Water and Carbon Storage Related Research at DOE/NETL

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• Developing a model examining advantages and challenges of integrated system

• Model addresses relevant areas of CO₂: capture, transportation, and storage; water: extraction and treatment for reuse by power plants

• Model contains available data and calculations but allows for user corrections to data and assumptions
Argonne National Laboratory Project

- Assessing:
  - Extracted water management options
  - Industries or sectors that can reuse water of lesser or different quality
  - Investigate innovative use of components of formation water

- Ongoing efforts will build off of the assessment and will use a life cycle assessment approach to assess the environmental costs and benefits of the previously identified options

Saline Brine Composition, Major Constituents

- Chloride
- Sodium
- Calcium
- Bromine
- Bicarbonate
- Sulfate
- Magnesium
- Potassium

Concentration mg/L

1 10 100 1000 10000 100000 1000000
Lawrence Livermore National Laboratory Project

- Brine pressurized by CO$_2$ storage as feedstock for desalination and water treatment

- Two pronged approach:
  - Evaluating membrane treatment methods
  - Modeling effects of saline extraction on CO$_2$ plume, pressure front, trapping mechanisms, and seal integrity
Regional Carbon Sequestration Partnerships
Developing the Infrastructure for Wide Scale Deployment

Seven Regional Partnerships
400+ distinct organizations, 43 states, 4 Canadian Provinces

- Engage regional, state, and local governments
- Determine regional sequestration benefits
- Baseline region for sources and sinks
- Establish monitoring and verification protocols
- Address regulatory, environmental, and outreach issues
- Validate sequestration technology and infrastructure

Characterization Phase (2003-2005)
Search of potential storage locations and CO₂ sources
Found potential for 100’s of years of storage

Validation Phase (2005-2011)
20 injection tests in saline formations, depleted oil, unmineable coal seams, and basalt

9 large scale injections (over 1 million tons each)
Commercial scale understanding
Regulatory, liability, ownership issues
RCSP Water Working Group

• Capture experiences related to CCS & water
• To provide a forum for brainstorming and communication on issues and opportunities
• Each RCSP has crosscutting challenges and opportunities but also many unique regional experiences
National Carbon Sequestration Database and Geographical Information System (NATCARB)

- Relational database and geographic information system (GIS)
- Integrates data from the RCSPs and various other sources
- Provides a National view of the carbon sequestration potential in the U.S. and Canada

National View of Saline Formations and Coal Basins

Brine Data from Selected Texas Formation

CO₂ Sequestration Site