Briefing on DEQ's Proposed Geologic Sequestration (GS) Regulation (Chapter 24 WQD RR)

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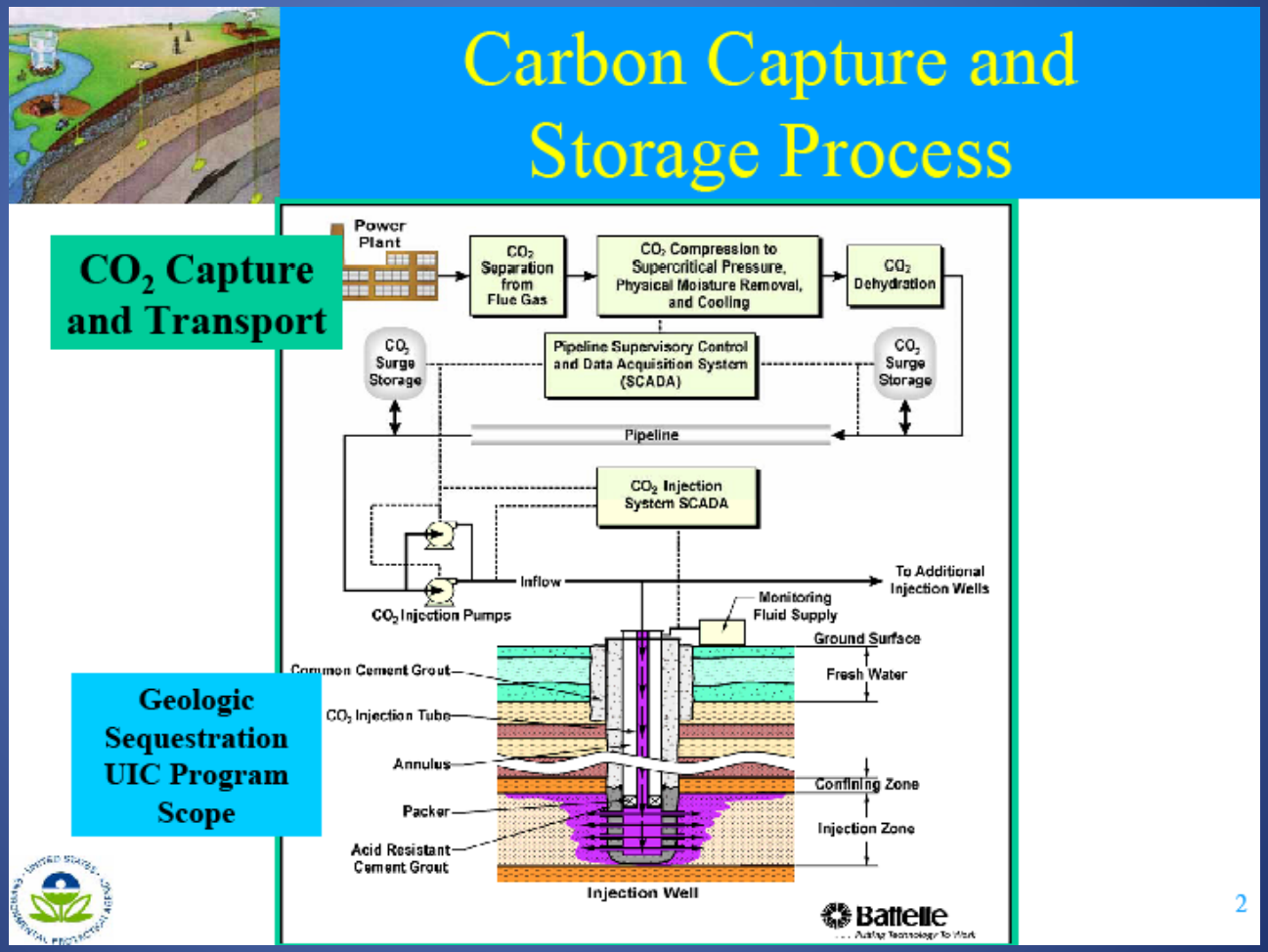
Water Quality Division

Overview

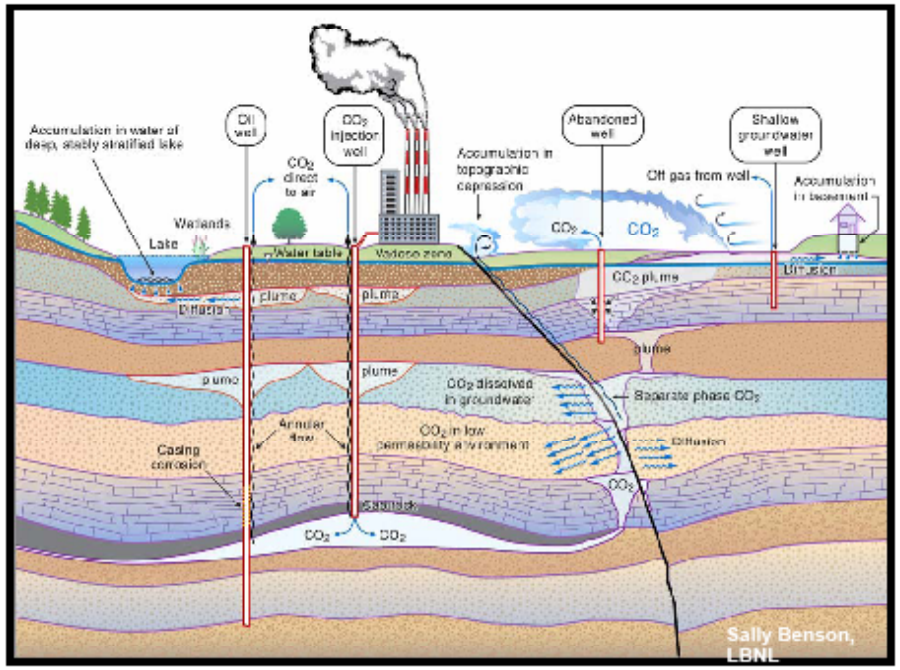
- Geologic Sequestration (GS)
  - (Carbon Capture and Storage - “CCS”)
- WY GS Legislation
- Development of the Proposed GS Regulation
- Overview of the Proposed Rule
- More to come before EQC……(HB 17)

Geologic Sequestration (GS)



Geologic Sequestration (GS)

Technical Challenges & Risks



- Abandoned wells are a key potential source of leakage
- Storage of significant volumes of CO_2 will likely cause large-scale displacement of native fluids
- Long-term behavior of CO_2 in the subsurface is not fully understood
- Key to GS is protecting underground sources of drinking water (USDWs)

Geologic Sequestration (GS)

Successful Deployment of CCS

- While CCS is not a "silver bullet," it is a key climate change mitigation technology
- Ensuring that permitting regulations are in place will enable commercial-scale CCS projects to move forward
- Clear guidelines will reduce uncertainty for project proponents
- Past experience gives us confidence that we can work closely with key stakeholders to develop well-designed regulatory approaches

"By harnessing the power of geologic sequestration technology, we are entering a new age of clean energy – where we can be both good stewards of the Earth, and good stewards of the American economy." - EPA Administrator Stephen L. Johnson

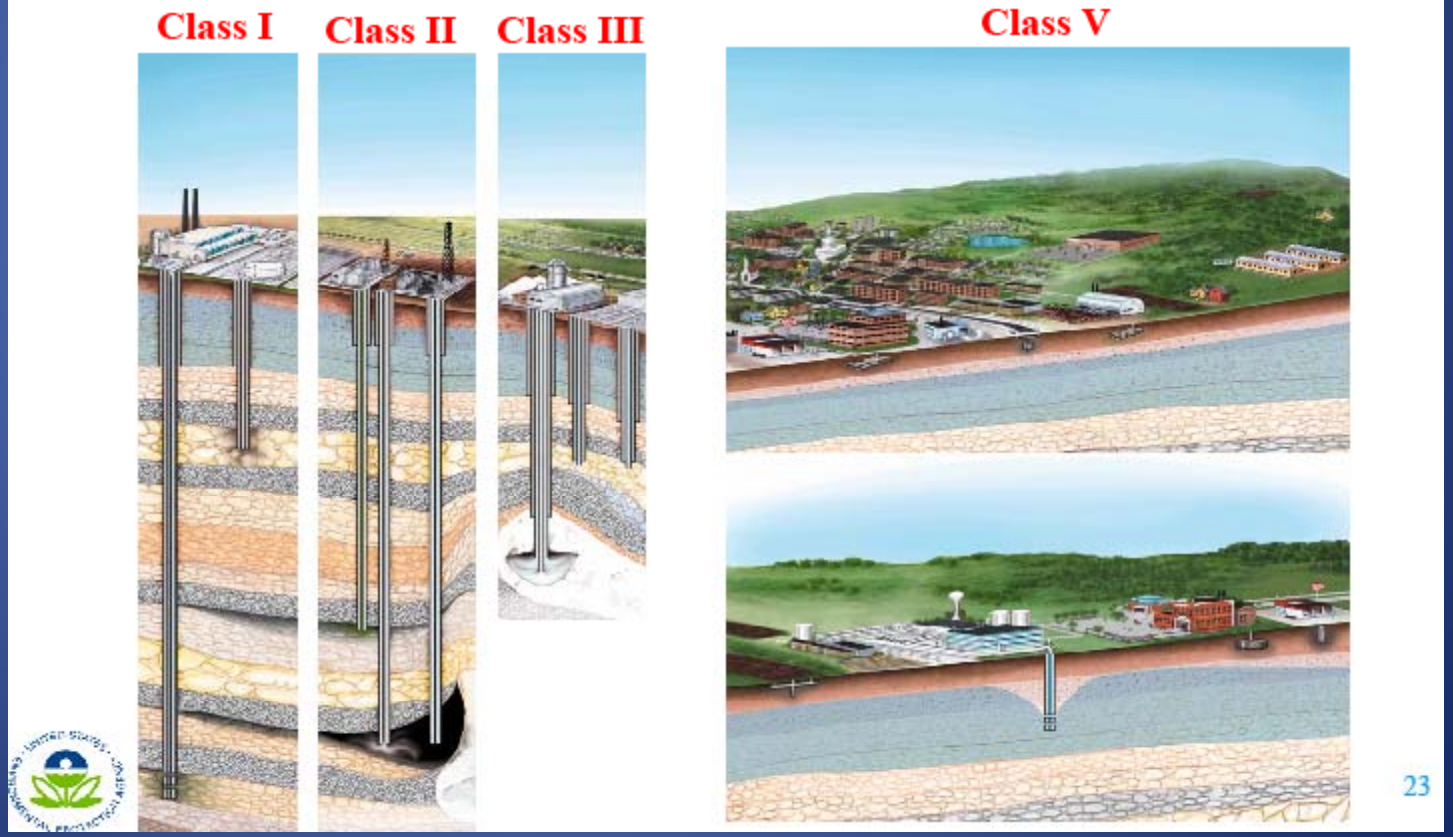
Geologic Sequestration (GS)

UIC Program Background
Framework

- The Safe Drinking Water Act (SDWA) requires EPA to develop minimum federal regulations for state and tribal Underground Injection Control (UIC) Programs to protect underground sources of drinking water
  - The UIC Program regulates underground injection of a *all* fluids – liquid, gas, or slurry
  - Natural gas (hydrocarbon) storage, oil & gas production, and some hydraulic fracturing are exempt from UIC requirements
  - The existing UIC program ***provides a regulatory framework for the Geologic Sequestration of CO_2***

Geologic Sequestration (GS)

UIC Program Background
Well Classes



Wyoming GS Legislation

- '08 Budget Session
  - House Bill 89
    - Pore space 'ownership' tied to the surface estate
  - House Bill 90
    - DEQ Permit required for GS (EOR exception)
      - Rules, regulations and standards to be developed by DEQ (WQD/UIC program)
    - Working Group established - directed to recommend financial assurance provisions
      - Report to Legislature by Sept. 30, '09

Wyoming GS Legislation

- '09 General Session
  - House Bill 57
    - Mineral estate is dominant over pore space
  - House Bill 58
    - Injector (not pore space owner) owns and is liable for injected CO2
  - House Bill 80
    - Establishes process for unitization of sequestration sites

Wyoming GS Legislation

- '10 Budget Session
  - House Bill 17
    - Authorized DEQ to develop rules:
      - bonding and financial assurance requirements for GS
      - define criteria for CO2 'plume stabilization'
      - set permit fees to support DEQ monitoring and oversight of carbon sequestration sites following closure

Development of the Proposed Wyoming GS Regulation

- Sources of DEQ's proposed regulation
  - WY Legislature (Jan '08)
  - EPA Proposed Regulation (Jul '08)
    - EPA NODA (Oct '09)
  - Rule Review Committees (Aug '08)
    - GWPC, NGWA
  - Existing DEQ UIC regulations for Class I and Class V underground injection wells
  - DEQ/OGCC/WGS Carbon Sequestration Working Group

GWPC Rule Review Committee

- Scott Anderson, Environmental Defense Fund
- Steve Crookshank, American Petroleum Institute
- Andrew Duguid, Schlumberger, Inc.
- Mark Fesmire, New Mexico Oil and Gas Conservation Commission
- Kevin Frederick, Wyoming Department of Environmental Quality
- Scott Imbus, Chevron
- Scott Kell, Ohio Department of Natural Resources
- Michael Parker, ExxonMobil
- Tom Tomastik, Ohio Department of Natural Resources
- Robert Van Voorhees, Bryan Cave Associates
- John Veil, Argonne National Lab

WYOMING

Major (X) and Minor (x) Sources of Language for Development of Chapter 24, "Class VI Injection Wells and Facilities, Underground Injection Control Program"

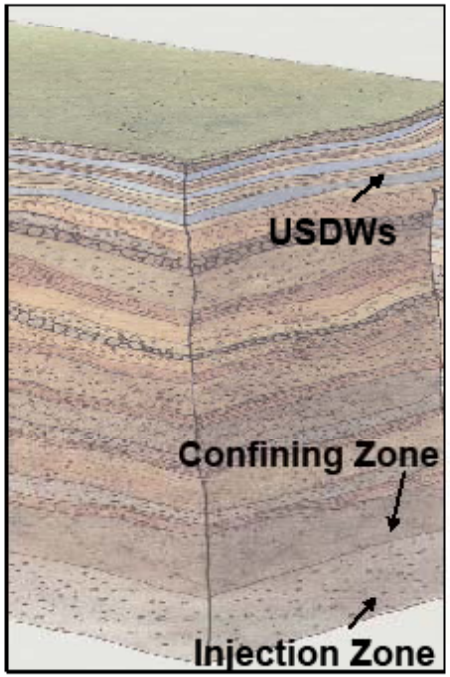
Chapter 24 Section Title	Existing DEQ UIC Regulations	EPA Proposed Regulation	Rule Review Committees*	WY Statutes
Authority and Purpose	X			
Definitions	X	x	x	x
Applicability		X		
Permit Processing & Requirements	X	x		
Permit Application		X	x	x
Prohibitions	X	x		
Criteria for Siting Class VI Wells		X	x	
Area of Review & Corrective Action		X	x	
Construction & Operation Stds		X	x	x
Logging, Sampling & Testing		X	x	
Operating Requirements		X	x	
Mechanical Integrity		X	x	
Testing & Monitoring		X	x	x
Reporting Requirements		X		x
Well Plugging		X	x	
Post-injection Site Care and Closure		X	x	X?
Emergency & Remedial Response		X		x
Financial Responsibility		X		X?
Public Participation	X			

* Primarily Ground Water Protection Council (GWPC) & National Ground Water Association (NGWA)

Overview of the Proposed Rule

Site Characterization

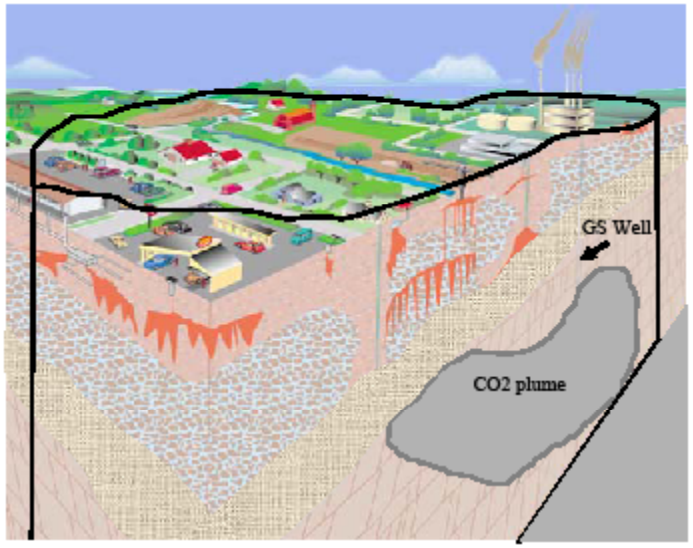
- Basic requirements:
  - Injection zone that can accept fluids
  - Confining zone (system) above the injection zone, that contains all fluids



Overview of the Proposed Rule

Area of Review

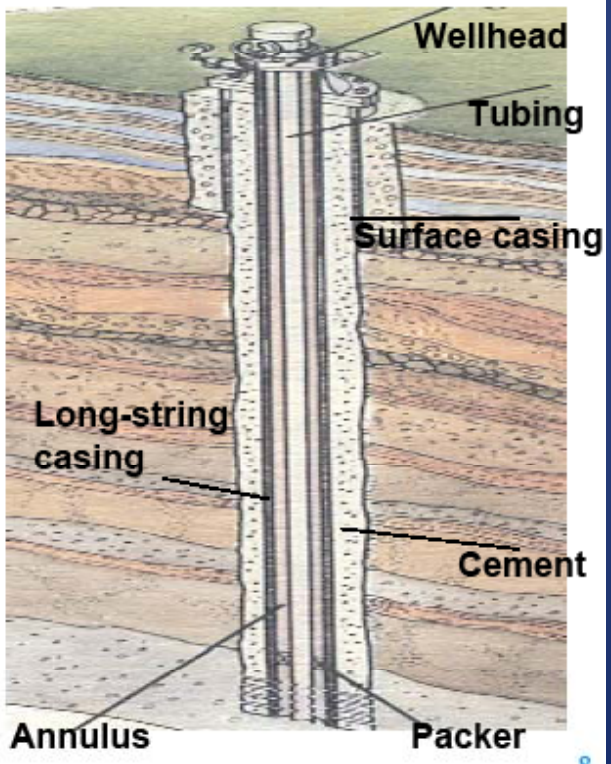
- Basic requirements:
  - Delineate the AoR
  - Identify all artificial penetrations and evaluate features that may allow upward migration
  - Determine if artificial penetrations and geologic features provide an adequate seal
  - Remediate (corrective action) if possible



Overview of the Proposed Rule

Well Construction

- Basic requirements:
  - Cased and cemented in a manner that prevents movement of fluids into an USDW
    - Surface casing and long string casing
    - Tubing and packer



Overview of the Proposed Rule

Well Operation and Monitoring

- Basic requirements:
  - Injection may not fracture confining zone
  - Monitor injection pressure, flow rate and volumes
  - Monitor the nature of the injected fluid
  - Perform mechanical integrity tests

Overview of the Proposed Rule: Well Operation and Monitoring

- Periodic re-evaluation (modeling) of the area of review around the injection well to incorporate monitoring and operational data and verify that the CO2 is moving as predicted within the subsurface

Overview of the Proposed Rule

Well Plugging and Post-Injection Site Care

- Basic requirements:
  - Wells must be closed in a manner that protects USDWs from endangerment
  - Owner/operator must demonstrate and maintain financial assurance (trust fund, bond, or other approved mechanisms) to close and abandon the injection operation
  - Liability stays with owner/operator

Overview of the Proposed Rule: Post-injection (Post closure) Site Care

- Extended post-injection monitoring and site care to track the location of the injected CO2 and monitor subsurface pressures
- Responsibility of the operator/permittee until CO2 has stabilized
  - HB 17: Minimum 10 years with 3 consecutive years of monitoring demonstrating CO2 plume stabilization; DEQ issues liability release certificate

Overview of the Proposed Rule: Long-term Stewardship

- Extended post-injection monitoring and site care to track the location of the injected CO2 and monitor subsurface pressures
- DEQ responsibility
  - HB 17: Special revenue account established to support DEQ oversight and monitoring; funded by permit fees

Overview of the Proposed Rule

Public Participation

- Basic requirements:
  - Provide public notice of a pending permitting action via newspapers, postings, and mailings and in some cases a public hearing
  - Provide opportunity for public input
  - Allow transfer of information between the permitting authority and the public to better inform permit decision making

WYOMING CARBON SEQUESTRATION WORKING GROUP

- **WYOMING CARBON SEQUESTRATION WORKING GROUP PERSONNEL**
- **WORKING GROUP CONVENERS**
- John Corra, Director of Department of Environmental Quality
- Bob King, Oil and Gas Commission
- Ron Surdahm, State Geologist
- **WORKING GROUP MEMBERS**
- Ian Andrews, Pacificorp
- Ralph Brokaw, President, Wyoming Association of Conservation Districts
- Kevin Frederick, Wyoming Department of Environmental Quality
- Nancy Freudenthal, Davis & Cannon LLP
- Bob Green, Rio Tinto Energy
- Ken Hendricks, Anadarko Petroleum
- Mark Northam, UW Director of the School of Energy
- Lyle Witham, Basin Electric
- **WORKING GROUP STAFF SUPPORT**
- Dan Clark, Wyoming Department of Environmental Quality

Working Group Final Report

- "…[develop]an appropriate bonding procedure and other financial assurance methods to assure that adequate financial resources are provided to pay for any mitigation or reclamation costs that the state may incur as a result of default by the permit holder. The bond or other financial assurance shall be required during the operating life of the sequestration project and throughout the post-closure care period in order to abate or remedy any violation of a permit, standard or rule established under the provisions of this act. "

Working Group Final Report

- The working group shall recommend to the joint minerals, business and economic development and joint judiciary interim committees, on or before September 30, 2009, the duration of the post-closure care period.

Working Group Final Report

- Recommendations:
  - Financial assurance types and processes (operation and post-injection site care)
  - Duration of post-injection site care period (10/3)
  - Special Revenue Account (fee based) to support DEQ Long-term Stewardship (Monitoring, Verification and Control Costs)
  - Additional Staff to administer GS permitting and oversight program
  - Model statute (HB 17)

Working Group Final Report

- HB 17 provisions:
  - Future DEQ rulemaking:
    - Financial assurance requirements (operations and post-injection site care)
    - Definition of ‘plume stabilization’
    - Fee system to support DEQ Long-term site care responsibilities

Where We Want To End Up

- Having regulations in place to:
  - Support geological sequestration of CO_2 in Wyoming
  - Support obtaining state 'primacy' to implement the federal program if/when federal regulations are promulgated

WS 35-11-313(j)

- *"The director shall recommend to the council any changes that may be required to provide consistency and equivalency between the rules or regulations promulgated under this section and any promulgated for the regulation of carbon dioxide sequestration by the United States environmental protection agency."*

Questions?


WHY DON'T THE GREENHOUSE GASES ESCAPE THROUGH THE HOLE IN THE OZONE LAYER?