

Southwest Regional Partnership on Carbon Sequestration

Quarterly Progress Report

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Executive Summary

Task 1–Regional Characterization: Bottomhole temperature from 9,096 wells throughout sedimentary basins in Oklahoma was acquired. Researchers calculated the subsurface temperature gradient for wells having bottomhole data and put them into a color-coded map.

Task 2–Public Outreach and Education: Researchers continued to develop contact email protocol for the SWP website, and to work on Velo updates and requests to implement the SWP upload script for incorporating metadata into files/folders shared on Velo.

Task 6–Operational Monitoring and Modeling: *6.1 Surface and near-surface:* Gravity measurements and data analysis continued at the FWU site. NETL worked on instrument calibration for SWP researchers. CO₂ surface flux monitoring continued and eddy covariance equipment was developed. The MVA database was expanded and refined. *6.2 Subsurface:* CO₂ injection data was compiled and water sample analysis performed. Researchers also worked on CO₂ flood modeling, coreflood simulations, regional characterization for 2D Petroleum System Modeling (PSM), MMP evaluation for FWU oil samples, and tracer testing. *6.3 Seismic:* The repeat 3D VSP and crosswell tomography surveys were performed and the data were processed. Researchers worked on identifying the best way to coordinate file management for the large amounts of data of different types collected and a seismic velocity model was calculated. Other work involved efforts to reduce the noise in the data at its collection point. Graduate Student Paige Czoski, Master of Science Candidate in Earth and Environmental Science at the New Mexico Institute of Mining and Technology, defended her thesis, “Geologic characterization of the Morrow B reservoir in Farnsworth Unit, TX using 3D VSP seismic, seismic attributes, and well logs.” *6.4 Reservoir Modeling:* Researchers worked on a numerical reactive transport model for FWU with TOUGHREACT and studied geomechanical processes in the Morrow Sandstone. Core description and development of a geologic model with Petrel software continued. Multiphase flow properties in the FWU were studied and a 2D planar model of the Morrow B sandstone continued development. *6.5 Risk Assessment:* Work continued on a SWP reservoir model with the CMG-GEM simulator to verify the proposed uncertainty quantification approach. Work continued on STOMP-EOR, the simulator for investigating subsurface processes both during the injection and post-injection periods, and on CO₂-PENS-PSUADE, evaluating the rates of CO₂/water injection and oil/gas production.

Task 8–Project Management: Chaparral Energy, LLC, began a process of significant staff restructuring, with less change in field personnel working with SWP. Schlumberger Carbon Service (SCS) will be eliminated, but Schlumberger indicated they would fulfill contracts with SWP that go through the end of Phase III Budget Period 3B. SWP researchers met with Chaparral’s new EOR team, with a positive outcome. In the field, CO₂ purchase for injection declined by the end of the quarter. Work began on a “SWP Communication Plan”. The Risk Group developed a prevention and mitigation plan for the FWU risk according to the updated FEPs registry, and seismic review results indicated all data were good. SWP researchers attended the 2015 SPE Production and Operations Symposium, March 1–5, in Oklahoma City and presented a paper.

TASK 1 Regional Characterization

Task 1.4 Continued Assessment

Arbuckle Formation

Acquisition of bottom-hole temperature was completed from 9,096 wells throughout sedimentary basins in Oklahoma. Temperature data was selected from the deepest wells in eight sections within each township though this protocol was not always possible depending on the availability of boreholes and well logs. Target wells were first identified from the IHS database, well logs were then acquired from TGS, and finally the maximum recorded temperature at bottomhole depth was identified from the well log header and recorded in an Excel database.

Researchers calculated the subsurface temperature gradient for wells having bottomhole data. These values were then mapped in a manner that color-codes temperature gradients throughout the state.

