

**Southwest Regional Partnership on Carbon Sequestration**

Quarterly Progress Report

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## Executive Summary

*Task 1–Regional Characterization:* Researchers completed a reanalysis of the carbon storage potential in oil and gas reservoirs in the Southwest Region. The subsurface temperature gradient for wells in the Arbuckle was calculated and incorporated in a color-coded map.

*Task 2–Public Outreach and Education:* Researchers worked on the draft outline of the NETL Best Practice Manual (BPM) and continued to work on the SWP website developing meta-data templates.

*Task 6–Operational Monitoring and Modeling:* Work progressed in several areas: In *6.1 Surface and near-surface:* Gravity measurements were taken at the Farnsworth Site and researchers maintained the gravimeter and the self-potential monitoring system; data were downloaded from five seismometers and gravity data was analyzed throughout the quarter. CO<sub>2</sub> flux measurements were taken and researchers installed the Picarro eddy covariance/flux tower with GPS and a sonic anemometer at the 1310A data shed.

Researchers also continued to refine the MVA database. In *6.2 Subsurface:* CO<sub>2</sub> storage and injection/production data were summarized. Water samples were analyzed and earlier samples taken for CHO isotopes were analyzed this quarter. Researchers continued to work on vapor-phase tracer activities. The first gas tracer was injected into Well 1313. In *6.3 Seismic:* Researchers continued to process the 3D VSP and crosswell tomography data and to perform inversions. A study comprising the geophysical modeling and structural interpretation of a 3D reflection seismic survey in the FWU was completed. Researchers continued to study the key potential geomechanical processes in the Morrow sandstone formation and the associated effects on the CO<sub>2</sub> capacity and injectivity. In *6.4 Reservoir Modeling:* Researchers continued work on TOUGHREACT, reactive transport model for the FWU. In geological characterization, seismic and geologic information were combined into a single static geologic model that incorporates the most recent seismic interpretations, and detailed microprobe and XRD analyses of 13-10A samples were performed; an improved geological model from current available geological, geophysical and engineering data from FWU was completed during this quarter—a significant Phase III deliverable. SWP researchers began initial shake-down and testing of the relative permeability and capillary pressure equipment to be used for FWU rock samples and measurements of FWU core were conducted to determine Farnsworth rock wettability. Researchers continued code development for CO<sub>2</sub> mass by residual trapping from the outputs using TOUGH2 and studied the impacts of relative permeability on CO<sub>2</sub> trapping mechanisms. In *6.5 Risk Assessment,* researchers worked with the CMG-GEM simulator to verify the proposed uncertainty quantification approach and continued to work on quantification of risk analysis on potential chemical impacts on groundwater due to CO<sub>2</sub> leakage. They completed the 25-run 3-D reservoir simulations in the west half of the FWU, constructed regression models between input variables and output responses, assessed the uncertainties of output responses such as cumulative oil production and net CO<sub>2</sub> injection, and analyzed the response surface of the output response in relation to the uncertain input variables for FWU 3-D reservoir simulations. Work on STOMP-EOR and CO<sub>2</sub>-PENS-PSUADE progressed as well.

*Task 8–Project Management:* Well 1310A was shut-in due to leakage and not repaired until the end of the quarter. Researchers discussed CO<sub>2</sub> issues with Chaparral’s CO<sub>2</sub> Midstream Director. SWP completed a contract with Panhandle Pumping of Perryton for site sampling, and FWU SWP Geomodel 2015 was provided to all SWP members for their use. A Seismic Data Review Meeting was held in Houston May 11 and 12. Budget Planning for BP3 progressed: a review of SWP spending indicated that SWP is within budget for Budget Period 3A.