Southwest Regional Partnership on Carbon Sequestration

Quarterly Progress Report

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Executive Summary

Task 2–Public Outreach and Education: The project team continued to assist with hosting and maintenance of the website, including continued improvements to the MVA data website. Researchers continued to participate and record/catalog the weekly SWP Science teleconferences and discussions. The Meetings website was updated for the upcoming 2016 SWP Annual Review meeting in October (Quarter 37) with meeting information and a registration page.

Task 6–Operational Monitoring and Modeling: Researchers continued to incorporate new data into the MVA Database. Data collected May 21–June 12, 2015 with the Picarro CRDS and 3-D anemometer were analyzed. *In 6.1 Surface and Near-Surface:* Gravity data measurements, CO_2 surface flux measurements and water sample analyses were performed and work continued on eddy flux research. *In 6.2 Subsurface:* CO_2 storage summaries continued and breakthrough continued in Well 20-8, the only production well in the sampling pattern yielding elevated concentrations for the 2,7-nds tracer. Lab results for PMCH and PECH tracers collected from the May 2016 injections indicated breakthrough on a number of wells from the two injections (#13-1 and #13-3) shortly after the May 4 injections. Flow patterns suggest a flow system strongly influenced by faults mapped near the #13-1 and #13-3 patterns, but more analysis is needed. *In 6.3 Seismic:* pre-planning was underway for the repeat 3D VSP in FWU 13-10A, and for crosswell tomography from FWU 16-02 to FWU 16-03, for late November 2016. Amplitude Versus Angle (AVA) regression and Elastic Full Waveform Inversion (eFWI) were tested using 3D VSP baseline and monitor datasets. *In 6.4 Reservoir Modeling:* Researchers continued to analyze three-phase relative permeability relationships. The FWU preliminary history matching and prediction geologic model presented to researchers last quarter was improved using the currently constructed static model with increased grid resolution, addition of faults and better petrophysical modeling. Researchers began its conversion to a forward simulation CO_2-EOR model, and also continued developing a suite of pore-scale modeling capabilities. Other characterization efforts involved transitioning reactive transport simulations from TOUGHREACT to STOMP, fracture alteration and fluid flow processes, and MMP analysis for Farnsworth oil. *In 6.5 Risk Assessment*: Researchers continued to apply PCE in the uncertainty quantification and probabilistic risk assessment of CO_2 sequestration and oil recovery. They evaluated impacts of hysteresis and determined polynomial basis functions based on porosity and permeability. CDFs and uncertainty bounds of model outputs were estimated based on ROMs. Researchers also worked on CO_2-cement interaction with a 2-D model for the FWU, including potential chemical/mineral reactions with CO_2 injection and its impacts on a generic sandstone formation and arsenic mobilization in shallow groundwater with CO_2 leakage. Other research included applying the STOMP-EOR simulator to the FWU #13-10A aqueous tracer tests, and risk analysis of FEPS with CO2-PENS-PSUADE. Work also progressed on caprock analysis and multiphase flow characterization.

Task 8–Project Management and Oversight: Fieldwork included sampling and maintenance. Researchers met with Chaparral and planning for repeat 3D VSP and additional cross-well tomography for a new pattern. Grid issues with the geologic model were resolved, and preparation was underway for the SWP Annual Project Review. The 2016 Risk Assessment Review was held in September. SWP researchers presented project status at the NETL Annual Meeting and connected with the NETL tracer sampling team. Reactive transport modeling was successful for one well for 100 years, and simulation work on tracer study results was initiated.