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Critical Challenges. Practical Solutions.



Energy & Environmental Research Center (EERC)

COAL CREEK CARBON CAPTURE: SITE CHARACTERIZATION AND PERMITTING (FE0032331)

2024 FECM/NETL Carbon Management Research Project
Review Meeting

David L. Lawrence Convention Center
Pittsburgh, Pennsylvania

August 5–9, 2024

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PROJECT OVERVIEW

Project Objective

- Characterize and permit a geologic CO₂ storage hub in central North Dakota to store up to 200 MMt of CO₂, which would contribute 10% of the 2 billion tonne CO₂ storage capacity goal of the CarbonSAFE Initiative Program.

Project Details

- Phase III project: \$47,109,239
 - DOE share: \$37,687,391
 - Cost share: \$9,421,848
- Period of performance:
 - 3 years, with two 18-month BPs
 - Start date: 10/1/2023

Project Partners



U.S. DEPARTMENT OF
ENERGY



NATIONAL
ENERGY
TECHNOLOGY
LABORATORY



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PROJECT SOURCES

- Proposed storage hub will aggregate CO₂ captured from 1200-MWe Coal Creek Station power plant and Blue Flint ethanol plant.
- Development of CCS at Coal Creek will result in a 19% CO₂ emissions reduction from North Dakota's stationary sources.



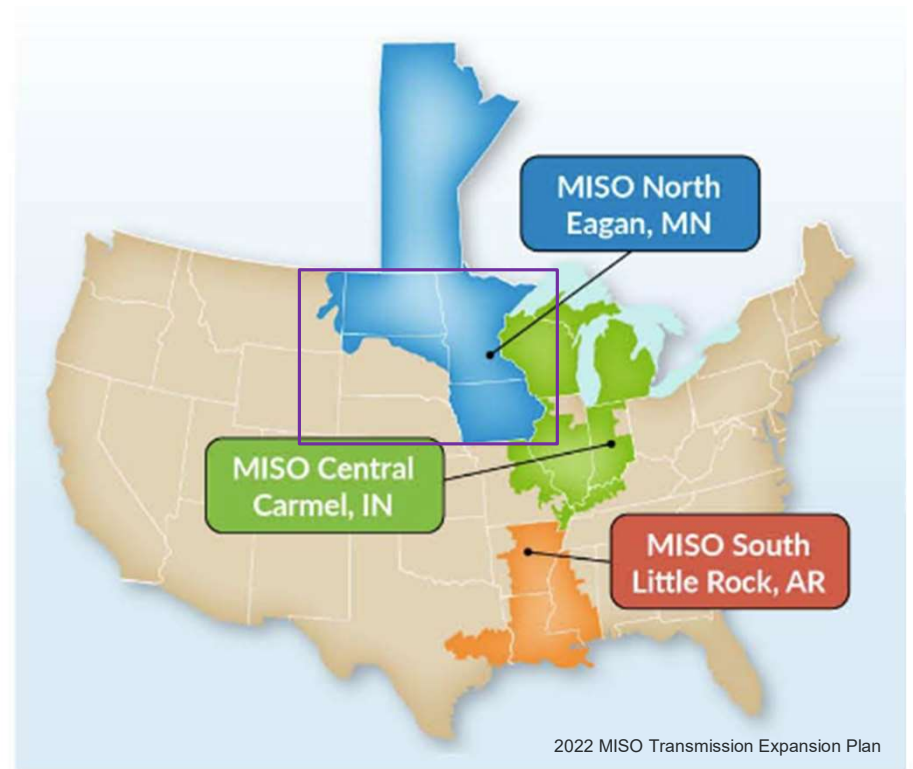
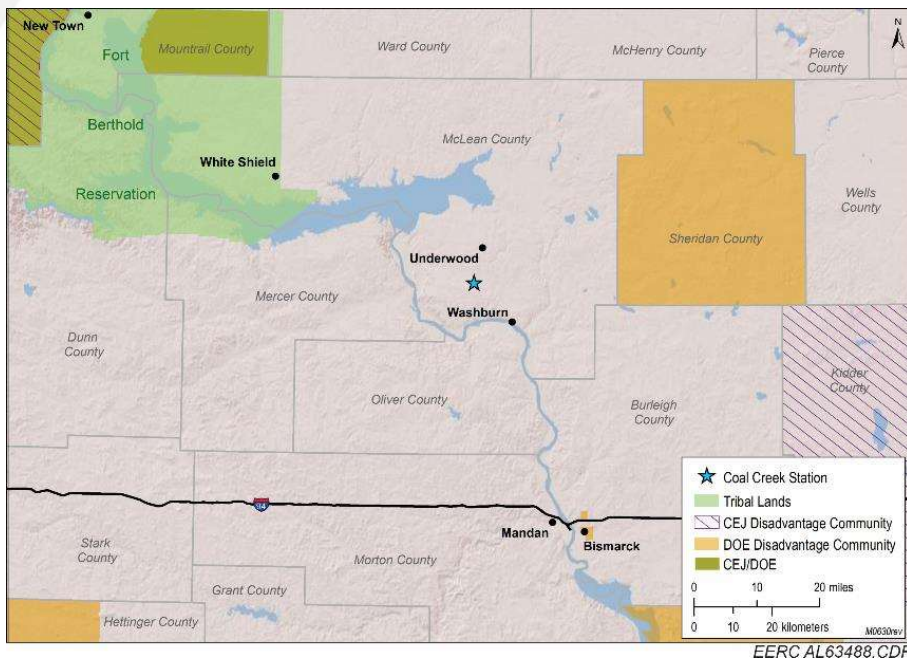
Coal Creek Station Power Plant



Blue Flint Ethanol Plant

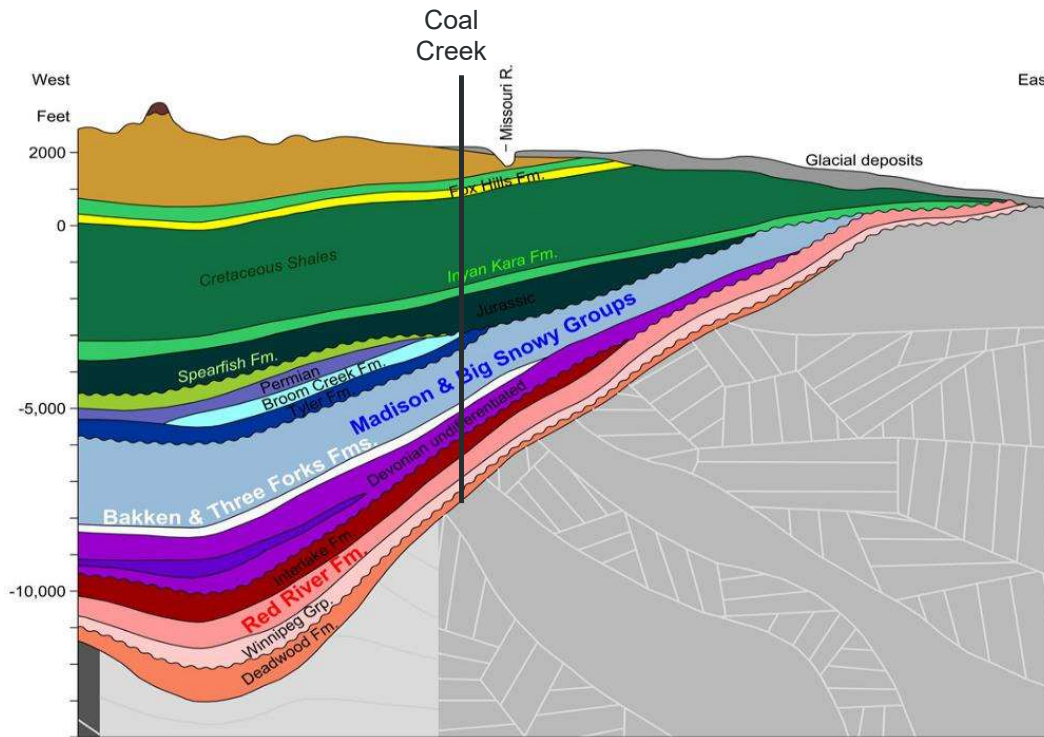
PROJECT AREA

Stakeholders in the region around the storage site AND the customers served by the MISO power transmission market



STORAGE TARGETS

Multiple deep saline formations: Broom Creek, Interlake, Red River, and Deadwood Formations and the Madison Group.



Williston Basin

Age Units		Rock Units	Approximate Depth (ft)	
Cenozoic	Quaternary	White River Grp Golden Valley Fm		800
	Tertiary	Fort Union Grp		
Mesozoic	Cretaceous	Hell Creek Fm	4700	
		Fox Hills Fm		
		Pierre Fm		
		Niobrara Fm		
		Carlile Fm		
	Jurassic	Greenhorn Fm	Colorado Group	
		Belle Fourche Fm	Dakota Group	
		Mowry Fm		
		Newcastle Fm		
		Skull Creek Fm		
Triassic	Inyan Kara Fm			
Paleozoic	Jurassic	Swift Fm	8100	
	Triassic	Rierdon Fm		
	Permian	Piper Fm		
	Permian	Spearfish Fm		
	Permian	Minnekahta Fm		Missourian Group
		Opeche Fm		
	Pennsylvanian	Broom Creek Fm		Missourian Group
		Amsden Fm		
	Mississippian	Tyler Fm		Madison Group
		Otter Fm		
Kibbey Fm				
Mississippian	Charles Fm	Madison Group		
	Mission Canyon			
Devonian	Lodgepole Fm	Madison Group		
	Bakken Fm			
	Three Forks			
	Birdbear			
Devonian	Duperow	Madison Group		
	Souris River			
Devonian	Dakson Bay	Madison Group		
	Praine			
Silurian	Ashem	Madison Group		
	Interlake Fm			
Silurian	Stonewall Fm	Madison Group		
	Stony Mountain Fm			
Ordovician	Red River Fm	Madison Group		
	Winnipeg Grp			
Ordovician	Roughlock Fm	Madison Group		
	Icebox Fm			
Cambrian	Black Island Fm	Madison Group		
	Deadwood Fm			

MAJOR PROJECT ACTIVITIES



Test Well Drilling

Seismic Survey

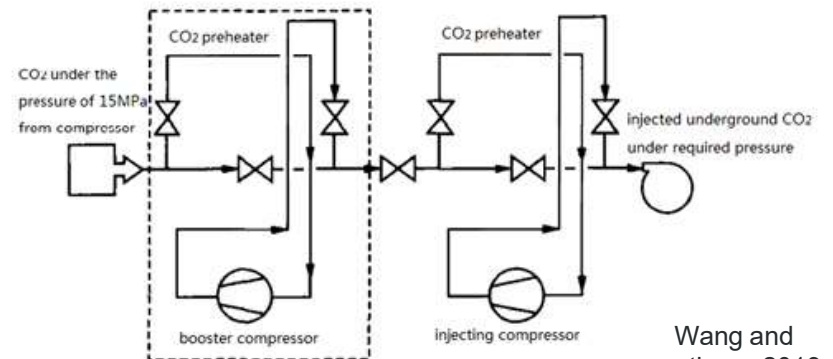


Baseline Sampling

Community Benefits Plan



Pipeline FEED Study



Wang and others, 2019

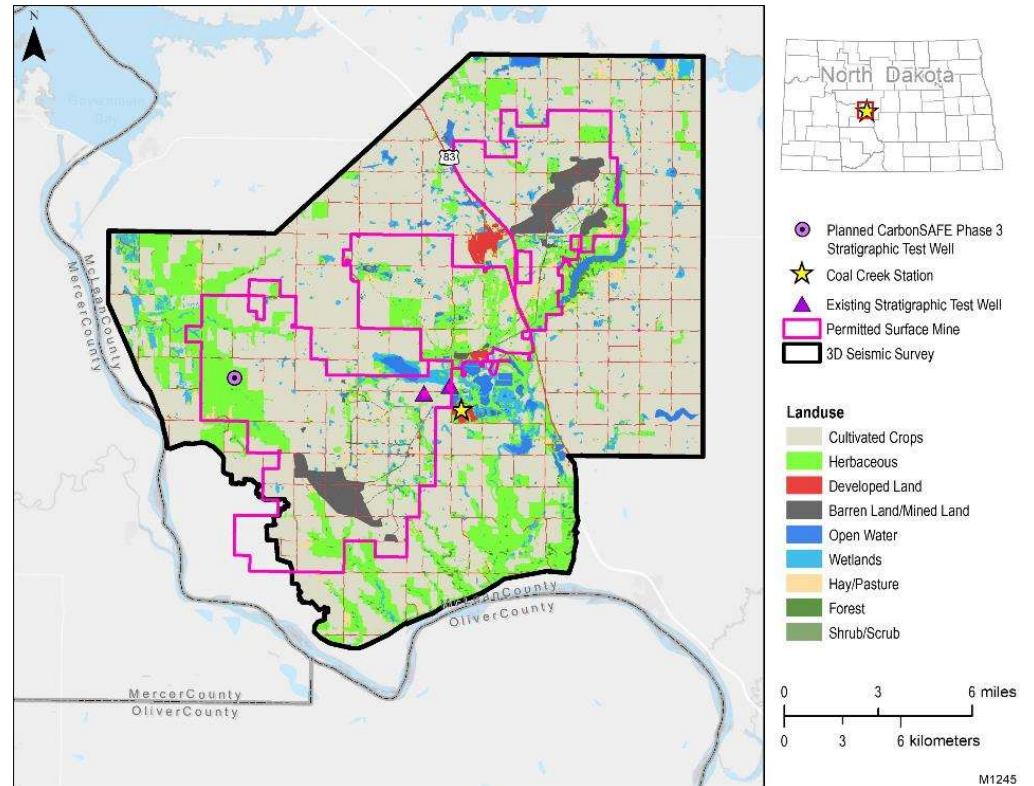
STRATIGRAPHIC TEST WELL

- Permit to drill
- Well pad construction
- Long lead-time materials
- Contract a rig (45-day lead time)
- Drilling, logging, coring, and testing



SEISMIC SURVEY

- Geophysical survey permit
- Majority of land access agreements
- NEPA determination
- Contracted acquisition company
- Hazard survey
- Archeology survey
- Seismic survey



COMMUNITY AND LABOR ENGAGEMENT

SMART Milestones

- Stakeholder engagement evaluation – **completed**
- Social characterization analysis – 2/2025
- Community open house – 03/2026

Other Activities

- Establishment of community advisory board
- Generation of outreach materials
- Meetings with municipal, county, and state regulators
- Engagement with landowners, local business owners, and the Three Affiliated Tribes
- Presentation at Lignite Energy Council teacher education seminar





COMMUNITY ADVISORY BOARD

- 10–12 members
- Quarterly meetings
- **Goal:** Provide advisement, insight, and feedback for project design and execution and stakeholder engagement
- First meeting held July 24, 2024

INVESTING IN JOB QUALITY AND A SKILLED WORKFORCE

SMART Milestones

- Skills gap assessment – **in progress**
- Safety procedure assessment – due 07/2026

Other Activities

- High school vocational class pilot capture facility tour
- SEG Evolve – CCS modeling and simulation workshop
- North Dakota Building Trades Union collaboration



DEIA

SMART Milestones

- Recruiting booth at minority-focused career event – **completed**
- K–12 STEM outreach in underrepresented community – **in progress**
- Technical presentation to an MSI – 06/2026
- Workforce diversity training partnership – 06/2026
- Minority workforce development partnership – **in progress**

Other Activities

- DEIA certificate program
- Companywide inclusion in the workplace session
- North Dakota Building Trades Union collaboration



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JUSTICE40

SMART Milestones

- Energy and environmental justice (EEJ) analysis – **completed**
- Updated stakeholder map – **in progress**
- EEJ training for project team members – 09/2025

Other Activities

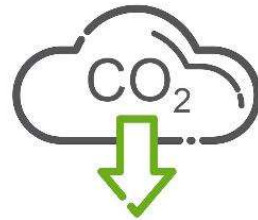
- Native American cultural competency training
- Cultural competency and respectful approaches on how to collaborate with tribal entities on research projects training
- Government to Government Tribal Summit

RELEVANCE AND OUTCOMES/IMPACTS

95% reduction of the CO₂ emissions from Coal Creek Station

19% reduction of CO₂ emissions from North Dakota's stationary sources

Supply of reliable low-carbon baseload power to MISO



Creation of 35–40 long-term careers

Creation of over 2000 direct/indirect short-term construction jobs

Opportunities to attract, train, and retain a skilled and well-qualified workforce

Internship opportunities for students from MSIs

LESSONS LEARNED



Impact of inflation: drilling costs and wellbore material costs increased significantly in 1 year.



NEPA approval process for fieldwork was more time-intensive than anticipated.



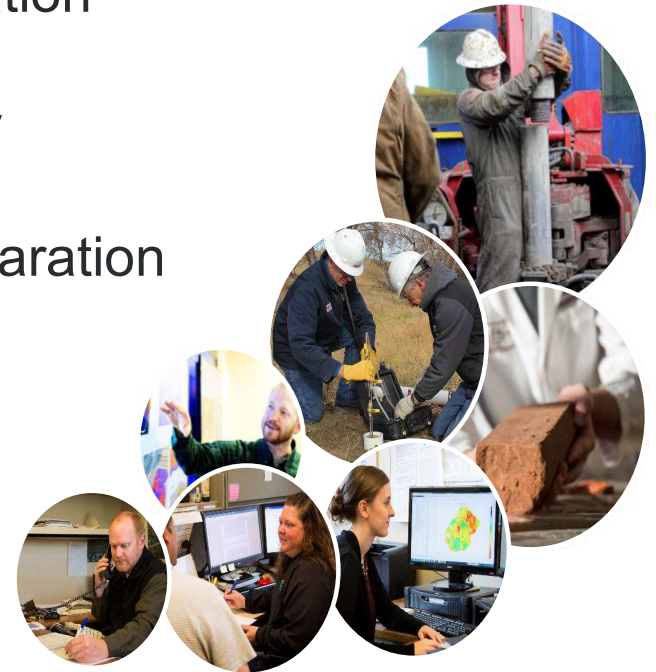
Direct dialog with agencies prior to Section 106 consultation process may have helped reduce timeline.



Super El Niño = good ground conditions in the fall.
Super El Niño = muddy ground conditions in late winter.

NEXT STEPS

- Detailed site characterization
 - Drill stratigraphic test well
 - Acquire 3D seismic survey
- Modeling and simulation
- Pipeline FEED study
- Class VI permit preparation
- NEPA compliance
 - Submit an EIV



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ACKNOWLEDGMENT

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A wide-angle photograph of a university campus during autumn. The sun is low on the horizon, creating a warm glow. In the foreground, there are green lawns and trees with yellowing leaves. In the background, there are several large, multi-story brick buildings, some with white accents. A parking lot with several cars is visible in the middle ground.

THANK YOU

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