



# ***The EPA Class VI GS Rule: Regulation and Implementation***

**Ground Water Protection Council**

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**Sarasota, Florida**

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Office of Ground Water and Drinking Water

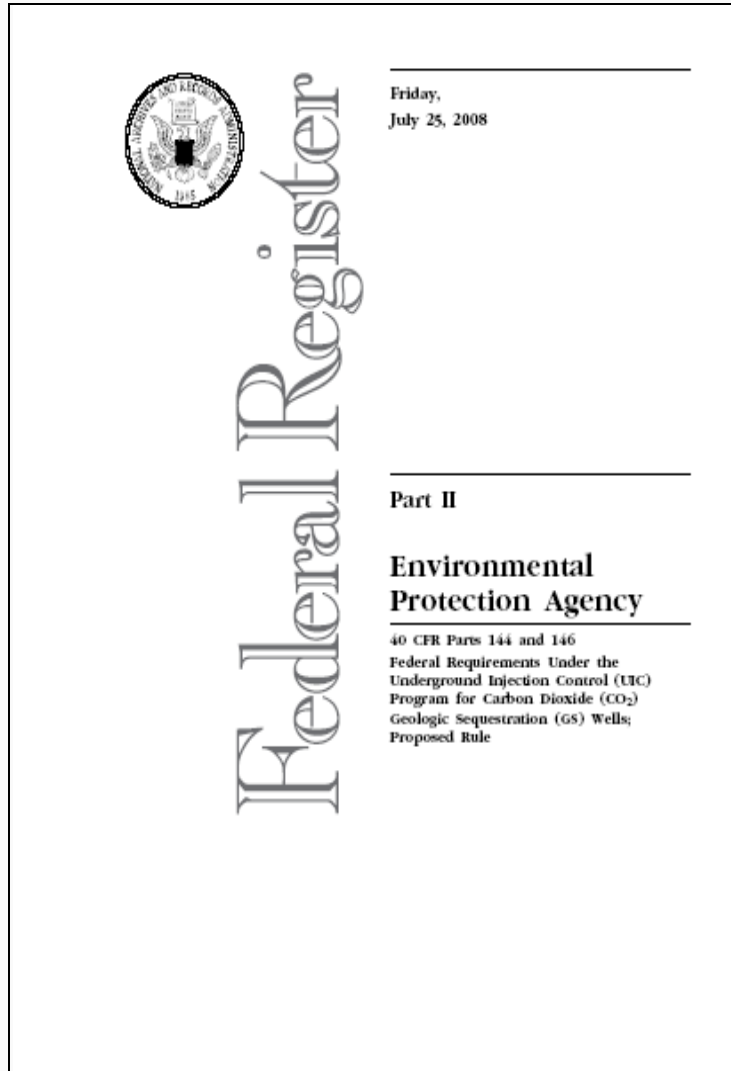
Washington, DC



# Presentation Summary

- Class VI Rulemaking and Requirements
- Class VI Permitting Update
- Class VI Program Guidance
- GS Primacy
- The Future

# GS Rule Background



- **Proposed Rule for GS of CO<sub>2</sub>**
  - Announced by Administrator: October 11, 2007
  - Signed by Administrator: July 15, 2008
- **NODA** published in 2009
- **Final Rule** published on December 10, 2010 revises UIC Program to address Geologic Sequestration via Class VI wells
- First new UIC rule since Class V Rule in 1998



# Class VI Rule Overview

## Considerations for GS

- Large Volumes
- Buoyancy
- Viscosity (Mobility)
- Corrosivity



## UIC Program Elements

- Site Characterization
- Area of Review (AoR)
- Well Construction
- Well Operation
- Site Monitoring
- Post-Injection Site Care
- Public Participation
- Financial Responsibility
- Site Closure

New well class established:  
Class VI



# Safe Drinking Water Act Underground Injection Control (UIC) Program

## Protecting Public Health and Drinking Water Resources

**Class I wells-**  
Isolate hazardous, industrial and municipal wastes through deep injection

AVERAGE = 4000 FEET

HAZARDOUS AND NON-HAZARDOUS INDUSTRIAL WASTES

**Class II wells-**  
Inject oil and gas production wastes

BRINE DISPOSAL

OIL & GAS RECOVERY

ENHANCED RECOVERY

\*PRODUCTION WELLS ARE NOT REGULATED BY THE UIC PROGRAM

**Class III wells-**  
Minimize environmental impacts from solution mining operations

SALT MINING

URANIUM MINING

URANIUM SOLUTION MINING

SALT SOLUTION MINING

SALT LAYER

\*PRODUCTION WELLS ARE NOT REGULATED BY THE UIC PROGRAM

**Class IV wells-**  
Prevent ground water contamination by prohibiting the shallow injection of hazardous waste except as part of authorized cleanup activities

HAZARDOUS WASTE

**Class VI wells-**  
Minimize environmental impacts from geologic sequestration

**NEW**

COAL-FIRED POWER PLANT

CO2 STORAGE

**Class V wells-**  
Manage the shallow injection of all other fluids to prevent contamination of drinking water resources

APARTMENT BUILDING

AUTOMOTIVE SERVICE STATION

LARGE-CAPACITY SEPTIC SYSTEMS

STREET DRAINAGE

INDUSTRIAL WASTE

FOOD PROCESSING

FARM HOUSE

In your community, there may be industrial waste disposal wells, storm water drainage wells, large-capacity septic systems, and other Class V wells. They are regulated and are not allowed to endanger drinking water resources.

**Class V wells continued**

SOURCE WATER PROTECTION AREA

DRINKING WATER PLANT

DRINKING WATER RESOURCES

PUBLIC WATER SUPPLY WELL

SCHOOL

AUTOMOTIVE SERVICE STATION

LARGE-CAPACITY CESSPOOL

MOTOR VEHICLE WASTE DISPOSAL WELL

All large-capacity cesspools are banned. New motor vehicle waste disposal wells are banned nationwide. Existing motor vehicle waste disposal wells in source water protection areas or other sensitive ground water areas must close or receive a permit.

Not drawn to scale



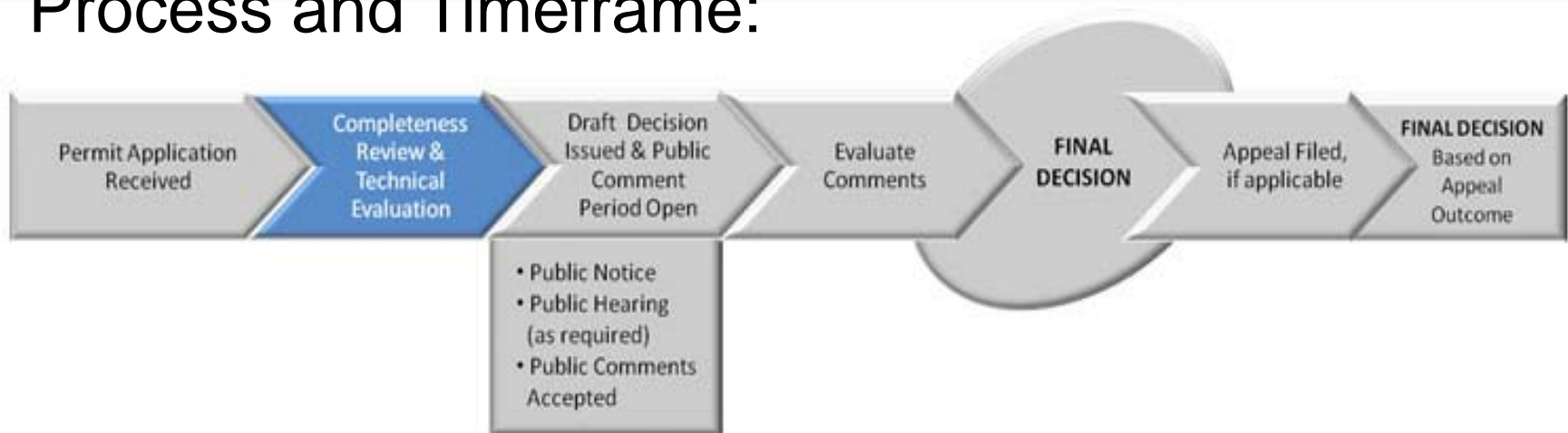
## **Class VI Requirements: 40 CFR 146.82 – 146.95**

- 146.82: Required Class VI permit information
- 146.83: Minimum criteria for siting
- 146.84: Area of Review and corrective action
- 146.85: Financial Responsibility
- 146.86: Injection Well Construction
- 146.87: Logging, Sampling, and Testing (prior to operation)
- 146.88: Injection Well Operation
- 146.89: Mechanical Integrity
- 146.90: Testing and Monitoring
- 146.91: Reporting and Recordkeeping
- 146.92: Injection Well Plugging
- 146.93: Post-Injection Site Care and Site closure
- 146.94: Emergency and Remedial Response
- 146.95: Injection Depth Waiver requirements

# Class VI Permitting



## Process and Timeframe:



- 40 CFR 146.82
- Iterative process and flexible
- Accommodates new information
- *Remember: This is a new process for everyone*





# Permit Applications

- Region 5:
  - Archer Daniels Midland: Decatur, Illinois
    - Two Class VI permit applications (CCS #1 and #2) received in December and July 2011, respectively
    - Injection formation: Mount Simon sandstone
    - Proposed injection volume and duration: approximately 4.75 million tons of CO<sub>2</sub> over 5 years (one well currently injecting CO<sub>2</sub> under a Class I state-issued permit)
  - Tenaska: Taylorville, Illinois
    - Two Class VI permit applications received in September 2011
    - Proposed injection volume and duration: 63 million tons of CO<sub>2</sub> over 30 years
    - Project may go forward as natural gas, but permits are still in





# Project Discussions

- Region 5:
  - FutureGen 2.0: Illinois
    - Proposed injection formation: Mount Simon sandstone
    - Proposed injection volume: ~1.3 million tons/year
    - Proposed injection duration: ~30 years with possibly up to 4 horizontally-completed wells
  - At least one other project has now become a Class II EOR project



# Project Discussions

- Region 7:
  - Wellington, Kansas
    - Proposed formation: Arbuckle
    - Proposed injection volume: 40,000 tons saline + 30,000 for EOR
    - Proposed project duration: TBD
- Region 8:
  - Big Sky: Kevin Dome, Montana
    - Proposed injection formation: Kevin Dome
    - Proposed injection volume: 1 million tons
    - Proposed duration: 8 year project

# Class VI Implementation



- Currently, EPA HQ is providing extensive one-on-one assistance to Regions, permit applicants (and states) on:
  - AoR delineation and computer modeling
  - Model-based post-injection site care and site closure timeframe determinations
  - Financial Responsibility (FR) demonstrations
  - Class VI Injection well design and construction
  - Project plan development
  - Permit application information submittals and reviews
  - Permit condition development assistance



# Class VI Guidance Documents

The final Class VI Rule identified technical guidance documents needed to facilitate safe, effective Class VI permitting and GS injection. Guidance documents focus on:

- Financial Responsibility
- Well Construction
- Project Plan Development
- Site Characterization
- Area of Review Evaluation and Corrective Action
- Testing and Monitoring
- Reporting
- Primacy Manual
- Implementation Manual
- Well Plugging, Post-Injection Site Care (PISC), and Site Closure
- Class II to Class VI Transition
- Injection Depth Waivers
- Recordkeeping



# Status of Guidance Documents

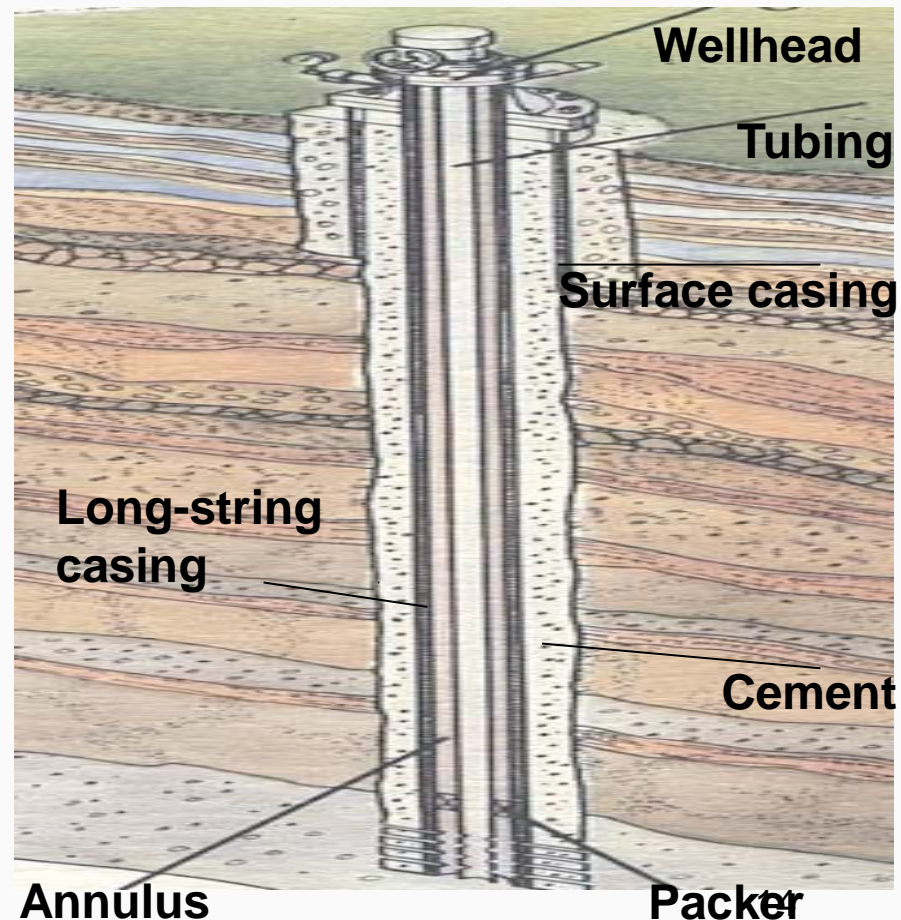
- Released and Final:
  - Financial Responsibility (July 2011)
  - Well Construction (August 2012)
  - Project Plan Development (September 2012)
- Soon to be released as Final documents:
  - Site Characterization
  - Area of Review Evaluation and Corrective Action
  - Testing and Monitoring
  - Primacy Manual
  - Implementation Manual





# Well Construction Final Guidance

- Finalized in August 2012
- Well-attended webinar
- Guidance describes construction requirements and flexibilities afforded by the Class VI regulations





# Class VI Well Construction Guidance

- Contains information on requirements for:
  - Injection well construction (40 CFR 146.86)
  - Logging, sampling, and testing of injection wells (40 CFR 146.87)
  - Injection well operation (40 CFR 146.88)
  - Mechanical Integrity testing (40 CFR 146.89)
- Affords flexibility in:
  - Selection of well construction materials
  - Well design (e.g., staging cement; use of multiple surface casing strings)
  - Logging and mechanical integrity testing techniques

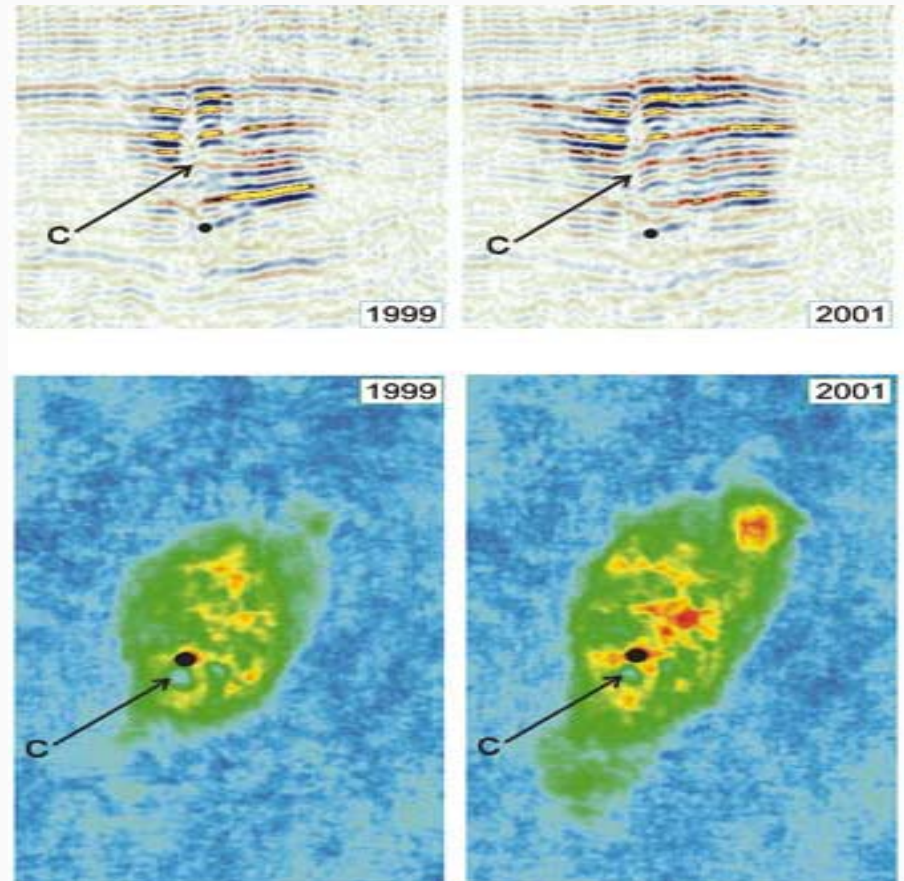


## Status of Guidance Documents (cont.)

- Soon to be released for public comment:
  - Class II to Class VI Transition *DRAFT*
  - Well Plugging, Post-Injection Site Care and Site Closure *DRAFT*
  - Injection Depth Waivers *DRAFT*
- Future release of DRAFT documents for public comment:
  - Reporting
  - Recordkeeping

# PISC Draft Guidance

- Shared final Draft with DOE
- Will be posted to the EPA GS website as soon as possible
- We are welcoming any and all comments in order to finalize it in 2013

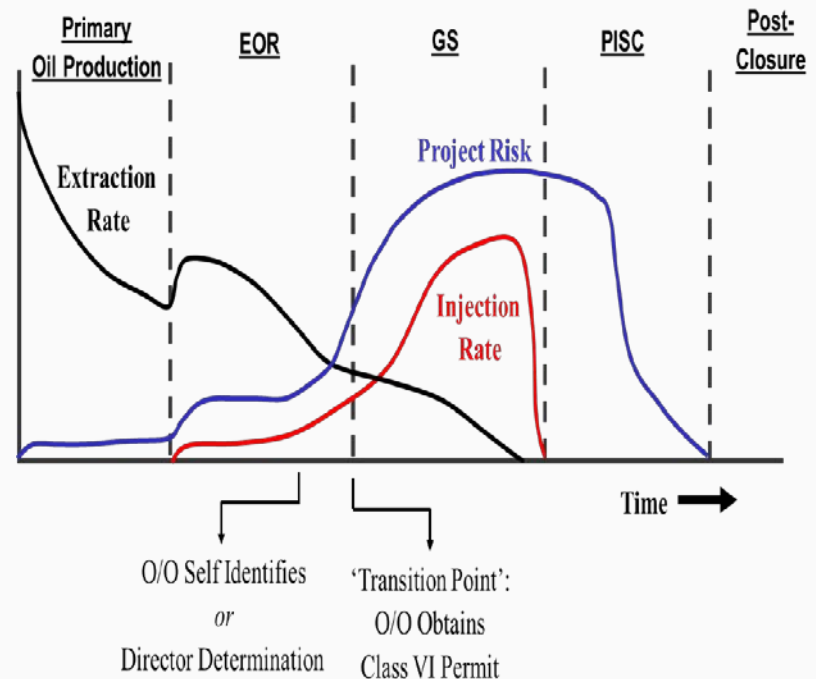


Seismic Monitoring Results,  
Sleipner



# Class II-VI Transition Draft Guidance

- Working with DOE and stakeholders
- Preparing *Draft*
- Will be released for comment ASAP
- Check GS website!







# Types of Flexibilities Addressed in Guidance

- Selection of injection site, formation type, and injection depth
- Use of *any* of a suite of computational, multi-phase fluid flow and transport modeling tools for AoR delineation
- Use of phased corrective action
- Selection of financial instruments for various phases of GS projects (e.g., operation, PISC)
- Demonstration and duration of the PISC timeframe
- Selection of monitoring technologies for plume and pressure front tracking and USDW protection



## More on Class VI Implementation

- **GS Data System development:**
  - Alternatives Analysis Completed in January 2012
  - Currently collaborating with GWPC and DOE on the potential for GSDS phased development
- **Coordination with:**
  - EPA Program Offices (OAR, OSWER, ORD\*, OWOW) and the EPA Regions (Monthly calls)
  - State and Federal partners (DOE, DOI/USGS/BOEM)
  - Non-governmental organizations
  - Industry and other stakeholders
  - CCS Presidential Task Force Offices

# Class VI Primacy



- Since September 2011, EPA has been directly implementing the Class VI GS Program
- This means all Class VI permit applications must come to the EPA Regions
- However, EPA has been discussing Class VI primacy with at least 10 States
- There are a few states that are further along in the Class VI GS primacy process



# Status of GS Primacy

- North Dakota:
  - Worked with R8 and HQ through 2012 on draft application materials
  - Will complete a State final GS rule in 2013
  - Submit Class VI Primacy package in April 2013
- Mississippi:
  - Indicated they will adopt Class VI by reference
  - Plans are still tentative when the State will apply



# Status of GS Primacy (more)

- Louisiana:
  - Discussed the Class VI requirements with EPA in 2012, may be finishing State GS regulations
  - No timeline when EPA expects a primacy pkg.
- Other States:
  - Have contacted the Regions or HQ to discuss application procedures, to ask about funding, or to seek further clarity on Class VI requirements



# The Future



## CCS and GS Research Continues:

- OGWDW Collaboration with LBNL and PNNL
- Office of Research and Development (ORD)
  - Intramural Projects wrapping up
  - **STAR Grant Progress Review**, January 7-8, 2013 in Washington, DC
- National Risk Assessment Partnership (NRAP)
  - DOE and DOE National Laboratories



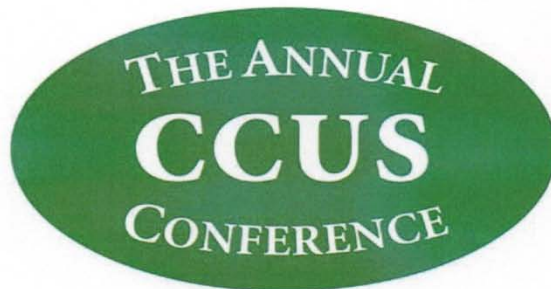
## Climate Change Remains in the News:

- National Climate Assessment Draft– U.S. Global Change Research Program (January 2013)
- American Geophysical Union
- Hurricane Sandy articles
- “A climate Manhattan Project” – *Washington Post* (1/18/2013)



# Upcoming Events

*MARK YOUR CALENDAR...*



**The Twelfth ■ May 13 -16, 2013**  
David L. Lawrence Convention Center  
Pittsburgh, Pennsylvania

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# Additional Information



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- <http://www.gpo.gov/fdsys/pkg/FR-2010-12-10/pdf/2010-29954.pdf>
- <http://www.gpo.gov/fdsys/pkg/FR-2011-09-15/pdf/2011-23662.pdf>



**THANK YOU!**

