



Overview of the Bell Creek Combined CO₂ Storage and CO₂ EOR Project

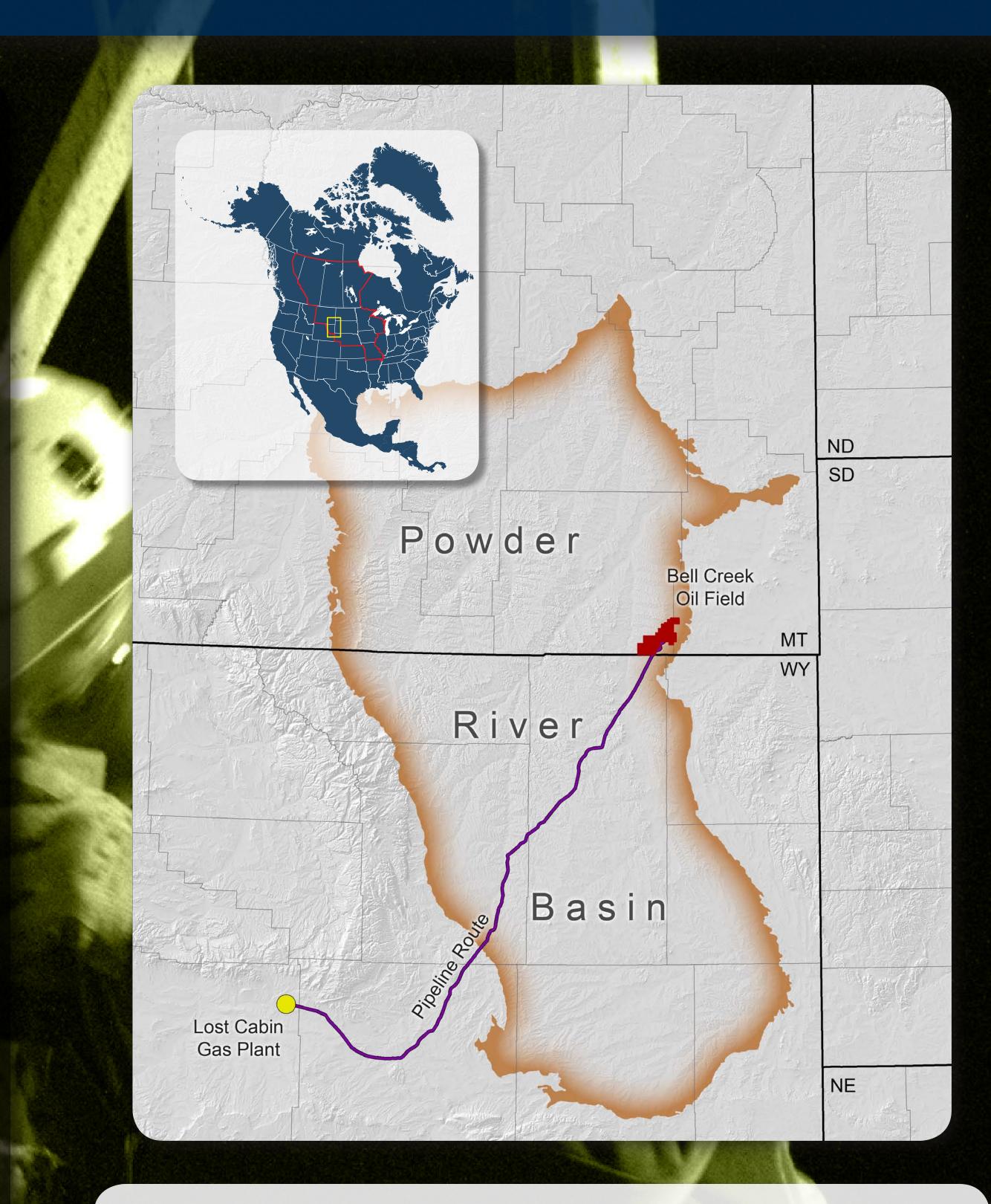


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he Plains CO₂ Reduction (PCOR) Partnership, led by the Energy & Environmental Research Center (EERC), is working with Denbury Onshore LLC (Denbury) to determine the effect of large-scale injection of carbon dioxide (CO_2) into a deep clastic reservoir for the purpose of simultaneous CO₂ enhanced oil recovery (EOR) and CO₂ storage at the Bell Creek oil field, which is owned and operated by Denbury. The CO₂ will be obtained from the ConocoPhillips-owned Lost Cabin gas-processing plant in Fremont County, Wyoming, which currently generates approximately 50 million cubic feet of CO_2 a day. The CO_2 will be transported 232 miles to the site via pipeline and injected into an oil-bearing sandstone reservoir in the Lower Cretaceous Muddy Formation (also known as the Newcastle formation) at a depth of approximately 4500 feet (1372 meters). The Muddy Formation within the boundaries of the Bell Creek oil field is characterized by high permeability (425–1175 mD) and high porosity (25%–35%), with reservoir pressures and temperatures that will maintain injected CO₂ in a supercritical state and are near conditions required for miscibility of CO₂ in the oil. The activities at Bell Creek will inject an estimated 1.1 million tons of CO₂ annually, most of which will be permanently stored.

In order to meet both PCOR Partnership and Denbury project objectives, a new observation well was drilled between injection and production wells in the portion of the field that will first undergo CO₂ EOR operations slated to begin early in 2013. The positioning of the well allowed for the collection of a modern robust data set to enhance ongoing geologic characterization activities and will provide access for a downhole monitoring program that will not interfere with oil field operations.



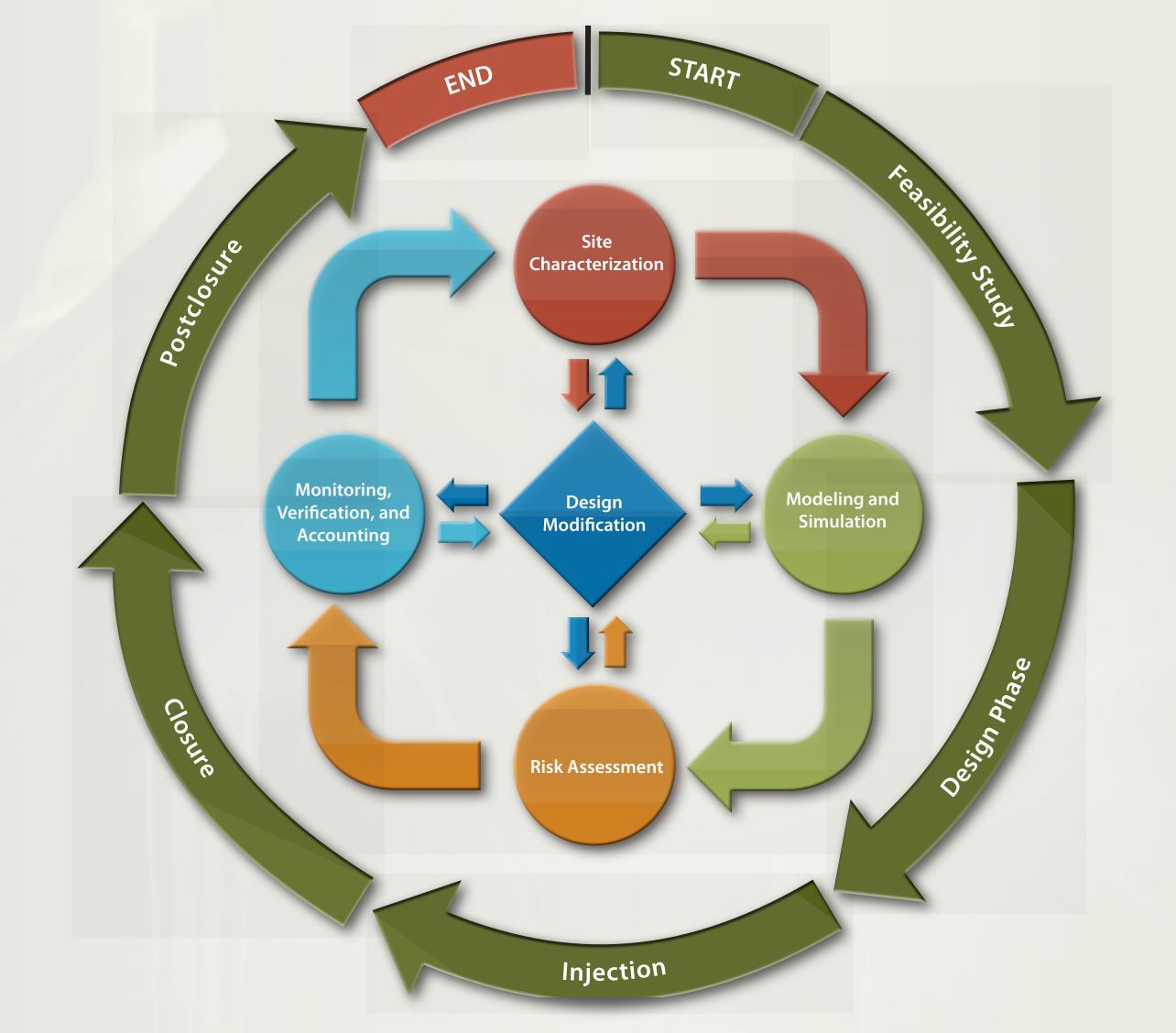


PDM equipment consisting of three casing-conveyed pressure and temperature gauges and a fiber optic distributed temperature system along the length of the wellbore was installed in the new observation well. The pressure and temperature gauges, connected to a capillary line, were mounted to the outside of the well casing along with a directional perforating charge. Once the system was cemented in place, a hydraulic firing head was activated to fire the perforating charge, opening a pathway through the capillary line, the cement sheath, and into the formation without damaging the integrity of the casing.





The PCOR Partnership has developed an approach that integrates site characterization; modeling and simulation; risk assessment; and monitoring, verification, and accounting (MVA) into an iterative process to produce meaningful results for large-scale CO_2 storage projects. Denbury will carry out the injection and production operations in a phased approach initiating in the Phase 1 area, while the EERC will provide support for the site characterization, modeling, simulation, and risk assessment and will aid in the development of an MVA plan to address CO_2 migration risks, mitigation strategies, and the ultimate fate of injected CO_2 .



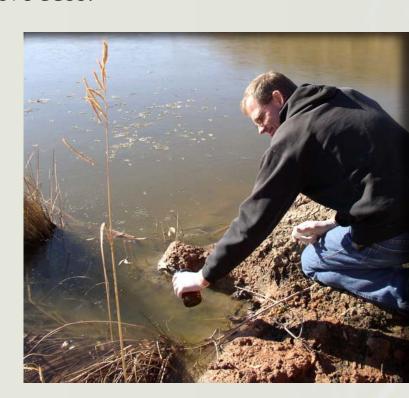
Seismic Acquisition

Seismic source testing completed November 2011.
 Collection of nearly 31 mi² of 3-D seismic data planned for fall of 2012

• After injection begins, targeted periodic time-lapse seismic surveys may be collected to track reservoir changes and subsurface CO₂ migration. The results will be used to compare, update, and tie simulation results to the real-world physics of injection.



Monitoring of the surface, near-surface, and deep subsurface environment is an essential component of any carbon storage project. The purpose of surface and near-surface monitoring is twofold: 1) to establish preinjection conditions for naturally occurring CO₂ levels in surface water, soil, and shallow groundwater aquifers in the vicinity of the carbon storage formation and 2) to provide a source of data to show that surface and near-surface environments remain unaffected by the injection process.

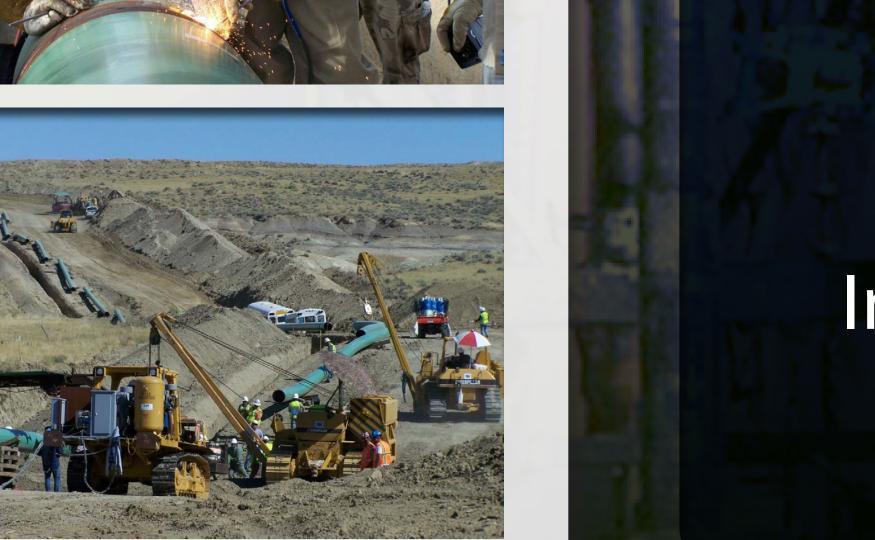




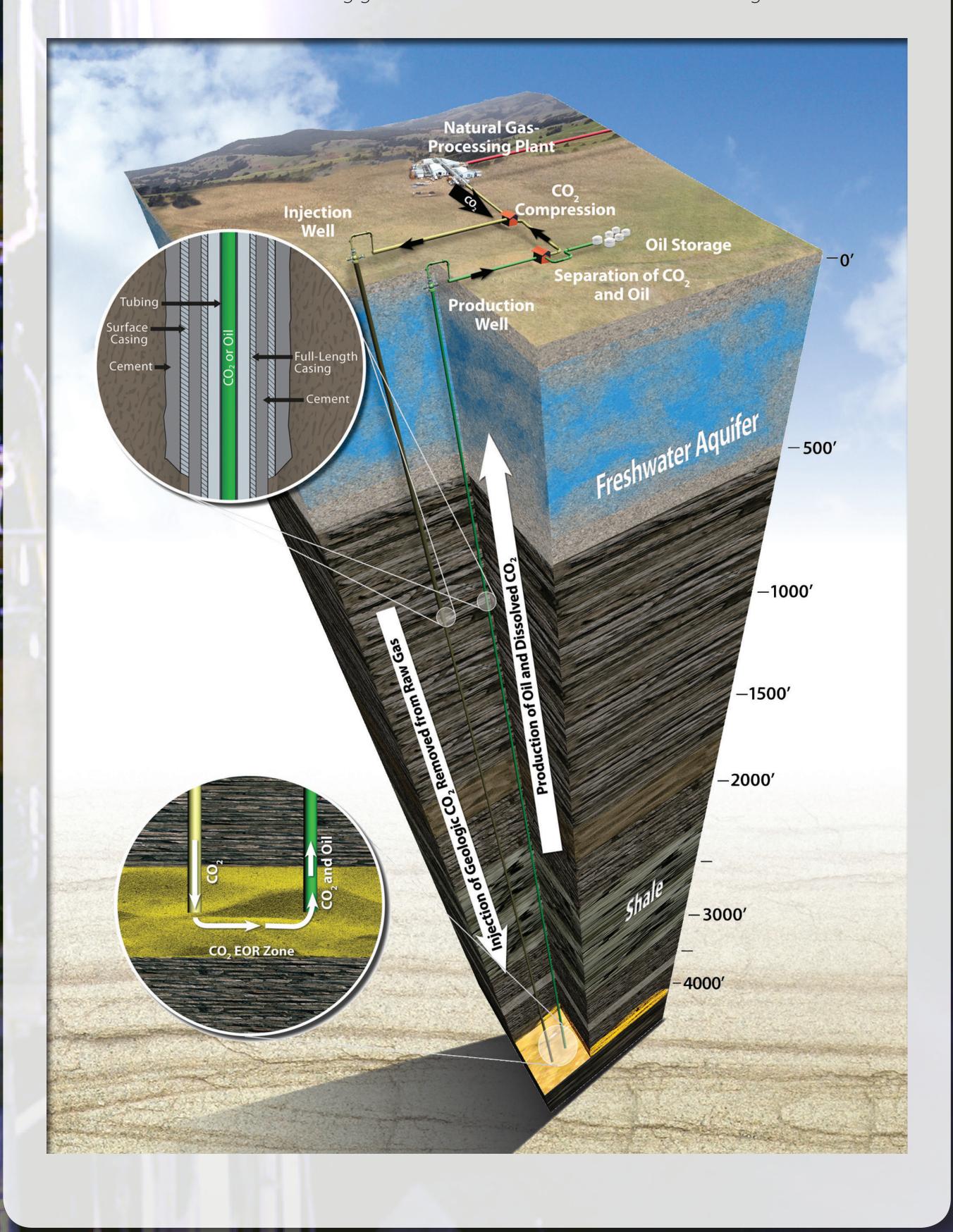
Construction of the 232-mile, 20-inch diameter Greencore pipeline under way with completion expected by December 2012.







Wells are engineered to protect precious groundwater resources whether for CO₂ injection or oil products. Production and injection well construction is governed by state and federal regulations. Three layers of steel (casing and tubing) and two layers of durable, long-lasting cement separate the contents from the surrounding groundwater in accordance with Montana regulations.



Bell Creek Project Benefits...

35 million barrels
of Incremental Oil
Inject > 1 million tons
of CO₂/year