

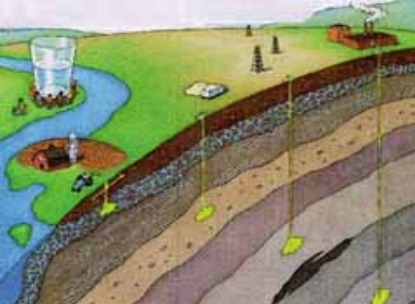
# **Geologic Sequestration of Carbon Dioxide**

## *EPA's Notice of Data Availability and Request for Comments*

**GWPC Annual Forum: Salt Lake City, Utah**

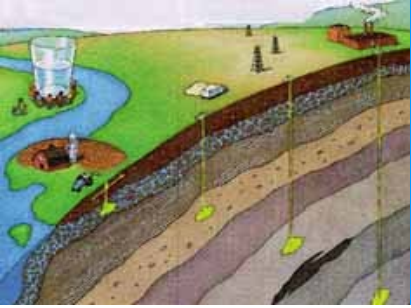


**U.S. Environmental Protection Agency  
Office of Ground Water and Drinking Water  
September 15, 2009**



# EPA's GS Rulemaking *Outline*

- Underground Injection Control (UIC) Program Background
- Proposal
- The Notice of Data Availability and Request for Comment
- Schedule

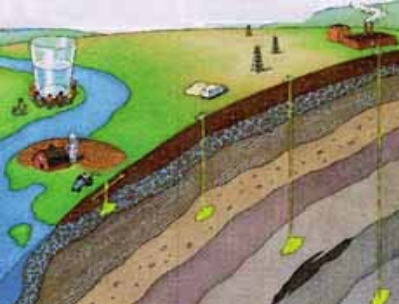


# UIC Program Background

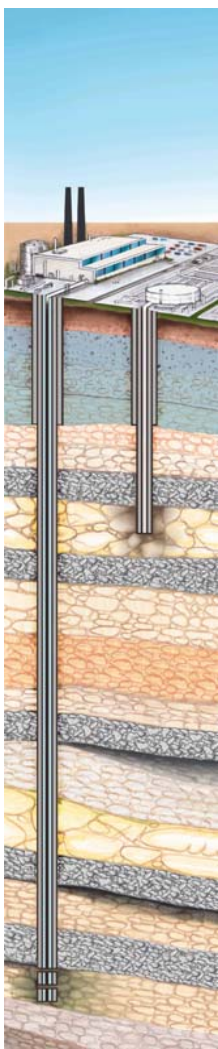
- The 1974 Safe Drinking Water Act (SDWA; Reauthorized in 1996)
  - Federal regulations for protection of Underground Sources of Drinking Water (USDWs)
  - USDW defined:
    - Any aquifer or portion of an aquifer that contains water that is less than 10,000 PPM total dissolved solids or contains a volume of water such that it is a present, or viable future source for a Public Water Supply System
- UIC Program regulates underground injection of *all fluids* – liquid, gas, or slurry
  - Designation as a commodity does not change SDWA applicability
  - Some natural gas (hydrocarbon) storage, oil & gas production, and some hydraulic fracturing fluids exempted
- Existing UIC program provides a regulatory framework (baseline) for the Geologic Sequestration of CO<sub>2</sub>

# UIC Program Background

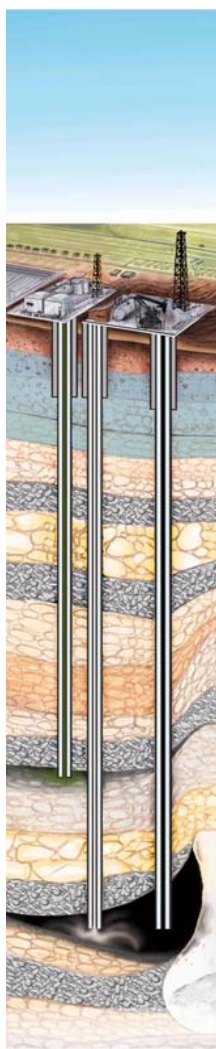
## *UIC Well Classes*



**Class I**



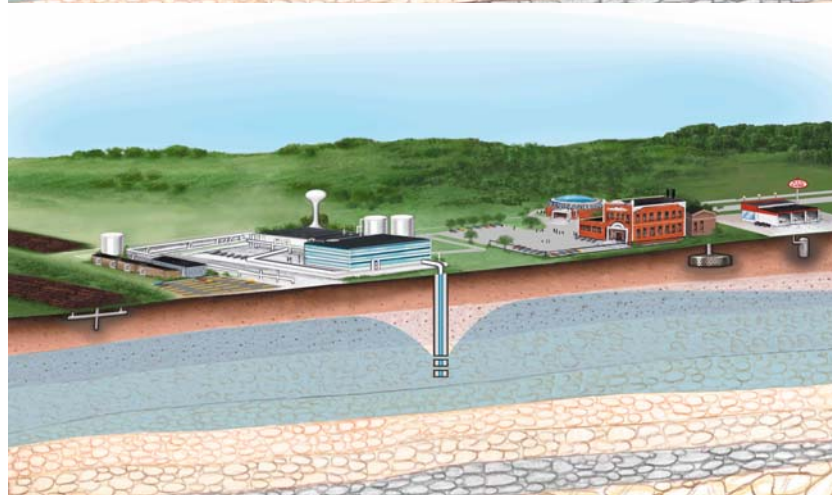
**Class II**



**Class III**

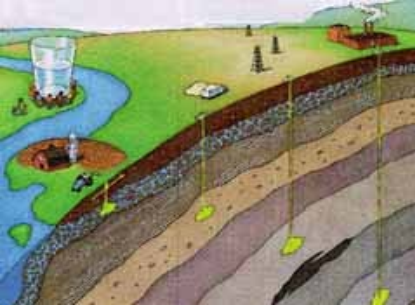


**Class V**

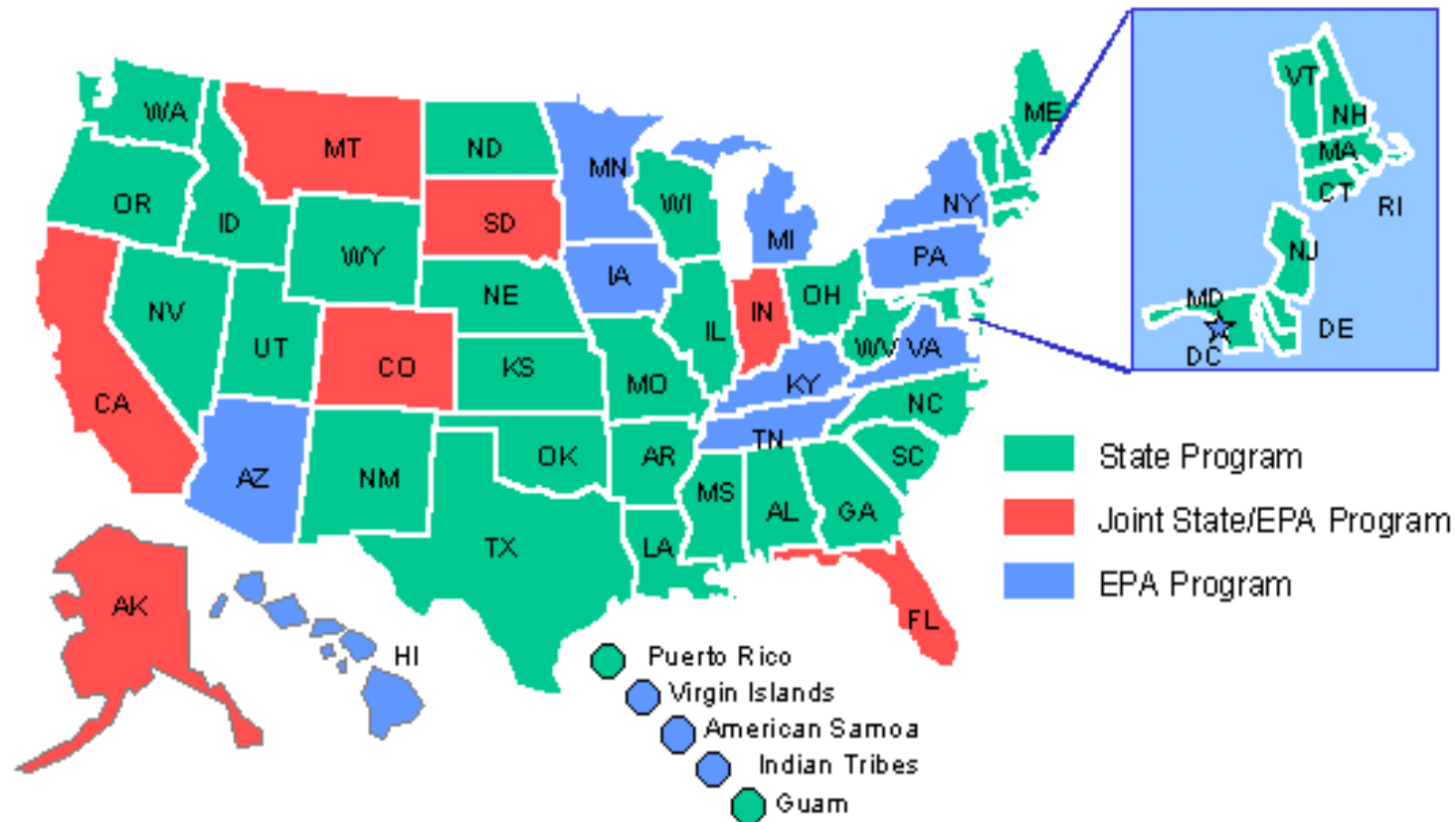


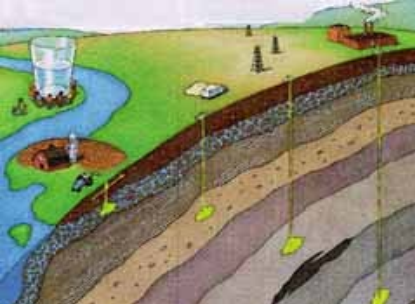
# UIC Program Background

## *Primacy*



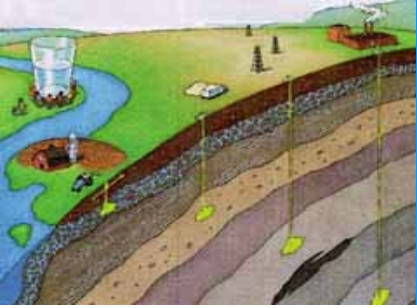
- 33 States have primary enforcement authority (primacy) for the UIC program; EPA and States share program implementation in 7 States; EPA directly implements the entire UIC Program in 10 states





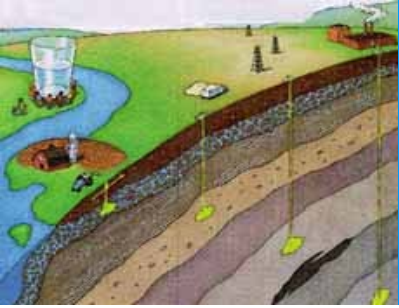
# EPA's GS Rulemaking *Rule Development Process*

- EPA developed a **Proposed Rule** for Geologic Sequestration (GS) of CO<sub>2</sub>
  - Announced October 2007
  - Signed & published July 2008
  - 150 day comment period through December 24, 2008
- Proposed rule uses Safe Drinking Water Act authorities and revises Underground Injection Control Program requirements for GS
- Priority placed on avoiding endangerment of underground sources of drinking water



# EPA's GS Rulemaking *Collaboration*

- Inter- and Intra- Agency Coordination
  - Workgroup of ~48 members
  - State co-regulators
  - Department of Energy and other Federal Agencies
- Stakeholder Outreach
  - Federal Advisory Committees
  - Non-governmental Organizations
  - Industry Groups
  - States and Tribes

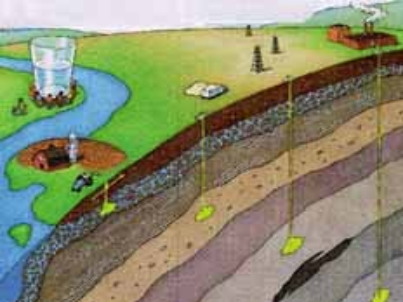


# EPA's GS Rulemaking

## *Goals of the Rulemaking Process*

- Develop proposed rules that would protect underground sources of drinking water under SDWA
- Tailor existing UIC program requirements to unique needs of GS of CO<sub>2</sub> for long-term storage
- Ensure adaptive approach to incorporate new data
- Use existing experience with industrial and enhanced oil/gas recovery injection



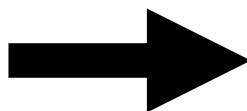


# EPA's GS Rulemaking

## *Approach to Rulemaking*

### Special Considerations for GS

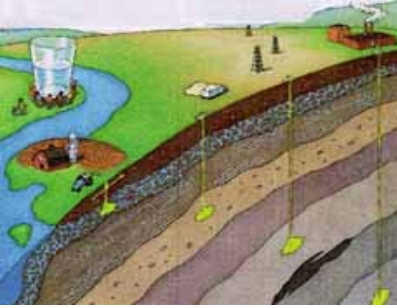
- Large Volumes
- Buoyancy
- Viscosity (Mobility)
- Corrosivity



### UIC Program Elements

- Site Characterization
- Area Of Review
- Well Construction
- Well Operation
- Site Monitoring
- Post-Injection Site Care
- Public Participation
- Financial Responsibility
- Site Closure

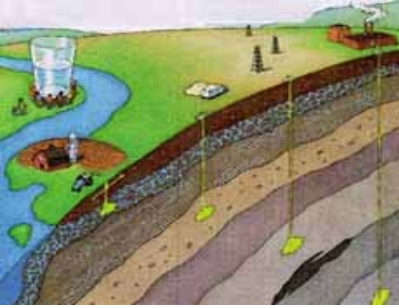
Develop new well class  
for GS – Class VI



# EPA's GS Rulemaking

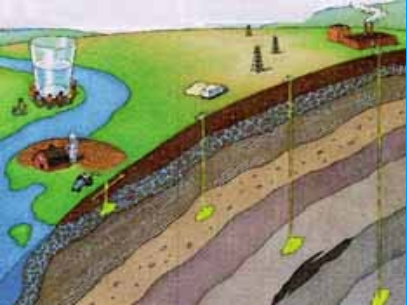
## *Proposed Rule*

- GS Proposed Rule
  - Published: July 25, 2008
  - Two Public Hearings (Chicago, IL and Denver, CO)
  - Comment Period Ended: December 24, 2008
- Proposed Rule Comments Received:
  - 385 public submissions
  - 151 unique comments



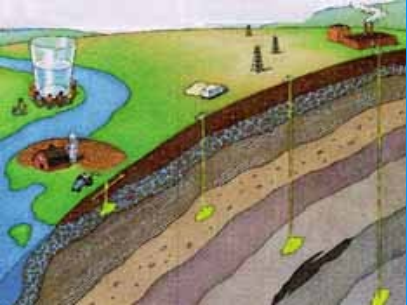
# Notice of Data Availability *Background*

- The Notice of Data Availability (NODA)
  - Developed in early 2009
  - Published August 31, 2009
- Developed to seek comment on
  - Research findings and project data
  - A new approach to address public comments on the proposed injection depth requirements



# Notice of Data Availability *Research*

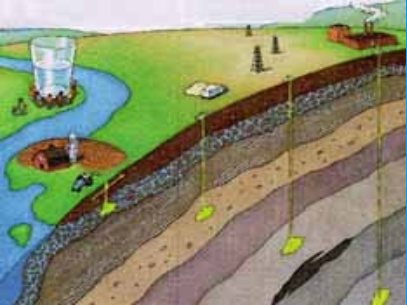
- Provides interim information on projects since the July proposal
- Department of Energy (DOE) GS Project Data
  - Aneth Field, Paradox Basin (Utah; SWP)
  - Escatawpa (Mississippi; SECARB)
  - Pump Canyon Site (New Mexico; SWP)
- Preliminary results support proposed requirements for site characterization, well construction, operation and monitoring and will help inform the final rule



# Notice of Data Availability *Research*

## Lawrence Berkeley National Laboratory Research

- Modeled Ground Water Quality Changes Related to the Mobilization of Trace Elements
- Modeled Basin-Scale Hydrologic Impacts of CO<sub>2</sub> Storage
- Preliminary results validate the importance of the proposed GS requirements to ensure protection of USDWs



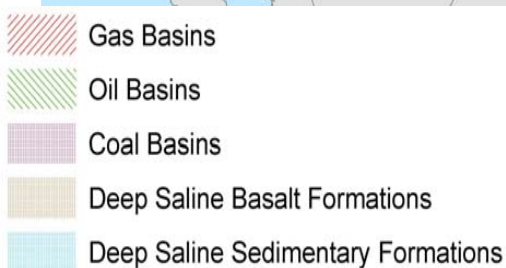
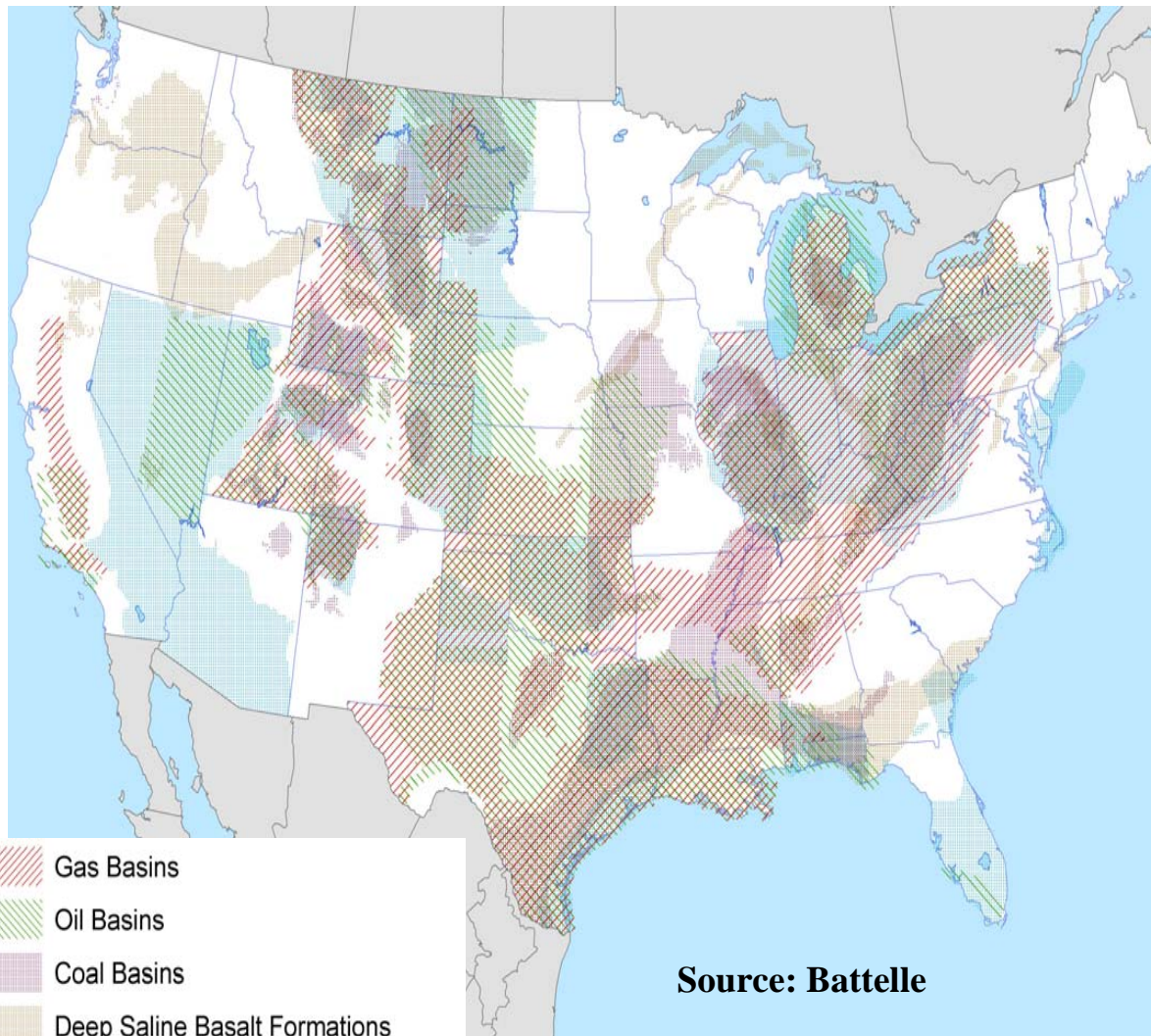
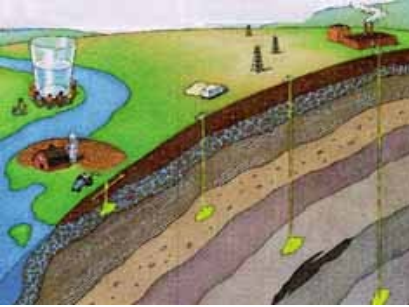
# Notice of Data Availability

## *Injection Depth*

- Proposal would require that all Class VI wells inject below the lowermost USDW
- There are some areas of the country where CO<sub>2</sub> storage capacity would be limited by injection as proposed
- Stakeholders:
  - Supported requirements as proposed (e.g., Water organizations, some States)
  - Supported more flexibility in this requirement (e.g. DOE, some States and industry)

# Geologic Sequestration

## *U.S. CO<sub>2</sub> Storage Capacity*

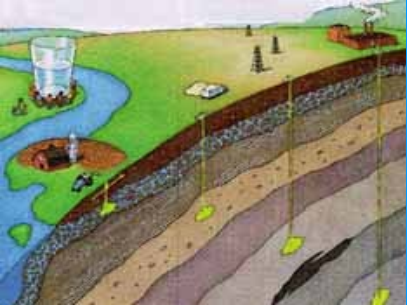


Source: Battelle

**U.S. CO<sub>2</sub> storage capacity is large & widespread**

**3,500+ GtCO<sub>2</sub> Capacity**  
within 230 candidate geologic CO<sub>2</sub> storage reservoirs

- Oil and gas reservoirs
- Deep saline formations
- Deep coal seams
- Basalt formations



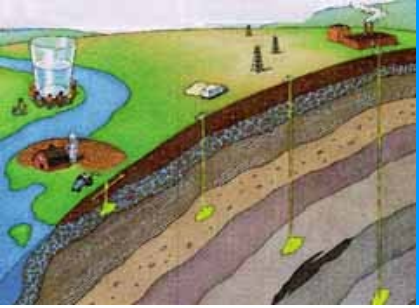
# Notice of Data Availability

## *Injection Depth*

The waiver process goals are to:

- Accommodate injection into different formations at varied depths
- Consider the concept that injection above and/or between the lowermost USDW, under specific circumstances, can be equally protective of USDWs
- Provide flexibility and respond to storage capacity concerns resulting from limiting injection below the lowermost USDW
- Ensure consideration of community drinking water resources by requiring coordination between the UIC Director and the PWSS Director





# NODA Public Comment Period

*August 31st – October 15th, 2009*

## Public Comments

- Inform future publications
- Include data and information
- Address merits of NODA topics
- Identify alternatives to the approach/methodology discussed in the NODA



# EPA's GS Rulemaking *Schedule*

- NODA Public Comment Period
  - Public Hearing: Chicago on 9/17/09
- Response to Comments:
  - Proposed Rule comments
  - NODA comments
- Development of Final Rule
  - Preamble and regulatory text
- Rule Finalization: Late 2010/Early 2011
- Rule Implementation



# Thank you!

## More information about the UIC Program

- EPA Geologic Sequestration of Carbon Dioxide Website – [http://www.epa.gov/safewater/uic/wells\\_sequestration.html](http://www.epa.gov/safewater/uic/wells_sequestration.html)
- Code of Federal Regulations: Underground Injection Control Regulations 40 CFR 144-148 – [http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=d6ee71a544eca89c533c825135913f13&c=ecfr&tpl=/ecfrbrowse/Title40/40cfrv22\\_02.tpl](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=d6ee71a544eca89c533c825135913f13&c=ecfr&tpl=/ecfrbrowse/Title40/40cfrv22_02.tpl)
- Written comments may be submitted at: [www.regulations.gov](http://www.regulations.gov) (docket i.d.: EPA-HQ-OW-2008-0390)