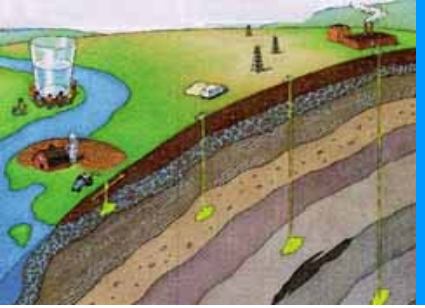
Geologic Sequestration of Carbon Dioxide

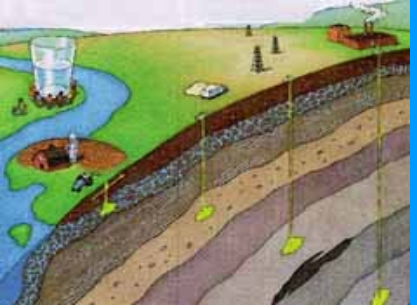
EPA's Notice of Data Availability and Request for Comment

U.S. Environmental Protection Agency
Office of Ground Water and Drinking Water
September 16, 2009



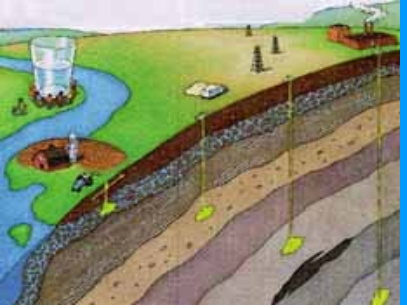
EPA's GS Rulemaking *Outline*

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



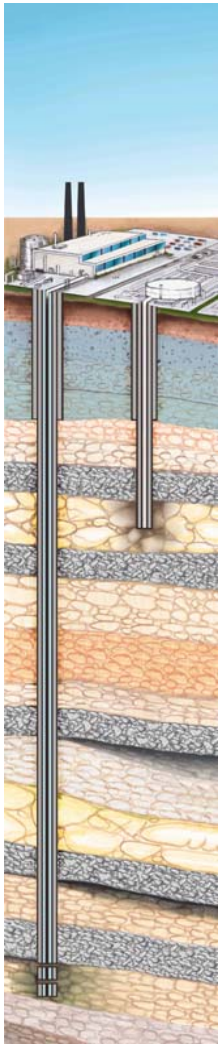
UIC Program Background

- 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_2

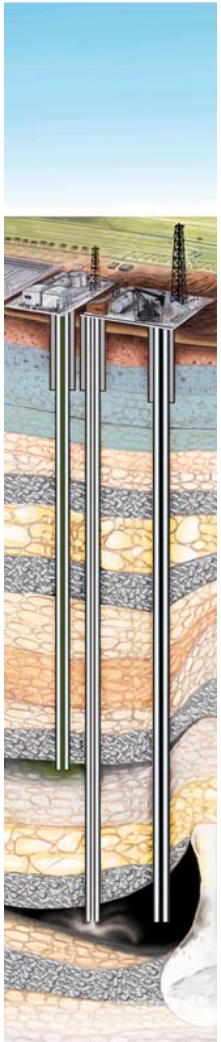


UIC Program Background
UIC Well Classes

Class I

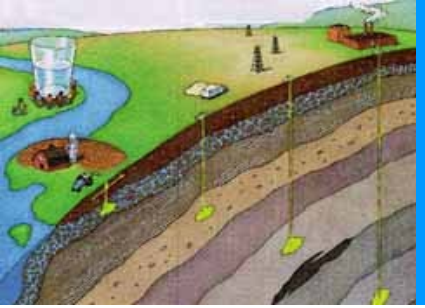


Class II



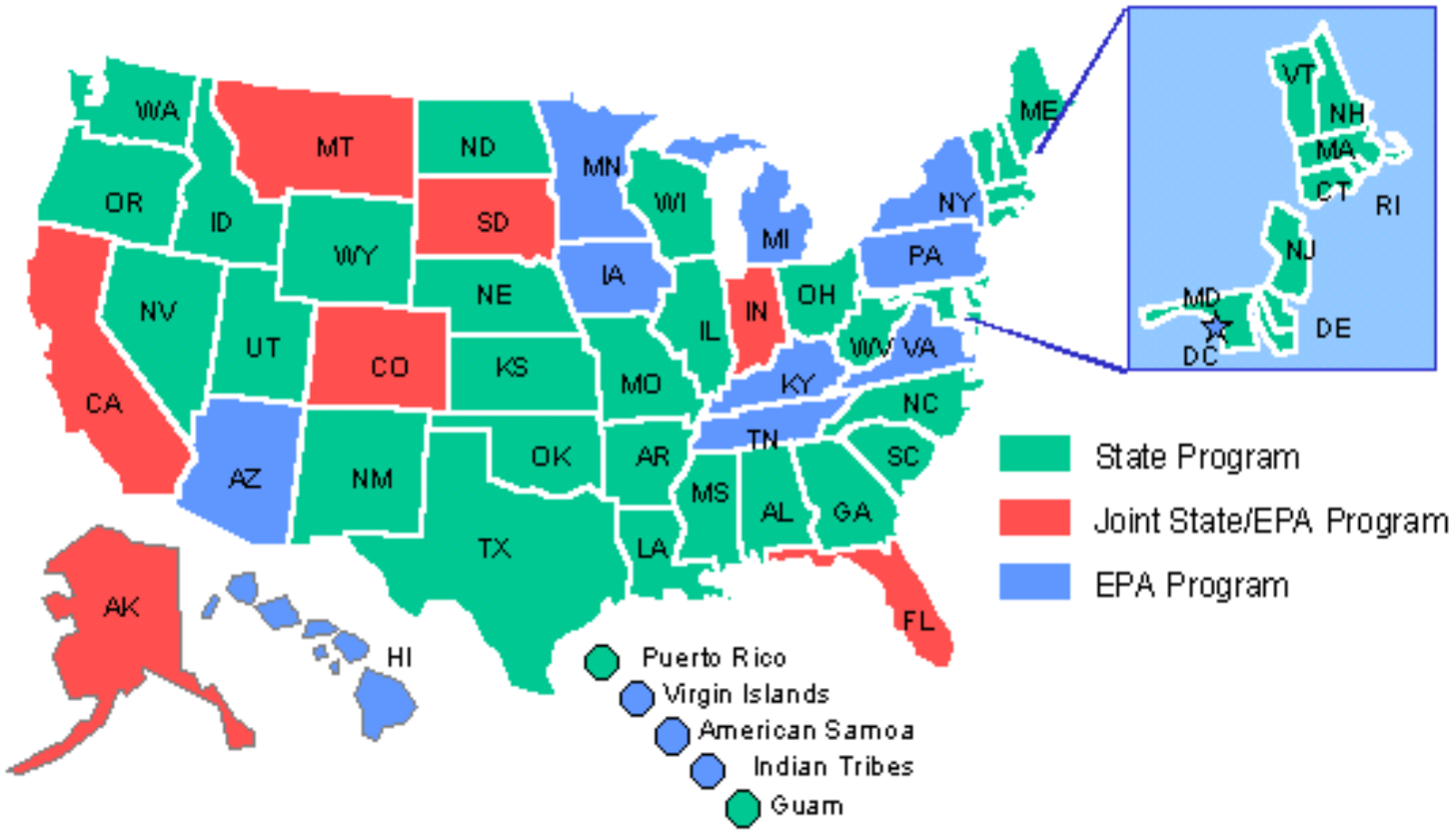
Class III

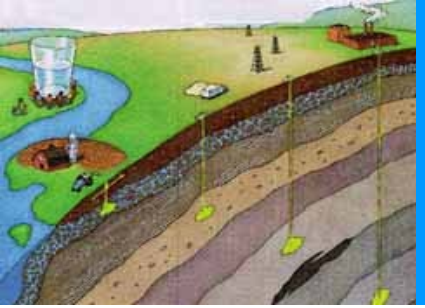
Class V



UIC Program Background *Primacy*

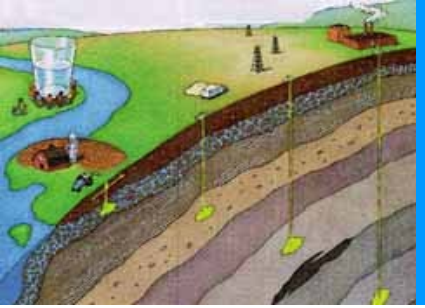
- 33 States have primary enforcement authority (primacy) for the UIC program; EPA and States share program implementation in 7 States; EPA directly implements the entire UIC Program in 10 states





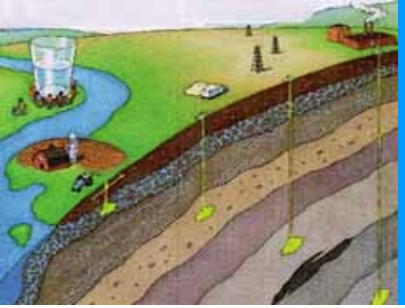
EPA's GS Rulemaking
Rule Development Process

- EPA developed a **Proposed Rule** for Geologic Sequestration (GS) of CO_2
  - 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*

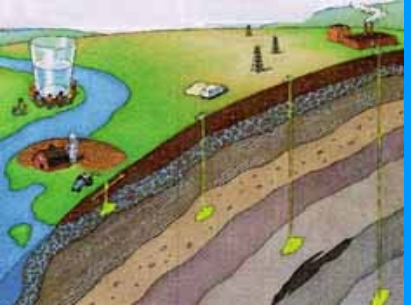
- Inter- and Intra- Agency Coordination
  - Workgroup of ~48 members
  - State co-regulators
  - Department of Energy and other Federal Agencies
- Stakeholder Outreach
  - Federal Advisory Committees
  - Non-governmental Organizations
  - Industry Groups
  - States and Tribes



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_2 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

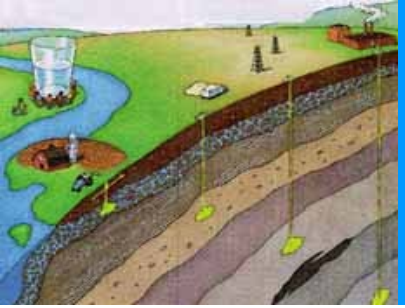
Special Considerations for GS

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

Develop new well class for GS – Class VI

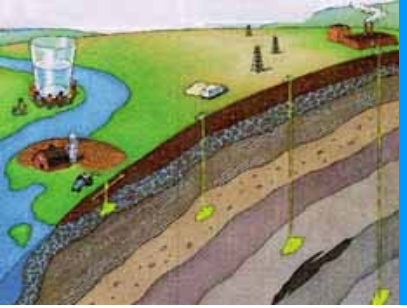
UIC Program Elements

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



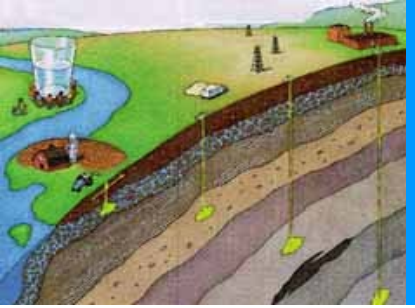
EPA's GS Rulemaking
Proposed Rule

- 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



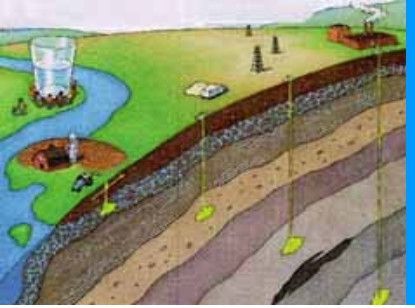
Notice of Data Availability *Background*

- 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

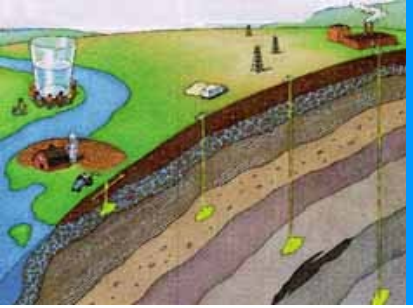


Notice of Data Availability *Research*

Lawrence Berkeley National Laboratory Research

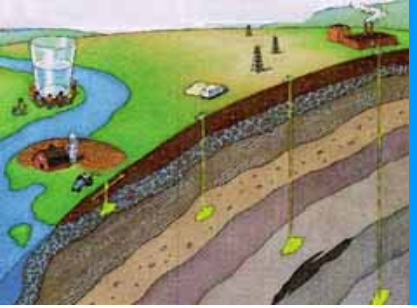
- Modeled Ground Water Quality Changes Related to the Mobilization of Trace Elements
- Modeled Basin-Scale Hydrologic Impacts of CO_2 Storage

- Preliminary results validate the importance of the proposed GS requirements to ensure protection of USDWs

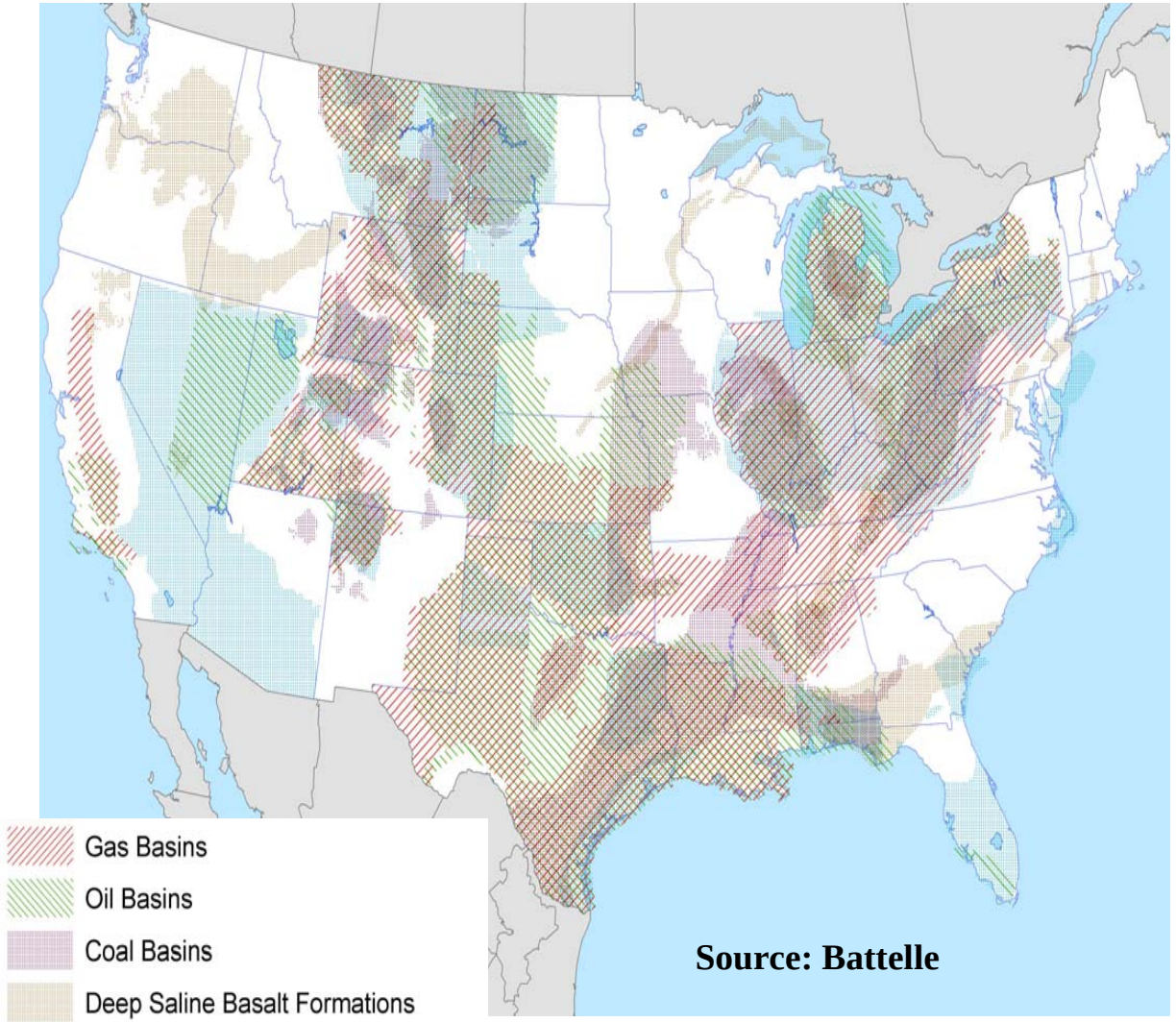


Notice of Data Availability *Injection Depth*

- Proposal would require that all Class VI wells inject below the lowermost USDW
- There are some areas of the country where CO_2 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_2 Storage Capacity

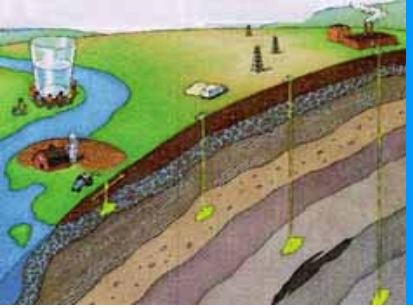


Source: Battelle

U.S. CO_2 storage capacity is large & widespread

3,500+ $GtCO_2$ Capacity within 230 candidate geologic CO_2 storage reservoirs

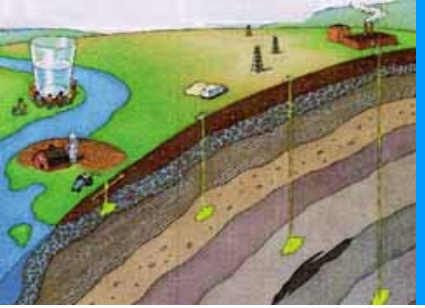
- Oil and gas reservoirs
- Deep saline formations
- Deep coal seams
- Basalt formations



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

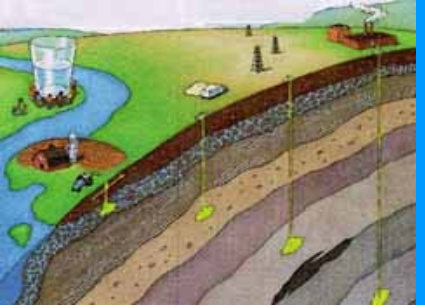


NODA Public Comment Period

August 31st – October 15th, 2009

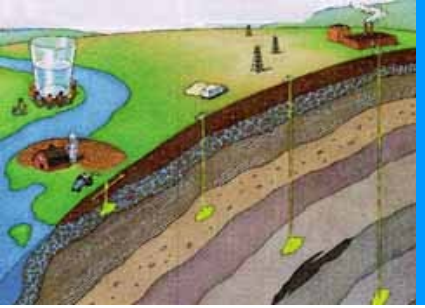
Public Comments

- 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
- 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
- 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
- Written comments may be submitted at: www.regulations.gov (docket i.d.: EPA-HQ-OW-2008-0390)