REDTRAILENERGY CCS PROJECT

RESULTS OF THE MARCH 2019 GEOPHYSICAL SURVEY NEAR RICHARDTON, NORTH DAKOTA

INTEGRATED CARBON CAPTURE AND STORAGE FOR NORTH DAKOTA ETHANOL PRODUCTION

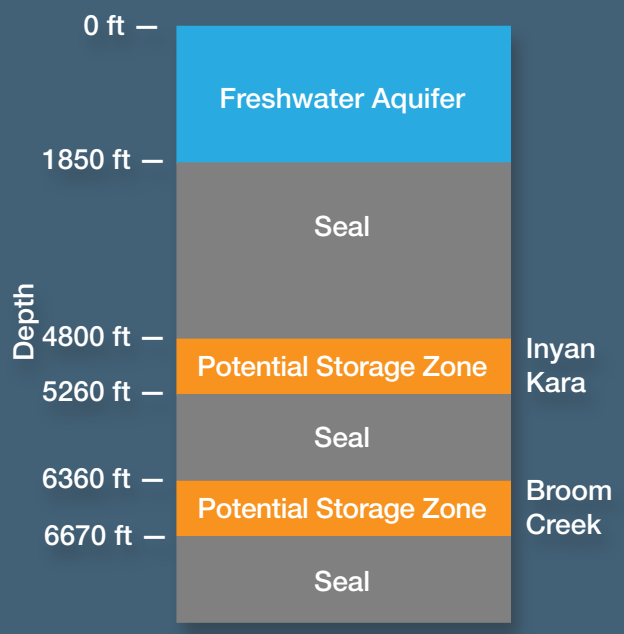
Over the period March 6–28, 2019, a field crew conducted an 8-mi^2 geophysical survey near Richardton, North Dakota, to learn about rock layers in the deep subsurface. The data gathering was part of the Red Trail Energy Carbon Capture and Storage (CCS) research effort, which is investigating the feasibility of safe, permanent, commercial-scale geologic storage for carbon dioxide integrated with ethanol production. The geologic information collected was assessed by engineers and scientists at the Energy & Environmental Research Center to help determine the potential for CO_2 storage in the area.

What Did We Learn?

The data from the geophysical survey helped evaluate the rock layers more than a mile below the surface.

Possible Injection Zones: The data show that one **potential storage zone (1)**, the Broom Creek Formation, lies at a depth of about 6400 feet, with an average thickness of 295 feet, and contains sand dune features that may be good CO_2 injection targets. A second **potential storage zone (2)**, the Inyan Kara Formation, lies at a depth of about 4800 feet, is roughly 410 feet thick, and contains several sand intervals that may be good injection targets.

Geologic Seals That Protect Drinking Water: The survey showed that impermeable rock formations make up 1200 feet of the layers between the potential CO_2 injection zones **(3)** that will act as a seal between the Broom Creek and the Inyan Kara Formations. The survey data also confirmed an additional ~3000 feet of impermeable rocks above the Inyan Kara **(4)** that will act as a seal between the CO_2 injection zone and the deepest freshwater aquifer.



How Are We Using the Survey Data?

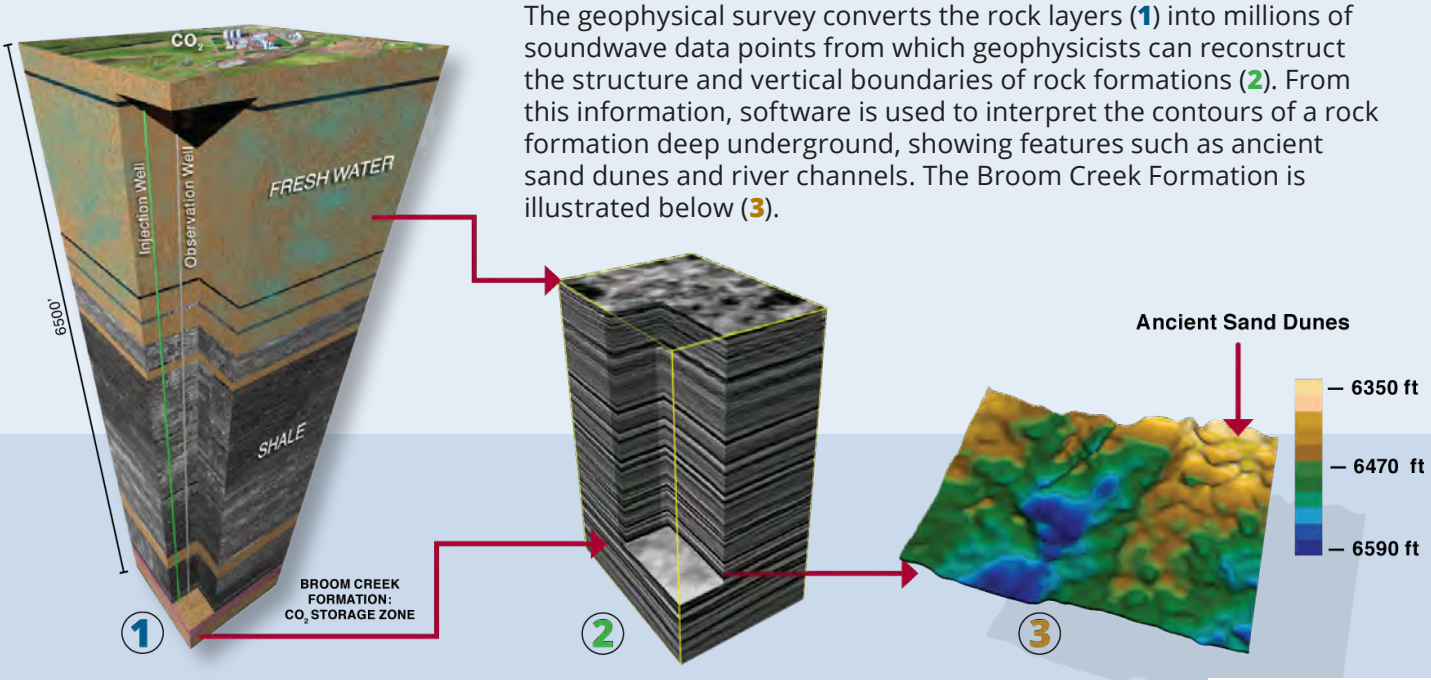
The survey data were incorporated into an existing 3-D computer model of the subsurface to improve its accuracy. The model is used to simulate movement of CO_2 in the storage zone, evaluate the suitability of the storage zone to contain CO_2, and determine the best location for a test well to learn more about the potential storage and seal rock layers. The information gained from the geophysical data will help with the state-required permit application for permanent geologic storage. Future geophysical surveys could be used to monitor and map injected CO_2 should a commercial CCS project begin operation.

What Are the Next Steps?

A community open house will share the geophysical survey results and future activities. The next phase of the project includes drilling a test well to collect rock and fluid samples from the two potential storage formations and to collect downhole data using established techniques. This information will help determine the best injection well location, select the best storage zone, and confirm that it will provide safe, permanent CO_2 storage.

TURNING SOUND WAVES INTO MODELS

The geophysical survey converts the rock layers (**1**) into millions of soundwave data points from which geophysicists can reconstruct the structure and vertical boundaries of rock formations (**2**). From this information, software is used to interpret the contours of a rock formation deep underground, showing features such as ancient sand dunes and river channels. The Broom Creek Formation is illustrated below (**3**).

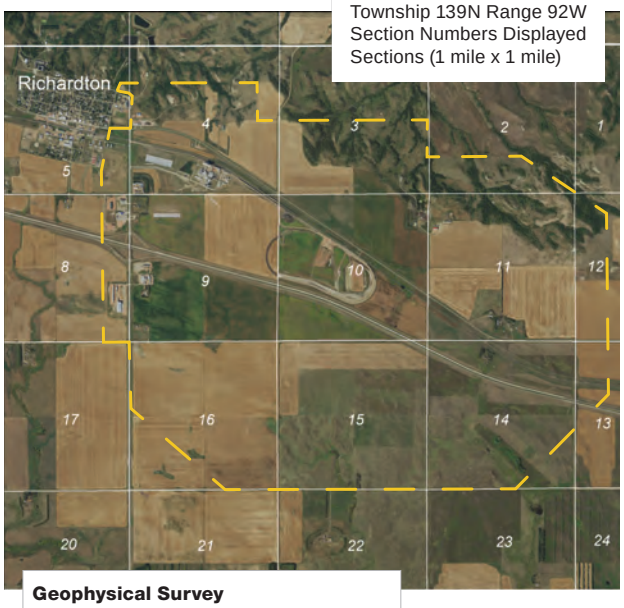


Vibroseis trucks generated vibrations every 165 feet along straight paths throughout the study area, avoiding buildings and infrastructure.

QUICK FACTS

- 23 Days
- 20 Man Crew
- 3600 SENSORS
- 8 square miles
- FOUR Vibroseis Trucks

A network of battery-powered sensors and Wi-Fi transmitters at 165-ft intervals collected data.



The ultimate goal of the ***Red Trail Energy Carbon Capture and Storage (RTE CCS) Project***, a multiphase research and development effort, is to create the first integrated CCS system in North Dakota. Led by the Energy & Environmental Research Center at the University of North Dakota, with support from Red Trail Energy, the Industrial Commission of North Dakota Renewable Energy Program, and the U.S. Department of Energy, technical partners in this research include Trimeric Corporation, Schlumberger Carbon Services, and Computer Modelling Group.

For More Information Contact:

Dustin Willett, Chief Operating Officer, RTE, dustin@redtrailenergy.com, (701) 974-3308
Nicole Massmann, Director of Communications, EERC, nmassmann@undeerc.org, (701) 777-5428

Learn more at https://undeerc.org/RedTrailEnergy/

© 2019 University of North Dakota Energy & Environmental Research Center