Standards for Geologic Sequestration of Carbon Dioxide
EPA Proposed Rulemaking
Signed July 15, 2008

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EPA’s Proposed GS Rule: Outline

- Geologic Sequestration of CO₂
- Proposal Development Process
- Components of the July 15 Proposal
- Schedule for Final Rule Development
- Public Comment: Your Role
EPA’s Proposed GS Rule: What is GS?

Geological Storage Options for CO₂:
1. Explored oil and gas reservoirs
2. CO₂iffein injected oil recovery
3. Deep saline formations
4. Deep commingled coal seams
5. CO₂-driven enhanced coal bed methane recovery
6. Deep saline field/basalt formations and other formations

EPA’s Proposed GS Rule: UIC Well Classes

Class I  Class II  Class III  Class V
EPA’s Proposed GS Rule: Rule Development Process

- **Proposed Rule** for commercial-scale geologic sequestration of carbon dioxide
  - Announced by Administrator on October 11, 2007
  - Signed by Administrator on July 15, 2008
  - 120 day comment period with public hearings planned
- **Authority**: Safe Drinking Water Act (SDWA); proposal revises Underground Injection Control (UIC) Program standards for Geologic Sequestration
- **Basis of rulemaking**: Authority under SDWA to prevent endangerment of underground sources of drinking water

Collaboration During Rule Development Process

- EPA’s Offices of Water and Air and Radiation worked to:
  - Clarify and address issues across EPA statutes (SDWA, CAA, etc.) and regulations
  - Coordinate technical and cost analyses for the proposal
  - Workgroup of ~48 members included DOE and 4 States (Texas, Arkansas, Alabama and Ohio)
  - EPA worked closely with the Department of Energy
  - EPA increasing coordination with:
    - The Department of Transportation
    - Bureau of Land Management
    - The United States Geological Survey
EPA’s Proposed GS Rule: Outreach to Stakeholders

- Federal Advisory Committees – National Drinking Water Advisory Council (NDWAC) and Clean Air Act Advisory Committee (CAAAC)
- States – Ground Water Protection Council (GWPC) and Interstate Oil & Gas Compact Commission (IOGCC)
- Non-Governmental Organizations and Water Utilities – National Resources Defense Council, World Resources Institute, Environmental Defense, AWWA and others
- Industry Groups – BP, Shell, Chevron, American Petroleum Institute, Schlumberger, Edison Electric Institute, etc.

EPA’s Proposed GS Rule: Workshops and Meetings

  - Modeling: Houston, TX 2005
  - Risk Assessment: Portland, OR 2005
  - Site Characterization: Berkeley, CA 2006
  - Well Construction and Integrity Testing: Albuquerque, NM 2007

- Two Stakeholder Meetings (2007 & 2008 in DC Area)
  - EPA’s rulemaking process
  - Technical and Implementation challenges
Goals of the Rulemaking Process:

- Clear and transparent process
- Encourage development of a promising tool while ensuring protection of USDWs
- Capitalize on years of EPA and State UIC program experience
- Adaptive approach: requirements shaped as new data from early projects is acquired
- Involve, inform, and educate the public

EPA’s Proposed GS Rule: Approach to Rulemaking

Special Considerations for GS
- Large Volumes
- Buoyancy
- Viscosity (Mobility)
- Corrosivity

Proposed Approach:
A new well class: Class VI

UIC Program Elements
- Site Characterization
- Area Of Review
- Well Construction
- Well Operation
- Site Monitoring
- Well Plugging and Post-Injection Site Care
- Public Participation
**EPA’s Proposed GS Rule: Site Characterization**

- **Proposed Approach**
  - Director has discretion to require identification of additional confining zones
  - Owners and Operators submit information on the following:
    - Structure and stratigraphy
    - Seismicity
    - Baseline geochemistry

**EPA’s Proposed GS Rule: Area of Review (AoR)**

- Region surrounding the project that may be impacted by injection activity
- Existing UIC program:
  - Fixed Radius
  - Simple Calculation
Proposed Approach

- Use computational modeling
- AoR reevaluation at a minimum of every 10 years
- Use phased corrective action at Director’s discretion

Proposed Approach

- Inject below the lowermost USDW
- Long-string casing cemented in place for entire length
- Surface casing through the base of the lowermost USDW and cemented to surface
- Well materials must be compatible with injectate and formation fluids
**EPA’s Proposed GS Rule: Well Testing and Operation**

**Proposed Approach**

- Continuous internal well mechanical integrity tests (MIT) and annual external MITs
- Injection pressure should not exceed 90 percent of fracture pressure in the injection system

**EPA’s Proposed GS Rule: Site Monitoring**

**Proposed Approach**

- Tracking of the plume and pressure front is required, but techniques, frequency, and spatial resolution are not specified
- Tracers are not required
- Surface-air and soil-gas monitoring is at the Director’s discretion
Proposed Approach
- Well-plugging materials must be compatible with CO₂ stream
- Post-injection site care is set at 50 years; however, it may be modified with a demonstration that the plume has stabilized and the pressure has dissipated sufficiently
- The owner or operator must demonstrate financial assurance through the end of post-injection site care

Proposed Approach
- 30-day comment period following public notice
- Preparation of a responsiveness summary for the public record
- Seeking comment on
  - Appropriate outreach techniques and technologies
  - Other ways to engage the public early in process
EPA’s Proposed GS Rule:

Proposed Approach

- Enhanced Oil Recovery Wells (Class II) using CO₂ would not be required to obtain a Class VI permit until absolutely no oil is being produced from the reservoir.
- Existing Class I, II or V wells that transition to a Class VI permit must comply with all new regulations.
- “Cemented-in-place” components of the well itself would be grandfathered into the new permit.

EPA’s Proposed GS Rule:

Schedule

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<tr>
<th>Activity</th>
<th>Milestone</th>
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<tr>
<td>Technical Workshops, Data Collection &amp; Analysis</td>
<td>Ongoing</td>
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<td>Stakeholder Meetings</td>
<td>December 2007/February 2008</td>
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<td>Interagency Review of Proposed Rule</td>
<td>Late May - Early June 2008</td>
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<td>Administrator’s Signature of Proposed Rule</td>
<td>July 2008</td>
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<tr>
<td>Public Comment Period for Proposed Rule</td>
<td>July – October 2008</td>
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<tr>
<td>Notice of Data Availability (if appropriate)</td>
<td>2009</td>
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<tr>
<td>Final UIC Rule for GS of CO₂</td>
<td>Late 2010 / Early 2011</td>
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EPA’s Proposed GS Rule: 
*Public Comment, Your Role*

- **Comments**
  - Form the basis of the next publication
  - Create “logical outgrowths” from proposal

- **Public Comment & Hearing Period**
  - Discuss merits of regulatory alternatives and the proposed approach (preamble and regulatory text)
  - Review and comment on docket materials
  - Provide new data and ideas

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EPA’s Proposed GS Rule

**Questions?**