

Three-million-metric-ton-monitored injection at the SECARB Cranfield project – project update

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Abstract:

The Southeast Partnership (SECARB) —early test at Cranfield field, Mississippi was the first of the commercial-scale projects of the U.S. Department of Energy's Regional Carbon Sequestration Partnerships (RCSP) to reach and exceed its injection target. More than 3 million metric tons of injected CO₂ has been monitored since the start of injection in July of 2008. Improved capacity assessment and storage permanence are the programmatic goals addressed.

The SECARB Cranfield project has produced information relevant to long-term storage in saline aquifers, as well as storage incidental to CO₂ enhanced oil recovery (EOR). The SECARB project added testing passive pressure in the above-zone monitoring interval (AZMI), supported injection at high rates, and assessed capacity of the downdip brine-bearing part of the system to accept additional CO₂ through a —stacked storage concept.

Capacity-assessment results include a multiphysics assessment of distribution of the CO₂ plume in time and space in heterogeneous lithologies. The 20-m-thick sandstones and conglomerates of the lower Tuscaloosa injection zone are predominantly highly permeable strata, but as flow evolved under a changing injection rate, CO₂ accessed only preferred paths. Dissolution of CO₂ into brine caused methane to come out of solution, which can have a significant impact on capacity where this process is important.

The monitoring program in the reservoir included fieldwide injection and production data, 4-D seismic, downhole pressure and temperature, geochemical sampling, and microseismic monitoring. Focused studies tested real-time pressure and temperature in an AZMI as a tool for detecting nonconformance. At the detailed area of study (DAS) in the downdip water leg, processes at the well- and interwell- scale were measured using electrical, acoustic, geochemical, pressure, pulsed-neutron, and thermal tools. Near-surface deployments included groundwater monitoring and a soil-gas study area. Data collected are still in assessment via numerous collaborations. Modeling by numerous teams is under way so that maximum information can be extracted from observations.

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