Southwest Regional Partnership on Carbon Sequestration

Quarterly Progress Report

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Brian McPherson, PI, and Robert Balch, PI/Project Director

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Recipient: New Mexico Institute of Mining and Technology
801 Leroy Place
Socorro, New Mexico 87801

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Executive Summary

The Continuation Application for Budget Period 4 was approved and BP4 began on January 1, 2019. Tasks active during Budget Period 4 will be 1, 2, 7, and 8. Much of the work of BP4 will be concentrated in Task 7.

Task 2–Public Outreach and Education*:* The SWP website was maintained. The SWP Annual Meeting page was set up and information was disseminated.

Task 7– Post-Injection Period Monitoring and Risk Assessment: In *7.1 Surface and Near-Surface,* the project team began working with existing Texas Water Conservation District groundwater models of the High Plains Aquifer, the most critical USDW at the FWU study site. Water samples were taken, but CO_2 surface flux samples could not be taken because of adverse weather conditions. SWU researchers noticed gaps in the data stored on the LiCor eddy flash drive (cause not determined) and continued to develop methods for quantifying CO_2 emissions from point sources. They addressed on-the-fly lag time correction for the Picarro spectrometer and worked on downhole pressure and temperature data from 13-10A. Tracer sample testing was ongoing. Researchers conducted an optimal design study for the FWU microseismic monitoring network. CO_2 storage was reported. In 7.2 *Refine Site Characterization Data,* a research plan and multiple simulation scenarios began development. In 7.3, *Refine Geologic and Reservoir Models*, work progressed on the geologic model, on evaluating the geochemical network developed in BP3 and its solution with the ECKEChem solver, and on developing capabilities for modeling the fault structures within the FWU as embedded features. Researchers cataloged the experimental relative permeability data from BP3, determining critical endpoints for both saturation and relative permeability. They continued to assess the impact of geochemical reactions on CO_2 storage via three-phase reactive transport models of FWU, and worked on column experiments, including data analysis, of CO_2 intrusion into the overlying groundwater aquifer. Development continued of an optimization framework to co-optimize CO_2-EOR performance and CO_2 storage in FWU, as well as project NPV, in a 20- year forecasting period. A generic reactive transport model for CO_2 injection into a sandstone reservoir was adapted and modified for TOUGHREACT, to test the impact of RP-CP parameters on dissolution and mineral trapping predictions. Researchers continued work on grid conversion software that will allow for code comparisons, targeting ECLPSE, CMG, TOUGH2, and STOMP. In *7.4, Risk Assessment*, researchers worked on a plan to deal with geomechanical rock failure due to CO_2 injection as a result of pore pressure increase and/or chemomechanical changes in the caprock, using RROM-GEN. Researchers worked on the new set of FWU reservoir category simulations with NRAP-IAM-CS. To simulate geomechanical effects associated with CO_2 exposure, rock samples were assessed to determine the best option for initial testing using analogous rock types compared to reservoir rocks. A study on vertical CO_2 intrusion into caprock was carried out with TOUGHREACT, and assessment continued via FWU three-phase reactive transport models of the impact of geochemical reactions on CO_2 storage.

Task 8–Project Administration and Oversight: Several field trips were made to the FWU. The BP4 Continuation was approved and BP4 began on January 1, 2019. The Annual SWP Meeting was held in Allen, Texas.