

**POWER GENERATION, CO₂ PRODUCTION, AND THE SEARCH FOR
CO₂ SEQUESTRATION SITES IN DEEP SALINE AQUIFERS
IN NORTHEASTERN ARIZONA**

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Arizona-based utilities that operate four large coal-fired power plants in northeastern Arizona have joined the West Coast Regional Carbon Sequestration Partnership (WESTCARB) and are sponsoring a pilot project to evaluate CO₂ injection and storage in the Colorado Plateau region of northeastern Arizona. Errol L. Montgomery & Associates was asked to assist WESTCARB and the lead industrial partner, Salt River Project (SRP), evaluate potential sites in the Colorado Plateau province for an Arizona pilot CO₂ storage project. Based on screening of regional geologic and hydrologic conditions and considerations of land access and permitting, a site at or in the vicinity of the Cholla Power Plant near Joseph City, Arizona was selected for a future demonstration project.

Two important factors were pivotal in selecting the Cholla Area for further consideration. First, oil and gas test wells drilled in this area indicate that deeply buried sedimentary rocks underlying the Cholla Area appear favorable for storing carbon dioxide. The potential CO₂ storage reservoirs are at a depth ranging from 3,600 to 4,500 feet below land surface and overlain by very thick and regionally extensive fine-grained strata that will confine and seal the CO₂ underground. A second key factor supporting pilot project implementation in the Cholla Area was based on water quality of the regional aquifer in the Coconino/De Chelly Sandstone. Groundwater wells penetrating the regional aquifer indicate an extensive area of poor quality groundwater exists just north of and roughly parallel to the Little Colorado River in this region. Total dissolved solids in groundwater range from approximately 20,000 to 70,000 milligrams per liter in this area due to the presence of evaporative salts in the underlying Supai Formation. The highly saline conditions present in the uppermost aquifer in the northern Cholla Area give reason to believe that underlying groundwater in potential CO₂ reservoirs will be saline.

The preferred site for the demonstration project is in the northeast part of Arizona Public Service (APS) property at the Cholla Power Plant. This site is suggested because it offers: (1) target reservoirs in the Pennsylvanian Naco Formation and the Devonian Martin Formation (primary target) having likely saline groundwater conditions, (2) extensive overlying fine-grained confining beds that prevent vertical leakage of CO₂ to the surface or into shallow drinking water, (3) target reservoirs appear to have sufficient injectivity and porosity for CO₂ storage, (4) sufficient depth of burial and hydrostatic head for CO₂ storage as a dense, supercritical fluid, (5) access to and/or near the site on paved roads, and (6) easement for land use and ease of permitting through APS cooperation.