Plains CO_2 Reduction (PCOR) Partnership
Energy & Environmental Research Center (EERC)

BELL CREEK TEST SITE – FIRST 3-D VSP REPEAT SURVEYS COMPLETED

Plains CO_2 Reduction (PCOR) Partnership Phase III
Task 9 – Milestone M44

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BACKGROUND

The Plains CO_2 Reduction (PCOR) Partnership is one of seven Regional Carbon Sequestration Partnerships competitively awarded by the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) in 2003 as part of a national plan to mitigate greenhouse gas emissions. The PCOR Partnership is led by the Energy & Environmental Research Center (EERC) at the University of North Dakota and includes stakeholders from the public and private sectors. The PCOR Partnership region includes all or part of nine U.S. states and four Canadian provinces.

Phase III, the development phase, is a 10-year effort (2007–2017) that extends the characterization (Phase I) and validation (Phase II) phases. The Phase III efforts of the PCOR Partnership include two large-volume demonstration tests, one in Canada (the Ft. Nelson project) and one in the United States (the Bell Creek project). The demonstration tests focus on injecting carbon dioxide (CO_2) into deep geologic formations for CO_2 storage.

Many different aspects of carbon capture and storage (CCS) will be evaluated during the demonstrations, ranging from CO_2 capture, compression, and pipeline transport to injection, recycle, and monitoring, verification, and accounting.

FIRST 3-D VSP REPEAT SURVEYS COMPLETED

The first 3-D vertical seismic profile (VSP) repeat survey at the Bell Creek oil field was conducted from Saturday, March 1, 2014, through Tuesday, March 4, 2014. Data were collected from 83 shot points utilizing a 60-level retrievable geophone array deployed in the 05-06 OW well and a 50-level permanent geophone array installed in the 04-03 OW well.

The first repeat VSP acquisition was conducted to demonstrate that CO_2 is visible at the reservoir reflector in order to guide future monitoring efforts, including a potential subsequent repeat VSP survey and a repeat 3-D surface seismic survey.

Because of an unexpected incident that occurred during the first day of acquisition, the first full-repeat VSP survey was suspended indefinitely pending the results of seismic processing. In total, 83 of the anticipated 930 shot points were recorded. Should processing demonstrate the ability to image and or detect CO_2 at the reservoir level, a subsequent VSP acquisition (at either

the 04-03 OW well or both wells) would be evaluated. Timing of a subsequent survey is contingent on local landowner access, weather conditions, permit restrictions, and budget constraints, with July 2014 being a likely target. Evolving reservoir conditions due to active large-scale CO_2 injection necessitate that any additional VSP work be considered, acquired, and processed as a subsequent VSP repeat.