



EERCSM



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NORTH DAKOTA[®]



Critical Challenges. Practical Solutions.



Energy & Environmental Research Center (EERC)

Roughrider Carbon Storage Hub (DE-FE0032282)

U.S. Department of Energy

2024 Office of Fossil Energy and Carbon Management/National Energy Technology Laboratory

Carbon Management Research Project Review Meeting

August 6, 2024

Wes Peck

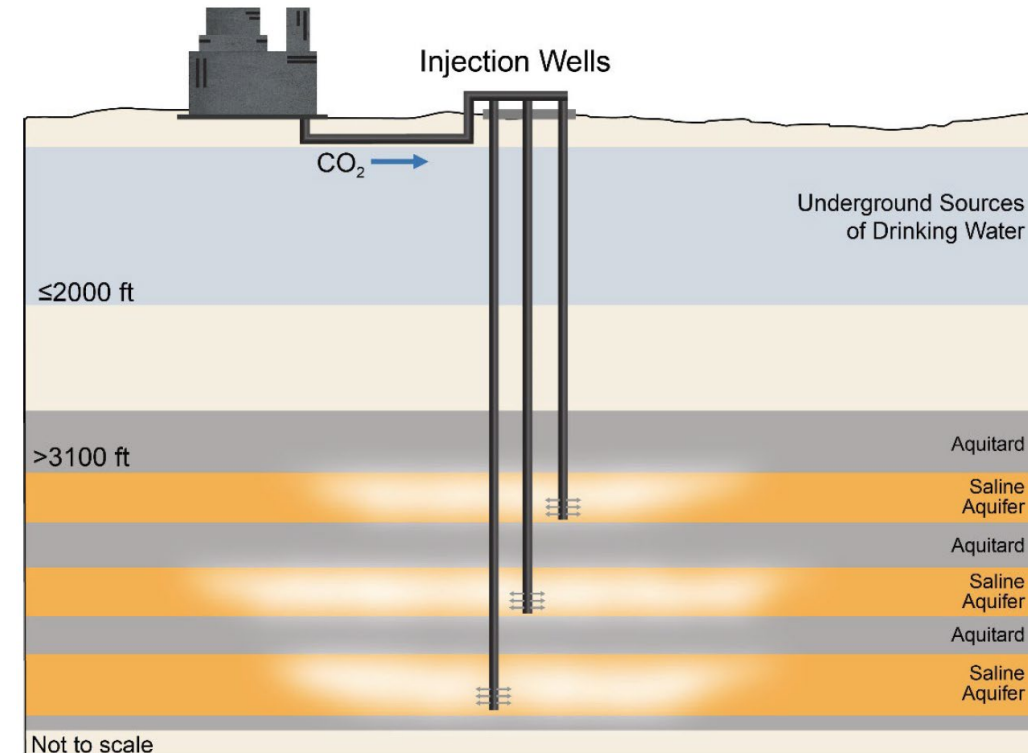
Energy & Environmental Research Center

Project Summary

- 2-year project.
- Investigate the feasibility of developing a commercial-scale CO₂ geologic storage hub in McKenzie County, North Dakota.
- Take CO₂ captured and aggregated from multiple distributed small-volume gas-processing facilities and a large planned gas-to-liquids facility.
- Stacked storage approach (multiple geologic formations).

Funding	DOE	Cost Share	Project Total
Dollars (MM)	\$9.00	\$7.55	\$16.55
Contribution	55%	45%	100%

- Performance dates:
 - Budget Period 1:
October 2023 – September 2025



Project Partners



Lead Organizations

- ONEOK
- Energy & Environmental Research Center
– (CarbonSAFE Phase II)

Project Partners

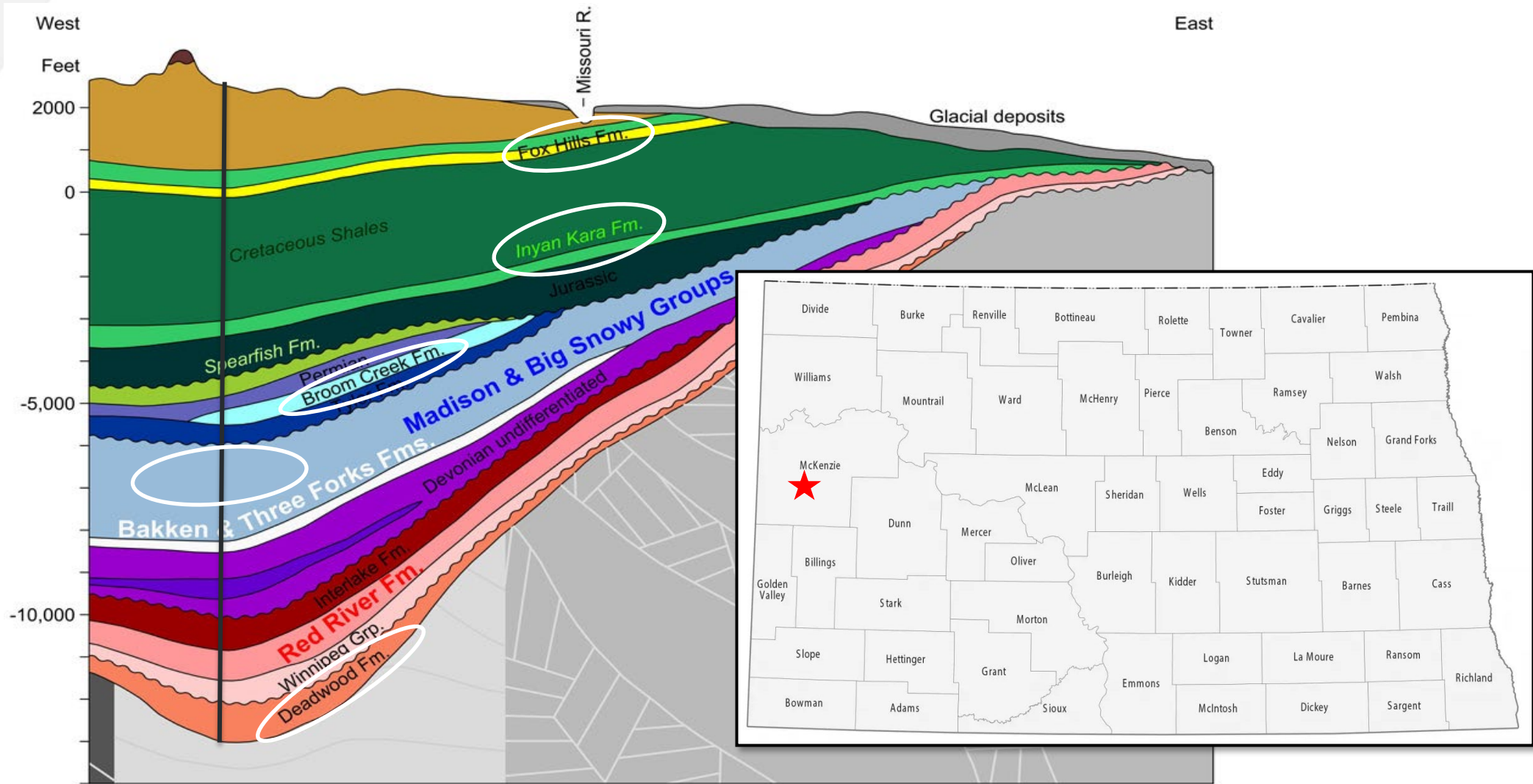
- North Dakota Oil & Gas Research Program
- U.S. Department of Energy
- Naset Consulting

Project Task Structure

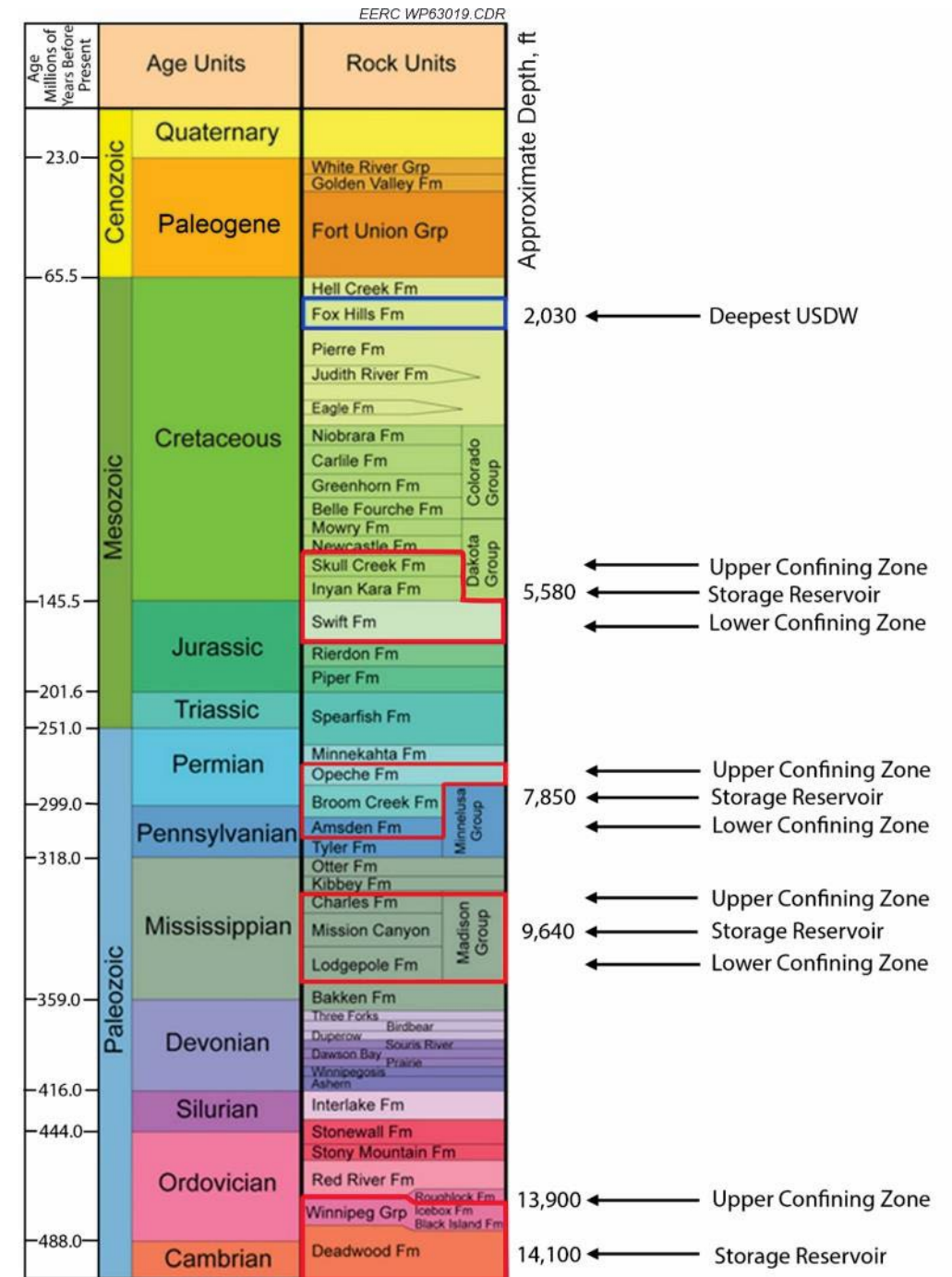
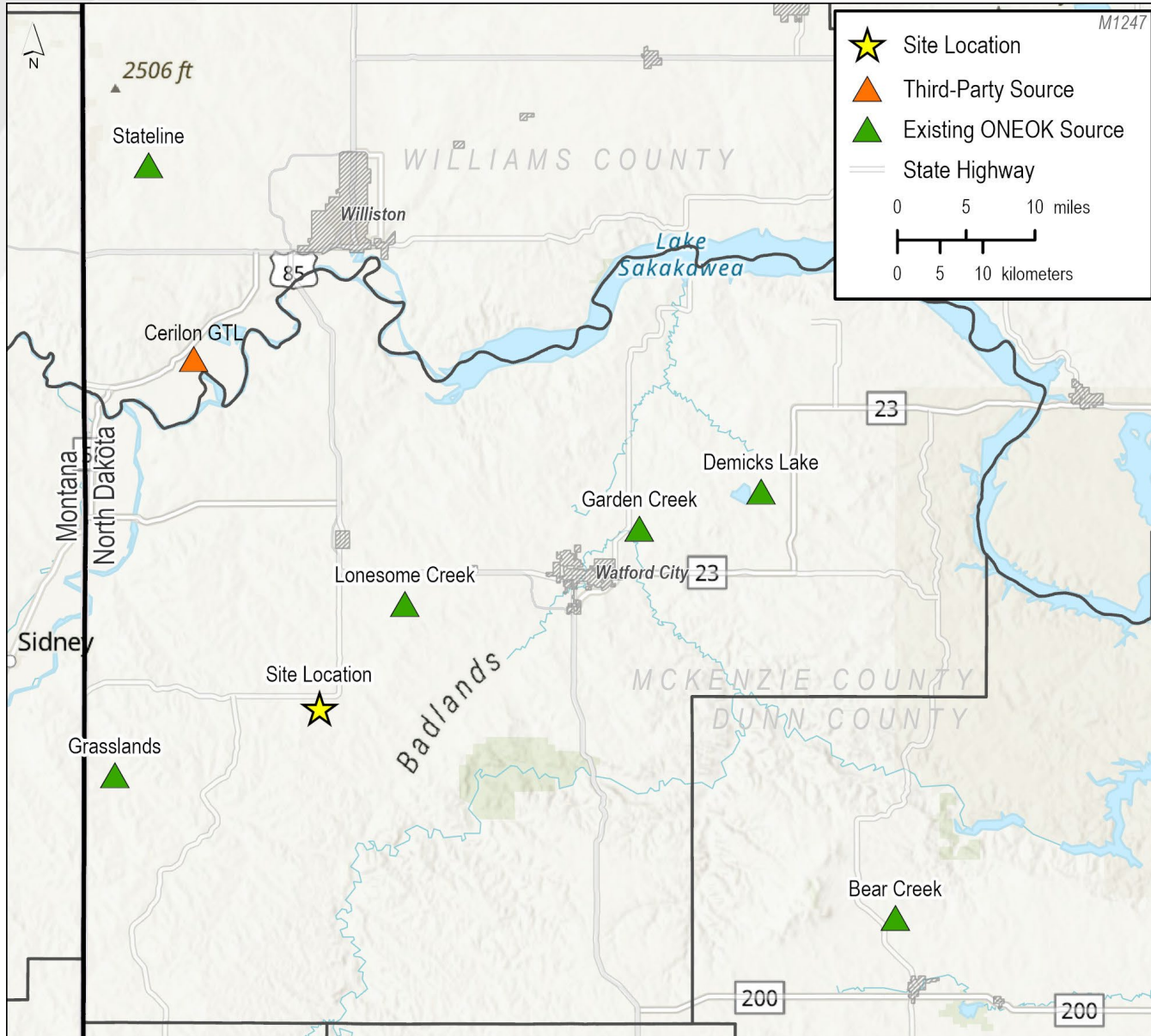
- Task 1: Project Management
- Task 2: Community Benefits Plan
- Task 3: Storage Complex Characterization
- Task 4: Geologic Modeling and Simulation
- Task 5: Technical and Economic Analysis
- Task 6: Site Development Plan



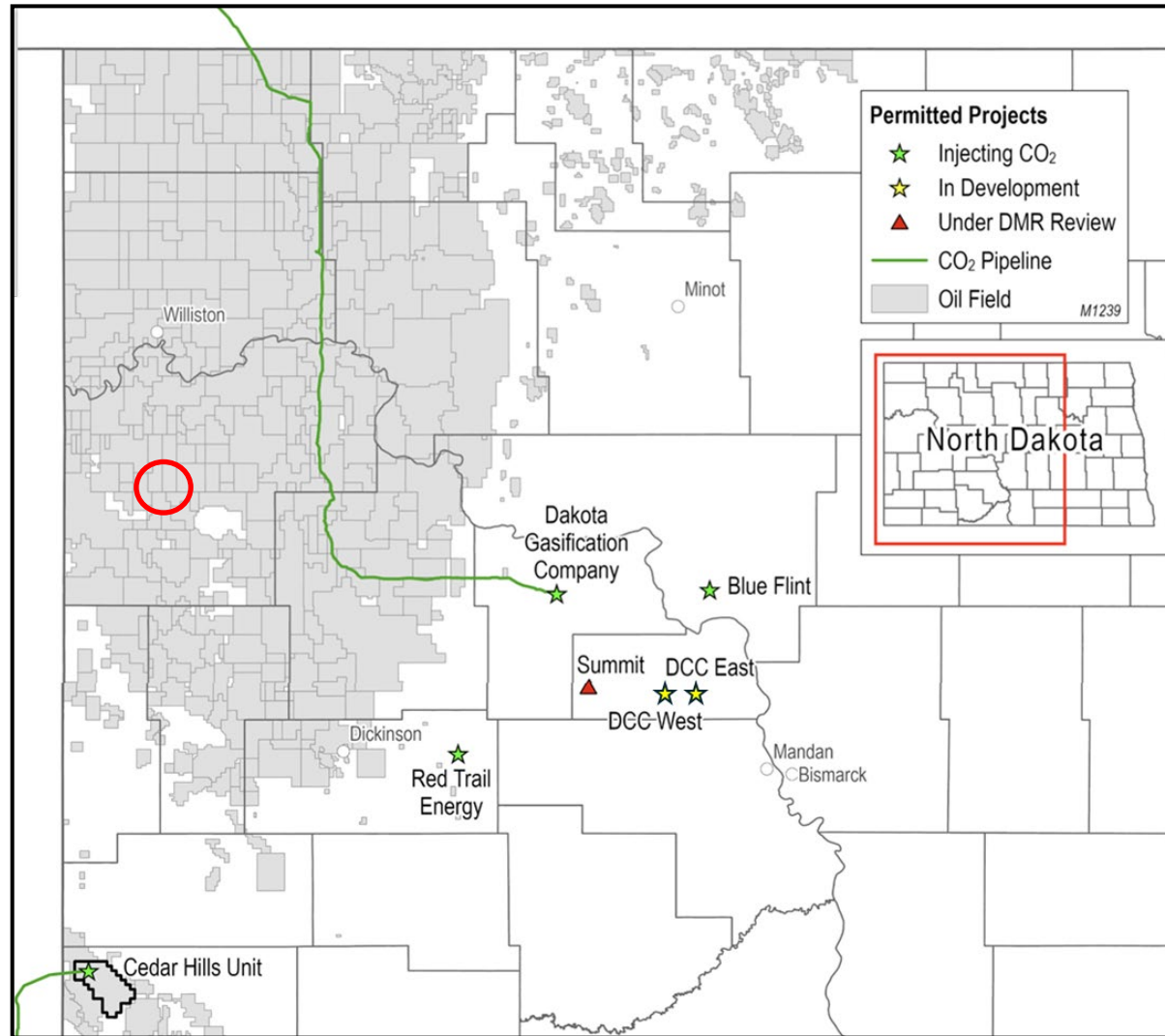
Project Location



Project Summary



New Challenges



Stratigraphic Test Well

- Characterize up to four prospective CO₂ storage complexes (storage targets and associated confining zones) within the area of interest (AOI).
 - Recover and analyze up to 1000 feet of core.
 - Drillstem tests in the prospective horizons.
 - Broad suit of geophysical logs collected.
 - Evaluate and model geologic CO₂ storage performance.
- Drill to the pre-Cambrian basement, i.e., the full stratigraphic depth of the Williston Basin.

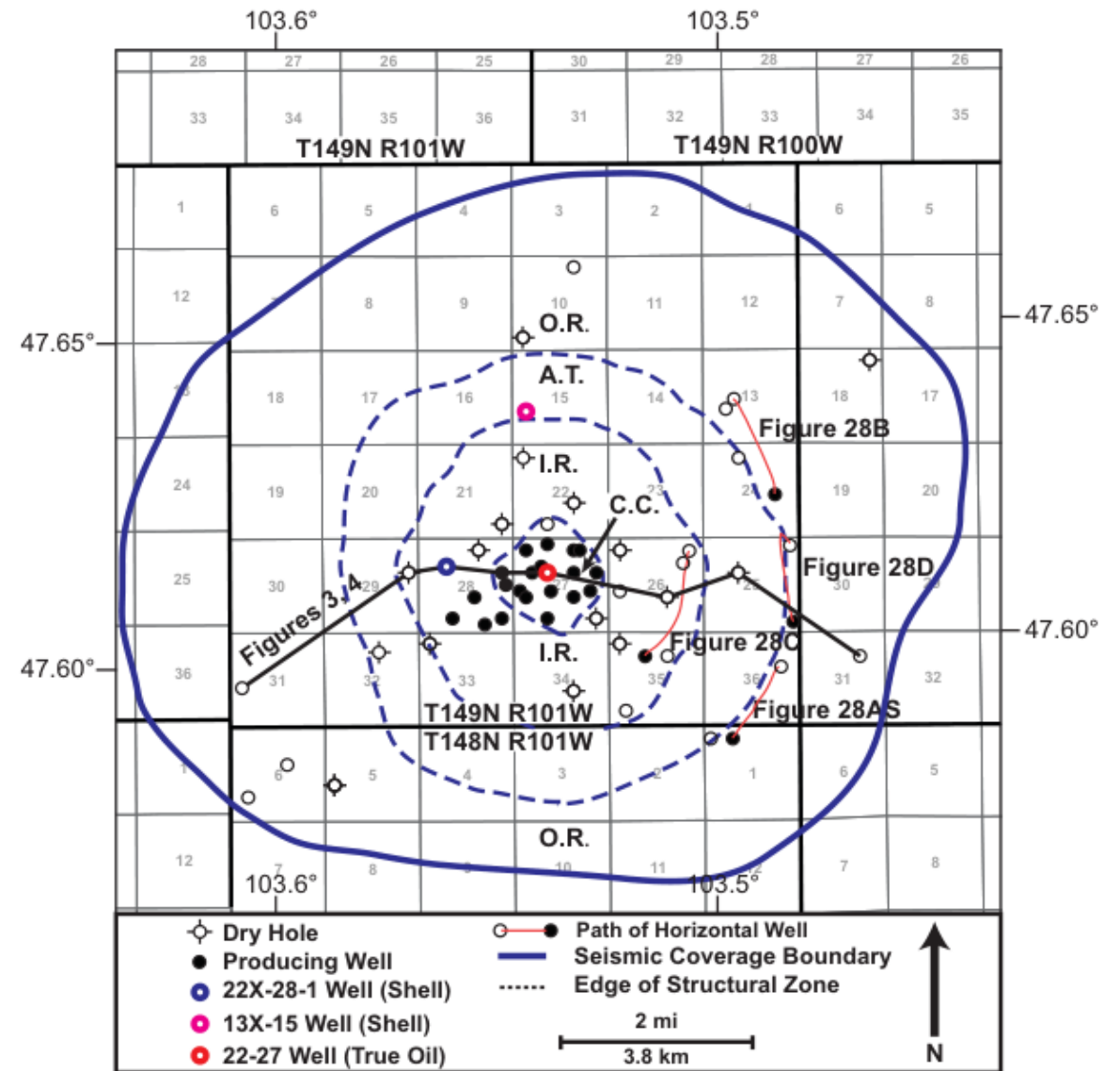


Modeling and Simulation

- **Target formations**
 - Inyan Kara
 - Broom Creek
 - Mission Canyon
 - Deadwood
- **Geologic modeling and simulation occurring over two rounds**
 - Existing regional data
 - ◆ Well logs, literature, other projects
 - New site-specific data
 - ◆ Test well, licensed 2D/3D seismic
- **Objectives (big picture)**
 - Modeling
 - ◆ Prepare geologic model suitable for numerical simulation.
 - ◆ Estimate storage resource potential.
 - ◆ Assess heterogeneity.
 - ◆ Identify data gaps.
 - Simulation
 - ◆ Assess injectivity of up to 50 Mt CO₂ over 20 and 30 years into targets.
 - ◆ Estimate CO₂ and pressure plume size.
 - ◆ Delineate key design parameters.
 - ◆ Identify data gaps.

Modeling and Simulation

- Potential conflicting subsurface activities include saltwater disposal (Inyan Kara and Broom Creek) and oil and gas production (Mission Canyon and Deadwood).
- AOI includes the Red Wing Creek impact crater that complicates structural modeling.



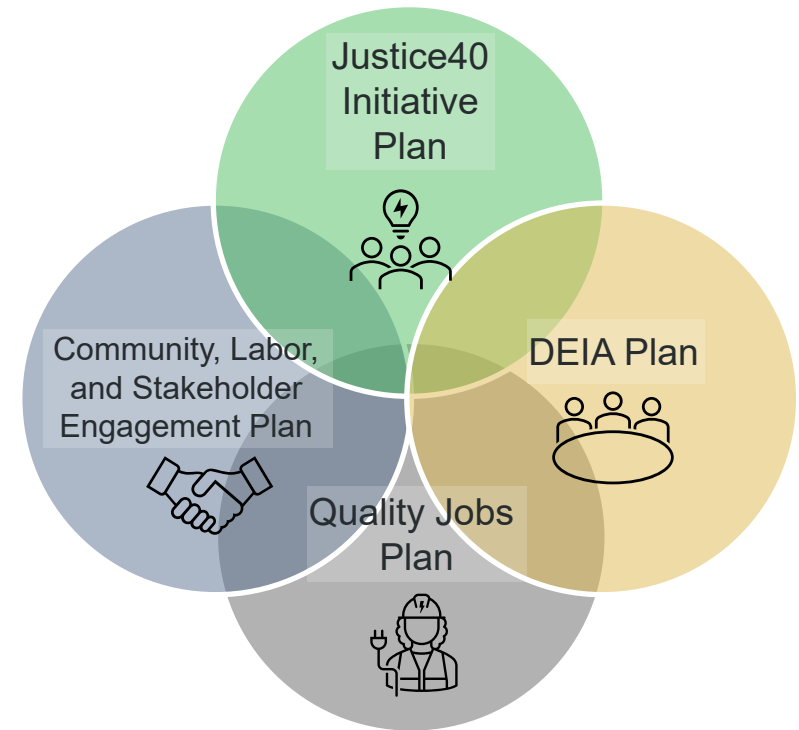
Herber et al. (2022)

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COMMUNITY BENEFIT PLAN

OUR GOAL:

Develop trustworthy messaging to enhance community relationships and foster neutral-to-positive attitudes toward the Roughrider CarbonSAFE project.

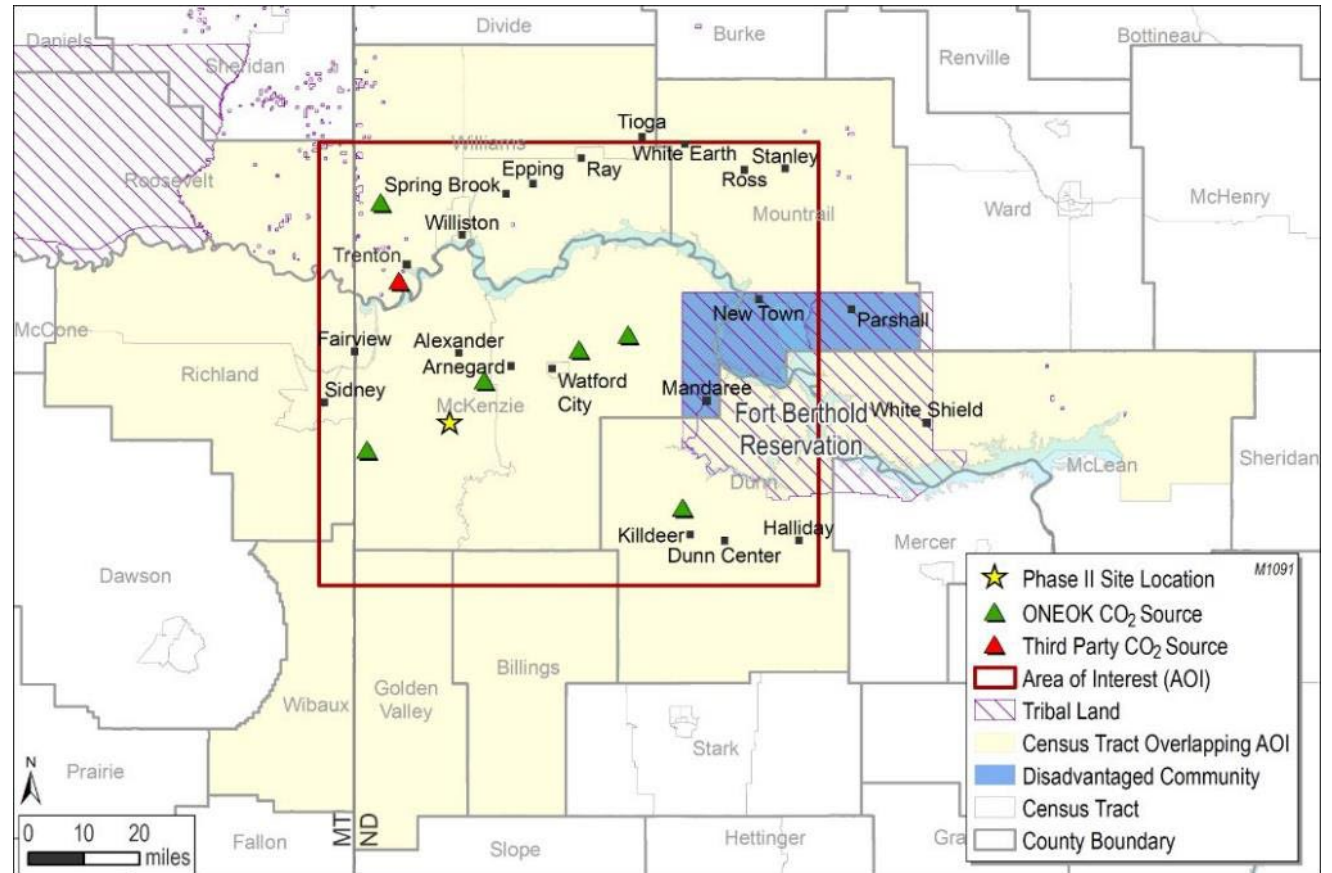


- Be factual and objective.
- Serve our partners' best interests.
- Maintain courtesy to and respect for the stakeholders and community.
- Provide transparent and proactive communication.
- Ensure consistent use of key messages.

Community Benefits Program (CBP) Overview

Roughrider CarbonSAFE Phase II CBP helps ensure broadly shared prosperity in the clean energy transition through a set of four core policy priorities:

- Engaging communities and labor
- Investing in America's workforce
- Advancing DEIA
- Implementing Justice40





Engagement

Advisory Group

- Monthly meetings

Community Open Event and Fact Sheets

- Feasibility project overview
- Stratigraphic test well drilling

Institutional Review Board – Human Subjects Research

Virtual Listening Sessions

- Commercial sponsor employees
- Area emergency responders

Public Opinion Survey

- Every Door Direct Mail invitation
- First-quarter 2025

Drilling FAQs
SUBSURFACE GEOLOGIC STUDY IN

The Roughrider Carbon Storage Hub research project is investigating the feasibility of permanent geologic storage of carbon dioxide to manage CO₂ emissions from North Dakota gas-processing plants.

WHAT IS HAPPENING?
As part of the project, cylindrical rock samples, and geologic data will be collected from an exploratory hole drilled in western McKenzie County, North Dakota. This work is slated to begin in autumn 2024.

This research activity will help inform whether deep rock formations—ranging from approximately 1-3 miles underground in this part of McKenzie County—could safely and permanently store CO₂.

The Roughrider Carbon Storage Hub
A FEASIBILITY STUDY EXPLORING PERMANENT CO₂ STORAGE

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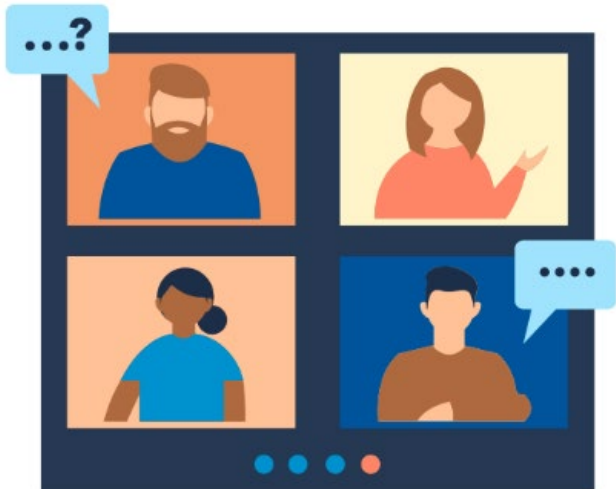
BENEFIT TO NORTH DAKOTA
This research is part of an ongoing effort to ensure clean, affordable energy and the wise use of North Dakota's resources.

DEEP UNDERGROUND
A primary activity of this feasibility study is to drill into four geologic layers to collect rock samples (cores). These layers, called formations, along with their names and depth underground are shown at right. The shallowest layer to be investigated is more than a mile underground.

INVESTIGATION
The project will collect rock samples from the formations, the shallowest of which is more than a mile underground.

Best of the West RIBFEST
WATTFORD CITY NORTH DAKOTA

AL CHALLENGES | PRACTICAL SOLUTIONS



A background image showing a group of students in a science laboratory. They are seated at a table with various glassware, including beakers and test tubes, and are focused on their work. The lighting is bright, and the atmosphere appears to be one of active learning and collaboration.

DEIA/STEM/Workforce Development Participation

- Nueta Hidatsa Sahnish College student career fair
- T4 (Tools Trades Torque Tech) student career event
- Native American cultural awareness learning opportunities (project team)
- North Dakota Petroleum Foundation teacher education seminar

Where Are We Today?

- Preparing to drill the 14,000-ft stratigraphic test well (mid-September).
- Ongoing CBP activities
- Acquiring legacy seismic data (2D and 3D)
- Building geologic models with legacy data running simulations (preliminary)





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UND NORTH DAKOTA

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A wide-angle photograph of a university campus during sunset. The sun is low on the horizon, casting a warm glow over the scene. In the foreground, there are large trees with some yellowing leaves. In the background, several multi-story brick buildings and a parking lot with many cars are visible under a clear sky.

THANK YOU

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