anthropogenic CO<sub>2</sub>

## ▶ Preserve “primacy” options

- Direct the State and RRC to pursue primacy
- Provide flexibility to align with potential Federal Rules

# Guiding Principles Cont'd

- ▶ **Prefer Railroad Commission** – streamline regulatory oversight under single agency (preferably Railroad Commission of Texas)
  
- ▶ **Precede and Predict Federal Rules**
  - Indicated by rules schedule outlined in SB 1387
    - Adoption of GS with incidental storage “IIb” Rules by March 1, 2010 (*Actual November 30, 2010*)
    - Adoption of Production with incidental storage rules by September 1, 2010 (*Actual June 27, 2011*)
  - Highlight Texas’ CO<sub>2</sub> regulatory experience

# Geologic Storage Regulations in Texas

- » Storage with Incidental Production; or  
Production with Concurrent Storage (EOR)

# GS in Texas

## ▶ **Storage with Incidental Production**

- Applicable to projects primarily for storage where there is minimal production and the reservoir is “pressured up”
- 16 T.A.C § 5.101 et seq.

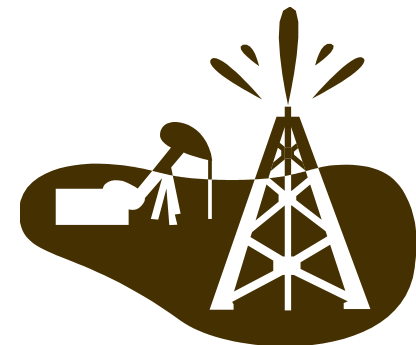
## ▶ **Production with Concurrent Storage**

- Applicable to EOR projects where there is “reasonable expectation of more than insignificant production” and reservoir pressures are no higher than production requirements
- 16 T.A.C. §§ 5.301–5.308



# Phase II – Production with Concurrent Storage

- ▶ RRC adopts Final Rule June 27, 2011
- ▶ Applicability
  - Injection of CO<sub>2</sub>a in productive reservoirs
  - Voluntary program
  - **Not a permit** – does not affect ability to operate
  - Does not include
    - Capture, transport, above ground storage facilities
    - Purification, compression or processing facilities



# Phase II continued

- ▶ Highlights of the Proposed Rule
  - Well and field requirements (AoR, MIT, operational, testing) controlled by **SWR 46 (Class II)**
  - Certification of injection and incidental storage of CO<sub>2</sub>a
  - \$500 Registration fee
  - \$10,000 Annual Certification Fee
  - Monitoring, Sampling & Testing information required to verify injected/permanently stored volumes
    - May comply by submitting **Subpart RR/UU** information

# Phase II continued

- ▶ Additional Requirements
  - Measure the total volume of CO<sub>2</sub>a injected
  - Continuous monitoring devices required
  - Meet additional well-plugging requirements
    - Flush injection wells; measure bottomhole pressure; final MIT; plugging material compatible with CO<sub>2</sub> stream
  - Director has the discretion to **impose conditions necessary to prevent escape of CO<sub>2</sub>a**
  - Demonstration of external MIT
  - Corrosion monitoring

# What does this suite of Federal and State Regulations Mean?

- ▶ As a carbon management technology, CCS is “real” – and CO<sub>2</sub> EOR may be “more real” for the time being
  - *So called “regulatory gaps” are quickly closing*
- ▶ CCS will be considered in new source and major modification stationary source proceedings going forward
  - *Expect litigation*
- ▶ CO<sub>2</sub> EOR appears to have a special compliance path, the contours of which remain uncertain



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