

Progress and Lessons from Implementing the US EPA Class VI Rule

Creating the right conditions for CCS to grow

5th IEA International CCS Regulatory Network Meeting

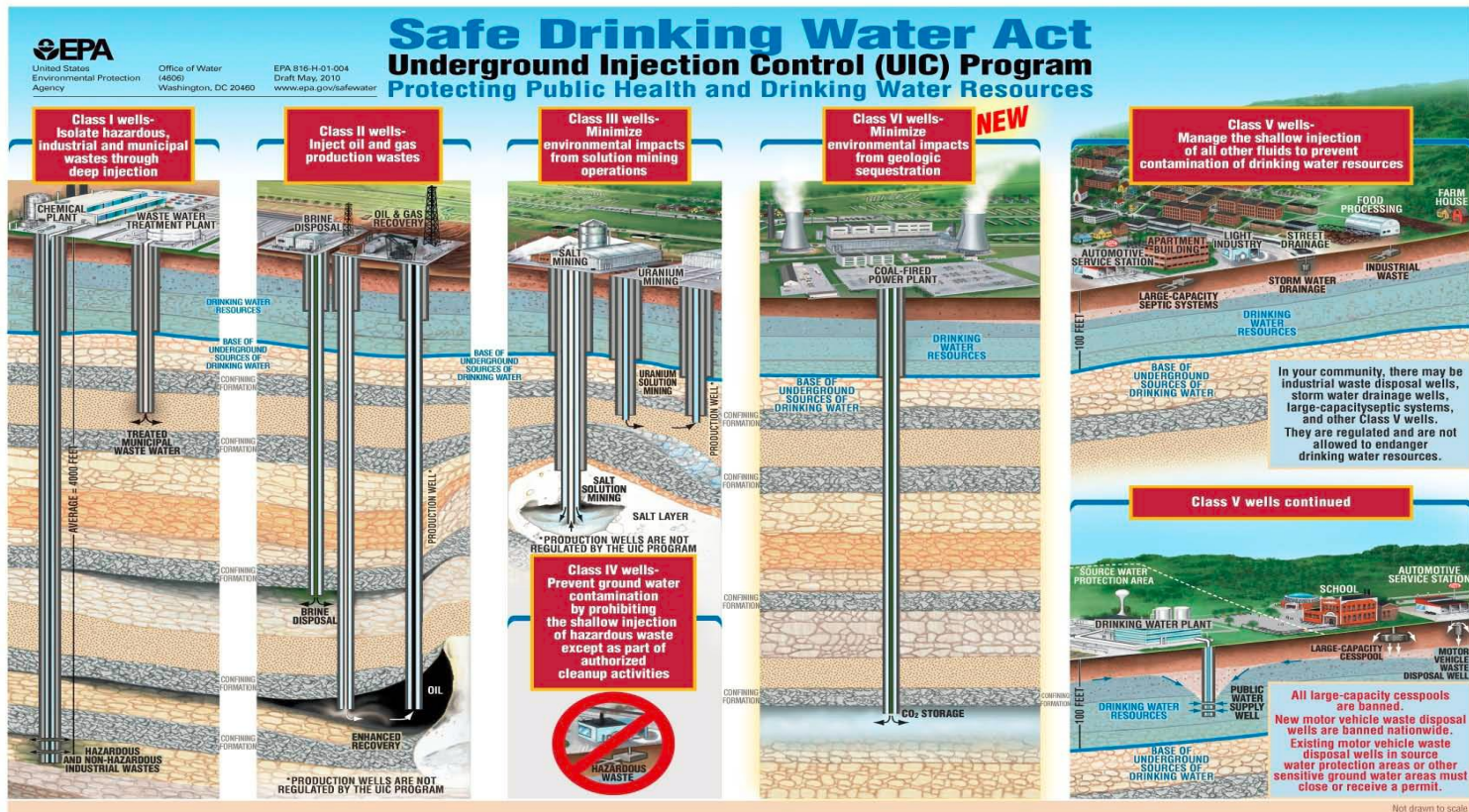
Bob Van Voorhees, Carbon Sequestration Council

18-19 June 2013, IEA Paris

GS Regulations in Place

- 2005 - USEPA initiated development of regulatory framework for geologic sequestration
 - Building on DOE RCSPs and technical workshops
 - Technical Workshops on GS – 2005 – 2008
 - Stakeholder workshops 2007 – 2008
- 2007 - Guidance 83 issued for Class V experimental technology well projects
- 2008 - Class VI regulations proposed
- 2010 – Class VI regulations promulgated

EPA Well Classifications



Class VI Rule Background

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

Source: U.S. Environmental Protection Agency

CO2 Injection Permitting

- Class V Experimental well (basically the same as a Class I non-hazardous)
- Class I Non Hazardous
- Class II for all projects using EOR
- EPA initially signaled RCSP Phase II, Phase III and similar projects to continue under Class V permits
- EPA now asking all GS projects to permit as Class VI

EPA Implementation Actions

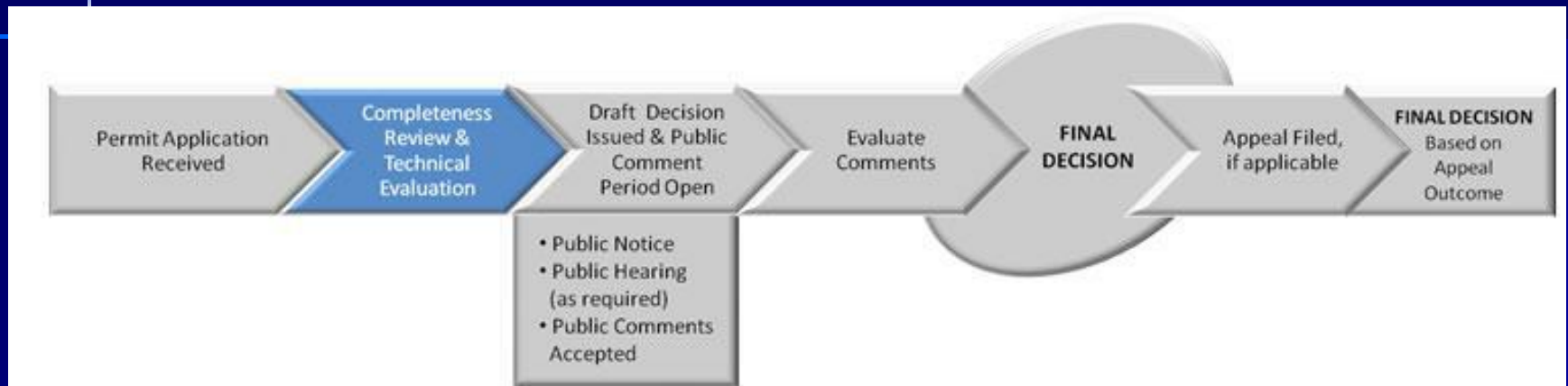
- Currently, EPA HQ is providing extensive one-on-one assistance to Regions, permit applicants, and states on:
 - AoR delineation and modeling
 - Model-based post-injection site care timeframe determinations
 - Financial responsibility demonstrations
 - Injection well design and construction
 - Project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

Class VI Guidance

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, Recordkeeping and Data Management**
 - **Primacy**
 - **Implementation**
 - **Well Plugging, Post-Injection Site Care (PISC), and Site Closure**
 - **Class II – Class VI Transition**
 - **Injection Depth Waivers**
 - **Guidance 83 ETW Revision??**
- Completed - Draft - Planned**

Permitting of CCUS projects



Process and Timeframe:

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

Class VI Permit Applications

All current applications in EPA Region 5 (Chicago):

- Archer Daniels Midland: Decatur, Illinois
 - Two Class VI permit applications (CCS #1 and #2) received in December and July 2011, respectively
 - Proposed injection volume and duration: approximately 4.75 million tons of CO₂ over 5 years
- Tenaska: Taylorville, Illinois
 - Two Class VI permit applications received in September 2011
 - Proposed injection volume and duration: 63 million tons of CO₂ over 30 years
- FutureGen 2.0: Illinois
 - Four Class VI permit applications received in March 2013
 - Proposed injection volume and duration: ~1.3 million tons/year for 30 years

Class VI 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 project duration: 8 year project

Class VI State Primacy

- EPA is Implementing Authority for Class VI as of September 2011
- EPA has not yet received or approved any Class VI primacy applications
- The Class VI Primacy application is different for:
 - States that currently do not have primacy for any class or have Class II (oil and gas) only
 - States that currently have primacy for Classes I, II, III and V may submit a program revision application to add Class VI

CCS Deployment Becomes More Complicated

- No completed US commercial projects
- Pilot-demonstration scale projects moving
- Developed with Class V and Guidance 83
- Many concerns expressed over Class VI rule hurdles for all types of projects
- Specific issues have surfaced for both pilot and demonstration scale projects

Flexibility in Class VI Rule

- Class II Aquifer Exemption Expansions
 - Not SDW with TDS >3,000 mg/l
 - Not reasonably expected to supply PWS
- Transition to Class VI
 - Class I, II, V Experimental Technology Wells
 - Retention of existing protective wells
 - Protections “in lieu of” Class VI standards
- Use of plans
- Phased corrective action for existing wells

Rule Tailoring Provisions

- Site characterization approach
- Modeling flexibility
- Area of review delineation/updating
- Use of plans
 - Area of review and corrective action
 - Testing and monitoring
 - Plugging and abandonment
 - Post-injection site care and site closure
 - Emergency and remedial response plan
- Other tailoring provisions included in rule

Rule Barriers to Flexibility

- Major Uncertainties
 - Complex demonstration modeling and data requirements
 - Magnitude of financial assurance
 - PISC period/alternatives (50-year default)
 - Testing and monitoring programs
 - Potential liability considerations
- No new Class VI Aquifer Exemptions
- Limitation on injection depth waiver
- Prohibition of area permits
- Prescriptive requirements

Project Developer Concerns

- Scaling rule provisions to pilots and demonstrations
- Long time to obtain Class VI permits
 - Early estimates indicated 18 months
 - Experience to date = 22 months & counting
 - Need more streamlined process
- Post injection site care (PISC) timeframe
 - Default period of 50 years inappropriate
 - Using alternative timeframe demonstrations
- Potential burdens for project host sites
 - Financial assurance demonstration
 - Long term liability presumptions for short term projects inherent in Class VI rule

Concerns Already Addressed

- Site characterization with stratigraphic test wells
- Surface casing may use single or multiple strings of casing and cement
- Annulus a pressure need not always exceed the operating injection pressure
- Use of alternative testing and monitoring methods
- Potential disallowance of qualified captive insurance
- Nonendangerment demonstration for closure

Challenges of Coordinating Demonstration Scale Projects with Commercial Rules

- Experimentation through pilots and demonstrations is essential
- Regulatory compliance burdens need to be appropriately scaled
- Experimentation extends not only to technology but also to permitting and methods for identifying PISC timeframes and requirements
- Need to incentivize, optimize and coordinate learning opportunities nationally and globally
- To facilitate project hosting, need to define and bound project operator commitments
- Technological and regulatory standards must be adaptable
- We can ensure permits address necessary regulatory considerations, but maybe not always within a commercial permitting framework – i.e., sometimes using experimental permits
 - For example, some projects may want to test failure and mitigation modes without endangering USDWs, human health or the environment – something not normally covered in commercial permits

For More Information



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