

## **Southwest Regional Partnership on Carbon Sequestration**

### Quarterly Progress Report

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Reid Grigg, PI, Brian McPherson, PI, and Robert Lee, Project Manager

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

## **Table of Contents**

<b>Table of Contents .....</b>	<b>2</b>
<b>List of Figures and Tables.....</b>	<b>3</b>
<b>Executive Summary .....</b>	<b>4</b>
<b>TASK 1 Regional Characterization .....</b>	<b>5</b>
Task 1.4 Continued Assessment .....	5
<b>TASK 2 Public Outreach and Education .....</b>	<b>13</b>
Subtask 2.2 Project Website .....	13
<b>TASK 6 Operational Monitoring and Modeling.....</b>	<b>14</b>
Subtask 6.1 Surface and Near-Surface Monitoring .....	14
Subtask 6.2 Subsurface Monitoring.....	19
Subtask 6.3 Seismic Activities.....	23
Subtask 6.4 Reservoir Modeling.....	28
Subtask 6.5 Risk Assessment.....	32
<b>TASK 8 Project Management and Oversight .....</b>	<b>38</b>
<b>Cost Status .....</b>	<b>43</b>
<b>Summary of Significant Accomplishments.....</b>	<b>50</b>
<b>Anticipated Delays .....</b>	<b>50</b>
<b>APPENDICES .....</b>	<b>50</b>

## List of Figures and Tables

Fig. 1. A map view of the CO <sub>2</sub> surface flux measurement locations.....	15
Fig. 2. Summary of relative permeability curves for brine and CO <sub>2</sub> at three TDS (total dissolved solid) concentrations. ....	22
Fig. 3. Merging of VSP and crosswell data at FWU 13-10. ....	24
Fig. 4. Crosswell tomography data. ....	25
Fig. 5. VSP data through FWU 13-14 and FWU 14-01.....	26
Fig. 6. Predicted saturation of CO <sub>2</sub> in the Morrow Sandstone in the Farnsworth Unit after 1 year of injection at a rate of 1 kg/s. ....	29
Fig. 7. Predicted saturation of CO <sub>2</sub> in the Morrow Sandstone in the Farnsworth Unit after 10 years of injection at a rate of 1 kg/s. ....	30
Fig. 8. Horsetail plots for net CO <sub>2</sub> injection and cumulative oil production. ....	36
Fig. 9. Statistical analysis of accumulative CO <sub>2</sub> injection and oil production with the fifth, 50 <sup>th</sup> , and 95 <sup>th</sup> percentiles. ....	36
Fig. 10. PID for the Farnsworth Unit injection project.....	37
Fig. 11. PID for geomechanics/CO <sub>2</sub> leakage at the FWU.....	38
Table 1. Types and Total Number of Samples and Analyses for the FWU Well 32-8 Core.....	5
Table 2. CO <sub>2</sub> Surface Flux Data .....	16
Table 3. Summary of CO <sub>2</sub> Injection .....	20
Table 4. Water Sample Analyses.....	21
Table 5. Independent Uncertainty Parameters and Dependent Variables for the Farnsworth Site .....	34
Table 6. Project Budget and Expenditures for the Quarter October 1–December 31, 2014.....	44
Table 7. Milestone Plan Status .....	45

## Executive Summary

*Task 1–Regional Characterization:* Work continued on inputting bottomhole temperature data for the statewide Arbuckle Formation database of deep wells in Oklahoma. A core review on the FWU 32-8 core was performed and researchers prepared a technical memo titled “Core Sampling and Analysis Plans for FWU 32-8,” documenting core sample depths and giving instructions for sampling and/or analysis. This memo represents SWP’s oversight of all core analysis and to ensure that data collected will support the larger simulation and risk assessment efforts. Other work progressed on background geological characterization, tectonic history, incised valley fluvial models, and petrography.

*Task 2–Public Outreach and Education:* The project team completed and submitted the SWP section of the NETL Atlas (V). Maintenance of SWP-Velo software and user support continued.

*Task 6–Operational Monitoring and Modeling:* Gravity measurements at the Farnsworth Site were ongoing. Researchers evaluated the PHOENIX website for the database and data accessibility portal but SWP will continue to utilize HydroServe as the database for the MVA data. At the site, CO<sub>2</sub> soil flux measurements and water sampling continued. A CO<sub>2</sub> release analysis was concluded in this quarter to analyze the total CO<sub>2</sub> being released to the atmosphere at the FWU. Core studies found that permeability is controlled by the size of the pore throats and that their interconnectivity in the cores can have a significant effect on relative permeability. Researchers continued to work on fine-tuning gas sampling for the vapor-phase tracer program. A number of seismic activities began: background noise in the passive seismic data was further reduced. Researchers determined that it would not be possible to install downhole pressure and temperature data monitors in the FWU 32-06 due to extensive repair work necessary to plug leaks. By the end of the quarter, a rig was moved in and the FWU 32-04 well was prepared for the crosswell tomography survey to be conducted in January. Researchers characterized the natural seismicity in the FWU, and found no recorded cataloged earthquake within ~ 30 km radius from CO<sub>2</sub> injection Well 13-10A. A 3D seismic cube from the FWU was interpreted to identify large-scale faults in the reservoir and caprock system and to identify formation boundaries. Researchers continued to study key potential geomechanical processes in the Morrow sandstone formation and the associated effects on the CO<sub>2</sub> capacity and injectivity. Work on STOMP-EOR involved releasing the software to eight institutions. Other work included simulations of geochemical batch reactions in the overlying aquifers of the FWU EOR field for experimental design. Researchers studied the relative permeability curves used in STOMP-EOR, and capillary pressure functions in TOUGH2. The Risk Assessment team continued to work on the SACROC model with the CMG-GEM simulator to verify the proposed uncertainty quantification approach. Researchers conducted 1000 Monte Carlo simulations for CO<sub>2</sub>-EOR in a five-spot pattern to evaluate the rates of CO<sub>2</sub> and water injection, and oil and gas production. The process influence diagrams (PIDs) for the FWU were completed.

*Task 8–Project Management:* Key persons were assigned the lead in seeing tasks are completed and data reported for each major area. Protocol development for data managers to ensure proper inventory, accountability, and dissemination of project data progressed. Meetings and workshops were held, including the Annual SWP Review in Socorro, NM November 12–14. Researchers traveled to the FWU site to resolve problems in data collection. SWP continued to assess the deployment of gas phase tracers into several patterns at FWU. By the end of the quarter, January plans for seismic activities in the field were on schedule.