Southwest Regional Partnership on Carbon Sequestration

Quarterly Progress Report

Reporting Period: July 1–September 30, 2015

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Executive Summary

Task 1–Regional Characterization: researchers completed and upgraded the Arbuckle bottomhole temperature database and compiled a detailed temperature gradient map of Oklahoma,as well as a state-wide Arbuckle thickness map.

Task 2–Public Outreach and Education: researchers continued daily monitoring of website contact email for the Partner website, to work on the MVA database for Partnership-wide access, and to refine SWP-Velo, the collaborative research software.

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. In *6.2 Subsurface*: CO_2 flux measurements were taken and monitors were placed adjacent to nearby wells to evaluate potential release associated with wellbores. The project team took delivery of the second combined CO_2/CH_4 eddy flux system for the FWU. The Picarro eddy flux system installed in the 13-10A data shed was shut down early in the quarter (July 2015) due to the overheating problems. Researchers continued to refine the MVA database, incorporating additional data gathered over the quarter, including the vapor-phase tracer data. Water samples were collected in July and analyzed. Work continued on sampling and analysis following the initial vapor-phase tracer injection at the FWU in the previous quarter, finding that none of the water-phase tracers injected in May had yet reached production wells. Researchers and field operator identified well 1313 for injection of vapor-phase and well 14-1 for water-phase tracers in the next round of tracer injection. Researchers conducted a study to see if Morrow sandstone is typical of sandstone formations in other southwestern basins of the US. In *6.3 Seismic:* No seismic activities were conducted in the field for the period July–September 2015. Data processing continued, with the 3D VSP processing completed at the end of the quarter. Researchers continued to study the key potential geomechanical processes in the Morrow sandstone formation and the associated effects on the CO_2 capacity and injectivity. In *6.4 Reservoir Modeling*: researchers matched laboratory PVT data for a FWU reservoir fluid sample. They also worked on core description, incorporating and aligning core measurements with log measurements and creating a master well top list for FWU wells. Substantial progress was made constructing and simulating two 1D petroleum system models (PSM) at Farnsworth and Booker field. Researchers worked on correlation between porosity and permeability through the Farnsworth unit to predict permeability and progressed on reactive transport simulations with TOUGHREACT. The project team also worked on simulations for optimal production times. In *6.5 Risk Assessment*, two reports were completed: the draft caprock analysis and the second comprehensive risk assessment exercise for the FWU. Researchers continued risk assessment efforts using the Polynomial chaos expansion (PCE) approach for CO_2 sequestration and oil recovery with the CMG-GEM simulator. They also worked on STOMP-EOR fixing bug reports and implementing strategies for improving computational efficiency. Work also progressed on post-processes of Monte Carlo simulations of CO_2-EOR in a 5-Spot pattern and analysis of FEPS.

Task 8–Project Management: The most significant event of the quarter was the retirement of Dr. Reid Grigg, NMT Co-PI for the SWP, in August. Dr. Robert Balch is replacing Dr. Grigg as Co-PI. SWP also began the process of creating an advisory board to help promote and improve SWP activities. The PIs tentatively scheduled the annual SWP Partnership Meeting for December 2–4, 2015, at the University of Utah. In mid-August, PIs successfully presented the SWP Project at the annual DOE/NETL meeting.