ZAMA ACID GAS EOR, CO_2 SEQUESTRATION, AND MONITORING PROJECT

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ABSTRACT

Carbon dioxide capture and storage (CCS) in geological media has been identified as an important means for reducing anthropogenic greenhouse gas emissions currently vented to the atmosphere. The Energy & Environmental Research Center, through the Plains CO_2 Reduction Partnership, one of the U.S. Department of Energy's (DOE) National Energy Technology Laboratories Regional Carbon Sequestration Partnerships, is working to identify and test CCS opportunities in the central interior of North America. Several means for geological storage of CO_2 are available including depleted oil and gas reservoirs, deep saline aquifers, enhanced oil recovery (EOR) and enhanced coalbed methane recovery. Studies into CO_2 capture; transportation; storage; and monitoring, mitigation, and verification (MMV) have been, and continue to be, pursued to allow for the deployment of large-scale demonstrations. Understanding the fate of the injected CO_2 is an important aspect of the emerging CCS technology. MMV activities are critical components of geological storage locations for two key reasons. First, the public must be assured that CO_2 geological storage is a safe operation. Second, markets need assurance that credits are properly assigned, traded, and accounted for. Integrated geological and hydrogeological characterization and geochemical sampling and analysis programs are technologies that can document the movement of the injected gases and detect potential leakage from the storage unit.

Since December 2006, a stream of acid gas has been injected into a Devonian pinnacle reef structure for the simultaneous purpose of disposal, sequestration of CO_2, and EOR at the Zama oil field in northwestern Alberta, Canada. The project includes a variety of efforts focused on examining the effects that high concentrations of H_2S can have on EOR and carbon sequestration operations, particularly with respect to MMV. Research activities are being conducted at multiple scales of investigation in an effort to predict and, ultimately, verify the fate of the injected gas. Geological, geomechanical, geochemical, and engineering data are being used to fully describe the injection zone, overlying seals, and other potentially affected strata. Validating the integrity of the anhydrite sealing formation and determining the nature of potential geochemical and geomechanical changes that may occur because of acid gas exposure are the primary goals of the research.