



NORTH DAKOTA  
CarbonSAFE

# ACTIVITY FAQs

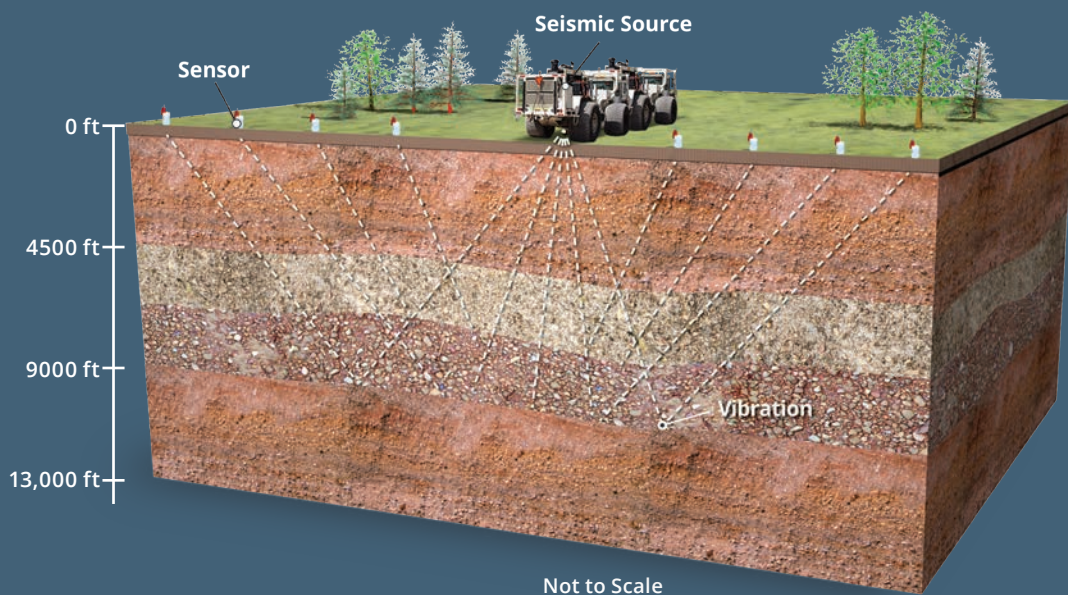
INVESTIGATING SAFE, PERMANENT GEOLOGIC STORAGE OF CO<sub>2</sub> IN NORTH DAKOTA

## Geophysical Survey Source Test near Center, North Dakota

A geophysical survey conducted in September 2017 highlighted the need for a stronger seismic source. Therefore, in summer 2019, a field crew will conduct a geophysical survey source test near Center, North Dakota, to learn about rock layers in the deep subsurface. The test is part of the North Dakota CarbonSAFE project research effort, which is investigating the feasibility of developing safe, permanent, commercial-scale geologic storage for carbon dioxide. The information collected will be assessed by engineers and scientists at the Energy & Environmental Research Center (EERC) and project partners to help determine the potential for permanent CO<sub>2</sub> storage in the area.

### What Is a Geophysical Survey?

A device called a seismic source generates vibrations that travel deep into the earth and are reflected back to the surface. Sensors at the surface record the reflected vibration. Geophysicists decipher these signals to learn about the subsurface rock layers. Frequently, the seismic source is a truck that creates vibrations using a metal plate pressed to the ground and shaken side to side. Deeply buried explosives, such as dynamite, can also create the low-level vibrations needed for a geophysical survey. Both sources will be used in this survey to compare the techniques.



Geophysical surveys are a common data collection tool and have been used in every county in western North Dakota.

### What Is the Benefit of the Survey?

The comparison testing of seismic sources will help determine what type of source will generate adequate vibrations for any future geophysical surveys to be conducted in areas previously mined for coal to evaluate rock layers over 9000 feet below the surface.

### What Is the Community Impact?

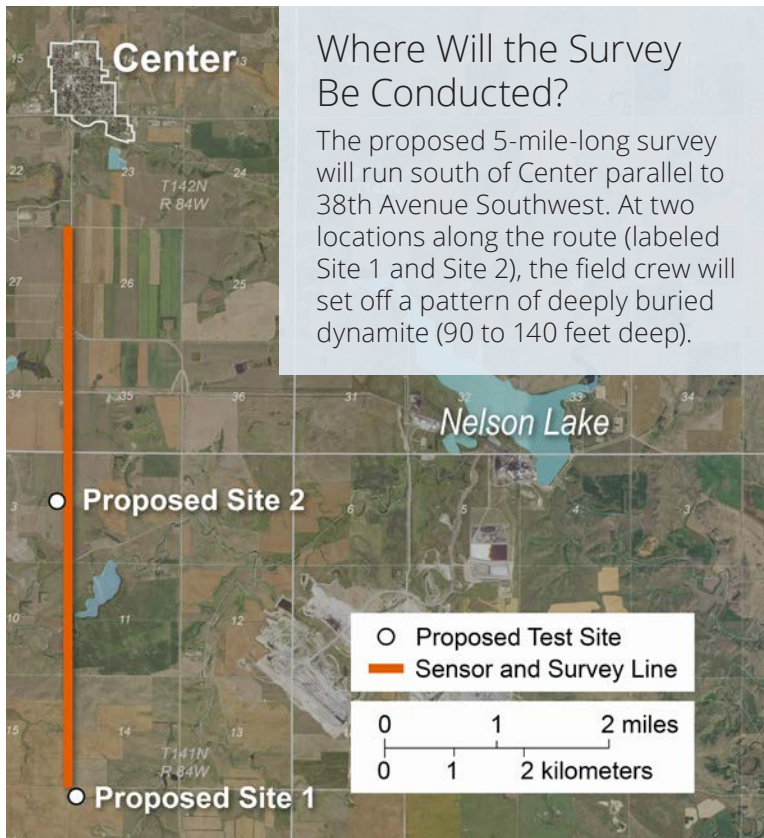
Safety and courtesy are top priorities during this survey. A low-level noise similar to that of a passing truck will be generated at each location from the vibrating truck-mounted plates. A person standing 100 feet from the source will not feel ground vibration. The buried explosive testing taking place at two controlled-access sites will not be felt by the public. Care will be taken to avoid or minimize any environmental impacts and maintain normal traffic flow. The work will be carried out under a permit issued by the North Dakota Industrial Commission.

## What Do Landowners Need to Know?

Project partners Minnkota Power Cooperative, Inc. (Minnkota) and BNI Energy recognize the impact of survey work during the growing season and will contact landowners before the survey work to request permission to place a line of sensors on their land for 7 to 10 days. The sensors are pressed into the ground by hand 150 feet apart by a field crew walking and driving ATVs. The sensors will remain in place until the survey is complete. Vibroseis trucks will travel along the section line near the sensors. The line of testing avoids buildings and other infrastructure, such as water wells and pipelines. Once survey work is complete, project partners will fully reclaim holes used for survey charges. Minnkota and BNI Energy will work with landowners to minimize inconveniences and address concerns.

## Where Will the Survey Be Conducted?

The proposed 5-mile-long survey will run south of Center parallel to 38th Avenue Southwest. At two locations along the route (labeled Site 1 and Site 2), the field crew will set off a pattern of deeply buried dynamite (90 to 140 feet deep).



## How Will the Survey Be Carried Out?

The test involves a 5-mile line of vibrational sensors and two source trucks (called vibroseis trucks). The survey crew drives the vibroseis trucks along the line, stopping every 300 feet to vibrate the ground for 1–2 minutes. The trucks will not vibrate the ground within 300 feet of buildings and other infrastructure. At two points along the line, eight holes drilled from 90 to 140 feet deep will be loaded with explosive charges manufactured for geophysical work. When conditions are safe and clear, the charges will be detonated one by one to test the effect of charge size and depth.



*Vibroseis trucks will follow the section line, stopping to generate vibrations every 300 feet, avoiding buildings and infrastructure.*



*Example of a sensor location showing the sensor, battery pack, and WiFi transmitter at a similar geophysical survey in Montana.*

## What Are the Next Steps?

Based on funding, the next phase of the North Dakota CarbonSAFE project will include additional geophysical survey work and other in-depth characterization of the deep geologic storage zone and overlying sealing formations. Based on the results of the source test, a 3-D geophysical survey may be conducted in late fall 2019. The final report for the current project phase will be available in late 2019.

**The North Dakota CarbonSAFE project** is determining the feasibility of safe, permanent, geologic storage of carbon dioxide. Led by the EERC at the University of North Dakota, partners include the U.S. Department of Energy, the North Dakota Industrial Commission's Lignite Research Program, Basin Electric Power Cooperative, Minnkota Power Cooperative, ALLETE Clean Energy, BNI Energy, and the North American Coal Corporation.

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