WESTCARB Phase I Results Review

Arizona Geologic Characterization

Errol Montgomery
Principal
Errol L. Montgomery & Associates
(520) 881-4912
emontgomery@elmontgomery.com

Berkeley, CA
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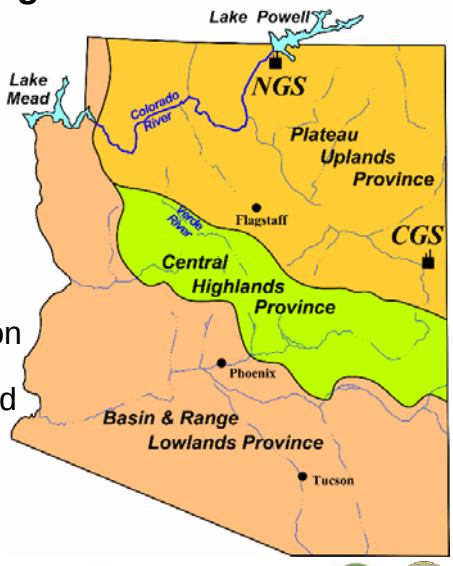
Site Characterization of Salt River Project Power Plants

- Preliminary assessment of SRP power plant sites:
  - Coronado Generating Station
  - Navajo Generating Station
- Hydrogeologic characterization to assess feasibility of geologic sequestration
  - Coronado Generating Station

Colorado Plateau Geologic Province

- 140,000 square miles in Four Corners area
- Thick sequence of laterally extensive, nearly flat-lying sedimentary strata
- Some structural deformation
- Some areas of coal, oil, and gas accumulations



Coronado Generating Station

- Coconino Sandstone good target reservoir and contains very saline groundwater to northwest, but is only 1,500 feet deep, or less
- Supai Formation has several target zones, all less than 3,000 feet deep, and probably having naturally large CO_2 concentrations
- CGS does not appear feasible for supercritical phase CO_2 injection

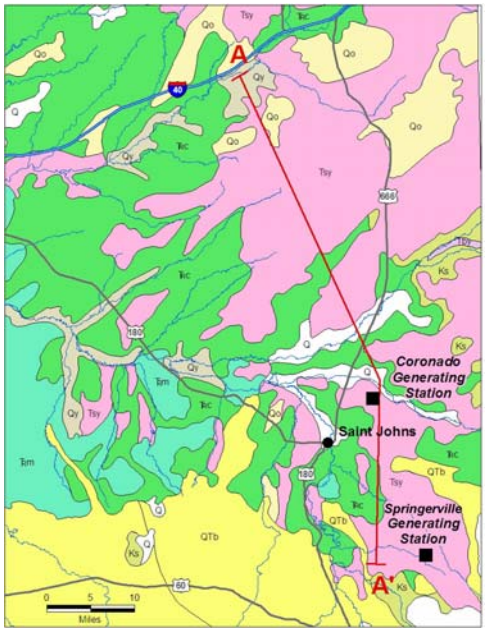
Navajo Generating Station

- Multiple target zones offer substantial potential for geologic storage
  - Kaibab Limestone/Coconino Sandstone
  - Cedar Mesa Sandstone
  - Redwall Limestone
- Geology largely unexplored below 1 kilometer
- Target units outcrop in Grand Canyon to southwest
- Navajo Nation lands would be involved

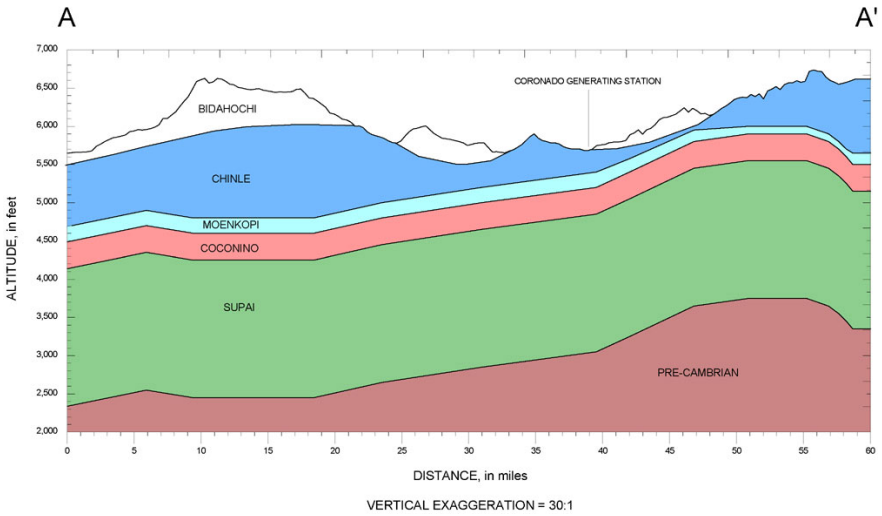
Objectives of CGS Hydrogeologic Characterization

- Identify permeable geologic units for potential CO_2 injection overlain by impermeable strata
- Evaluate hydraulics of potential reservoir unit in terms of:
  - hydraulic conductivity and porosity
  - groundwater conditions
  - water chemistry and other physical data
  - geologic structure
- Analyze suitability of potential reservoir unit for CO_2 injection and storage
- Identify technical uncertainties/data limitations

Regional Geologic Map for Coronado Generating Station

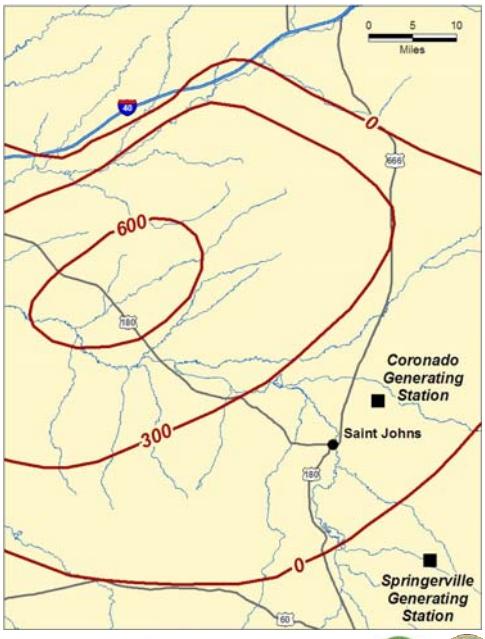


Geologic Cross-Section at CGS



Supai Formation

Thickness of salt deposits (in feet)

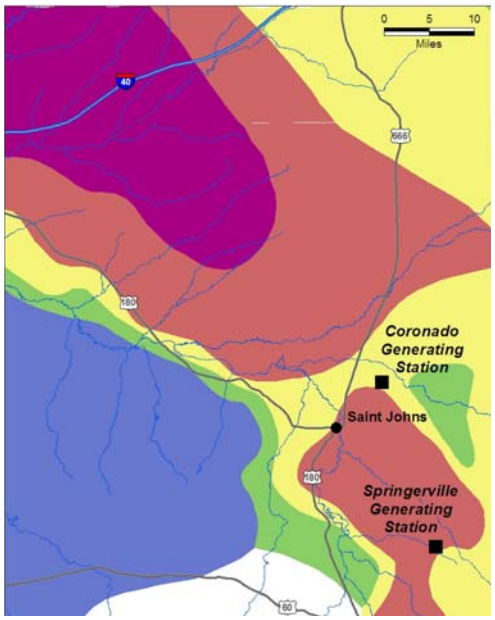


Regional Water Quality Of Coconino Aquifer

EXPLANATION

Total Dissolved Solids (mg/L)

- 0 - 500
- 500 - 1,000
- 1,000 - 2,000
- 2,000 - 10,000
- > 10,000



Key Hydrogeological Findings

- Potentially suitable area for sequestration located 25–40 miles northwest of CGS, and in this area:
  - Reservoir target is approximately 350-foot thick Coconino Sandstone
  - Overlying 1,000+ feet Chinle Formation provides confining layer
  - Groundwater is poor quality with high TDS content
  - Limited land use/seismically stable area
  - Limited number of deep wells in area
  - Structural containment evidenced by commercial gas production

Key Hydrogeologic Findings (cont'd)

- Shallow depth of burial and relatively low reservoir pressure would require vapor phase CO_2 storage
- Technical uncertainties/data limitations:
  - Potential lateral migration of CO_2 to regions where sandstone outcrops or seal is absent
  - Potential lateral migration of CO_2 to regions of good water quality
  - Potential other reservoir gases present
- Practical considerations:
  - Shallow depth will aid and limit cost of geologic characterization
  - Shallow depth would limit cost of drilling, CO_2 injection, and CO_2 plume monitoring