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**NORTH DAKOTA**



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Energy & Environmental Research Center (EERC)

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

2023 FECM/NETL Carbon Management Research Project  
Review Meeting

David L. Lawrence Convention Center  
Pittsburgh, Pennsylvania

August 28, 2023

Amanda Livers-Douglas

Assistant Director for Integrated Subsurface Projects

# PROJECT OVERVIEW

## Project Objective

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

## Project Details

- Phase III project: \$47,685,651
  - DOE share: \$38,148,520
  - Cost share: \$9,537,131
- Period of performance:
  - 3 years, with two 18-month BPs

## Project Partners



U.S. DEPARTMENT OF  
**ENERGY**



NATIONAL  
ENERGY  
TECHNOLOGY  
LABORATORY



**EERC**  
UNIVERSITY OF  
NORTH DAKOTA

**RAINBOW**  
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**N E S E T**



# PROJECT SOURCES

- Proposed storage hub will aggregate CO<sub>2</sub> 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% CO<sub>2</sub> emissions reduction from North Dakota's stationary sources.



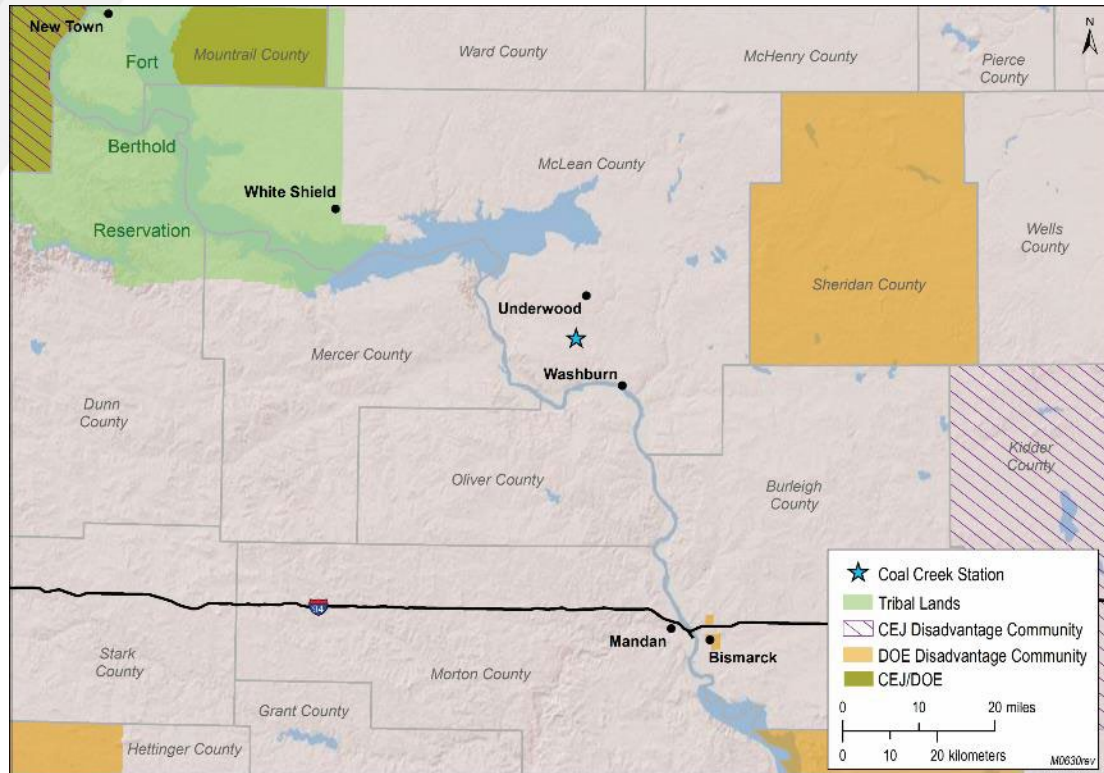
**Coal Creek Station Power Plant**



**Blue Flint Ethanol Plant**

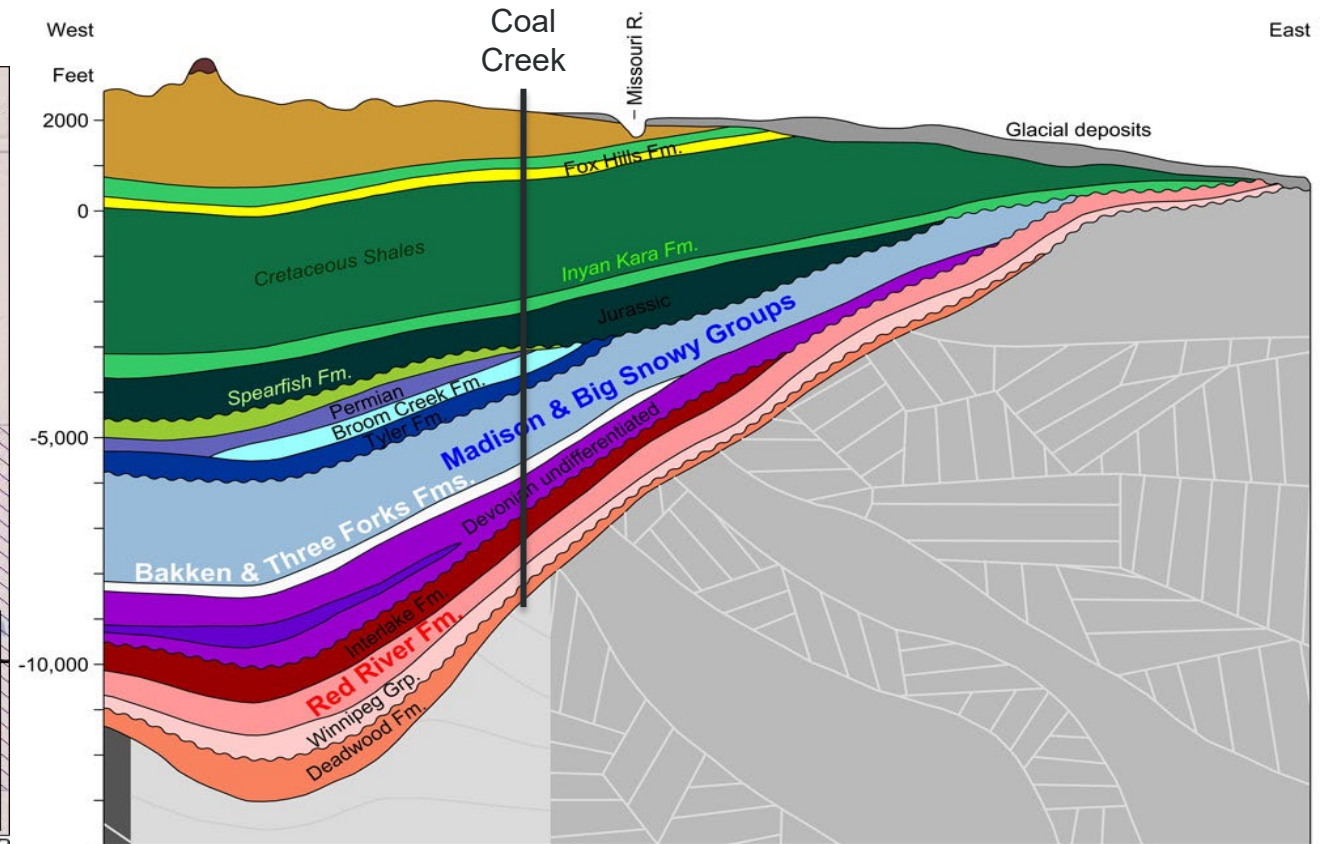


# PROJECT AREA



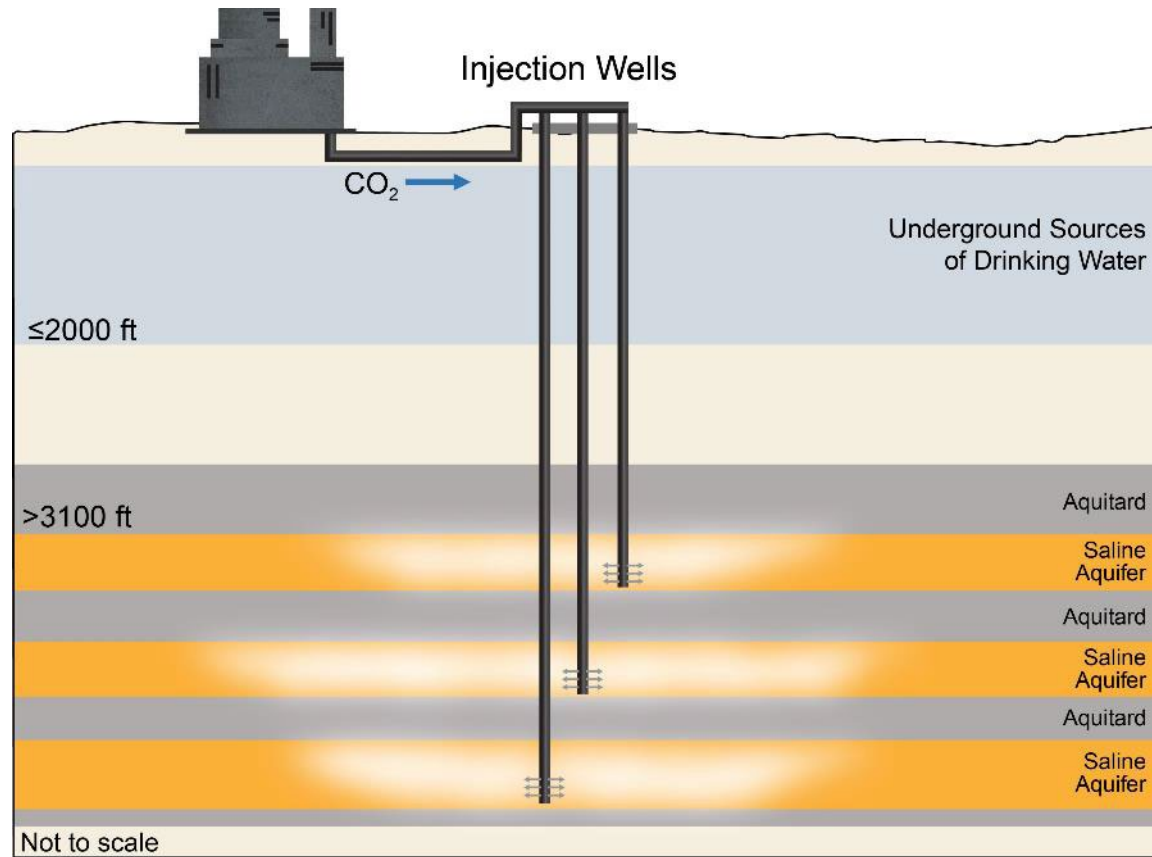
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## Williston Basin



# STORAGE TARGETS

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

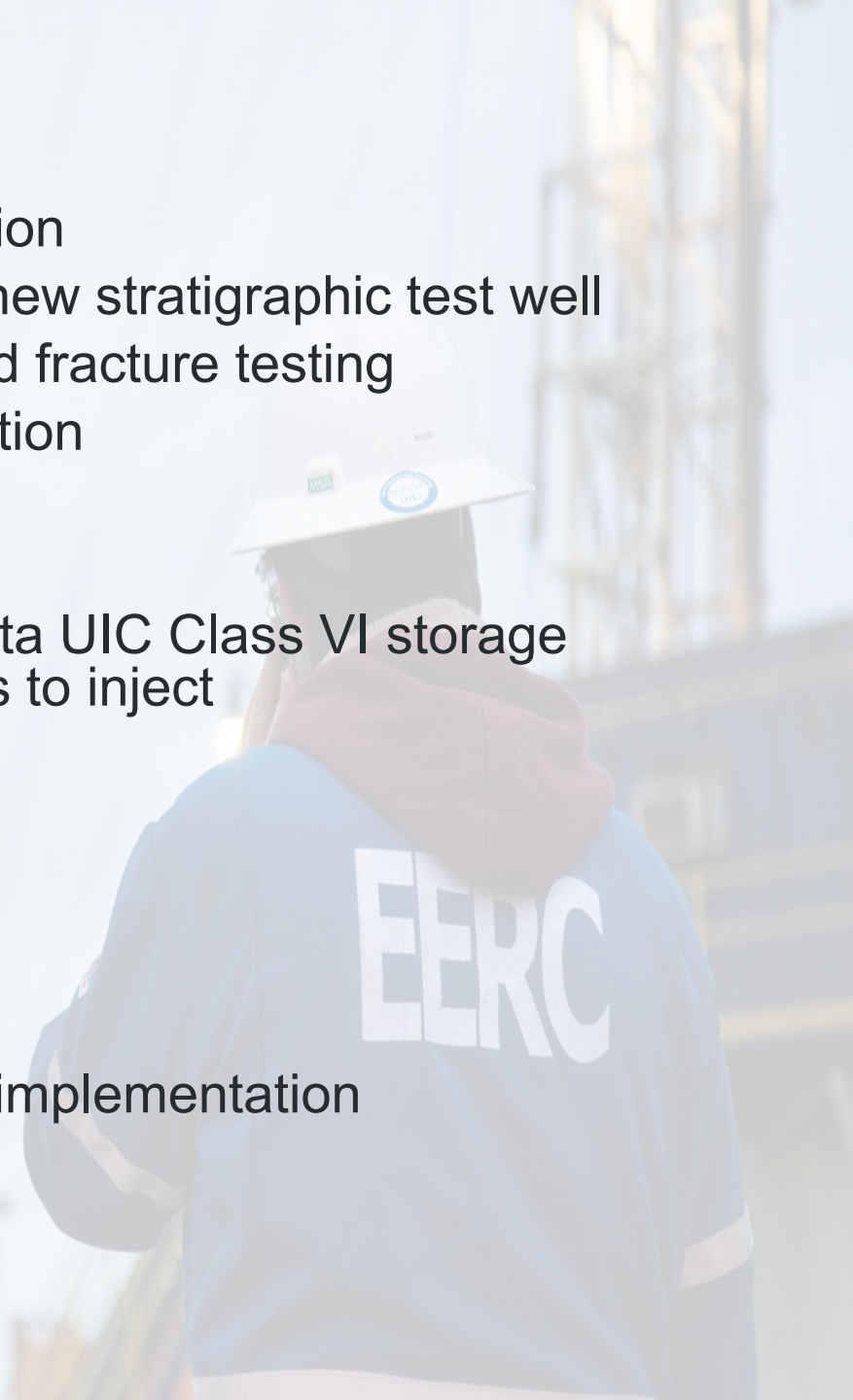


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Age Units		Rock Units	Approximate Depth (ft)
Cenozoic	Quaternary		
		White River Grp Golden Valley Fm	
	Tertiary	Fort Union Grp	800
		Hell Creek Fm Fox Hills Fm	
Mesozoic	Cretaceous	Pierre Fm	
		Niobrara Fm	
		Carlile Fm	
		Greenhorn Fm	
		Belle Fourche Fm	
		Mowry Fm	
		Newcastle Fm	
		Skull Creek Fm	
		Inyan Kara Fm	
	Jurassic	Swift Fm	4700
		Rierdon Fm	
		Piper Fm	
	Triassic	Spearfish Fm	
	Permian	Minnekahta Fm	
		Opeche Fm	
	Pennsylvanian	Broom Creek Fm	
		Amsden Fm	
	Mississippian	Tyler Fm	
		Otter Fm	
		Kibbey Fm	
		Charles Fm	
Paleozoic	Devonian	Mission Canyon	8100
		Lodgepole Fm	
		Bakken Fm	
		Three Forks	
	Silurian	Birdbear	8700
		Duperow	
		Souris River	
		Dawson Bay	
	Ordovician	Winnipeg Grp	9200
		Roughlock Fm	
		Icebox Fm	
		Black Island Fm	
	Cambrian	Deadwood Fm	

# MAJOR ACTIVITIES

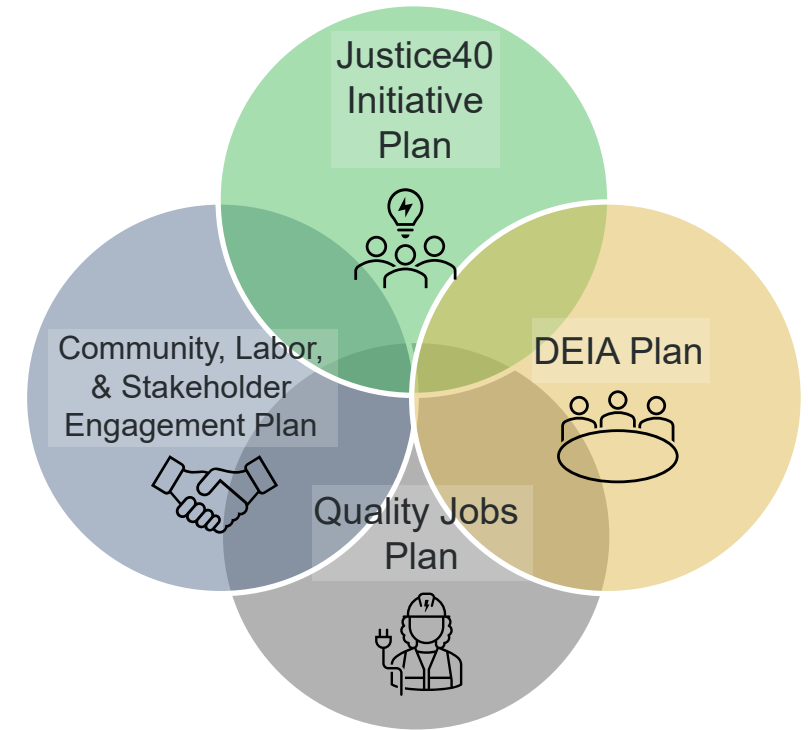
- Detailed site characterization
  - Drilling and coring one new stratigraphic test well
  - Geophysical logging and fracture testing
  - 3D seismic data acquisition
  - Baseline sampling
- Preparation of North Dakota UIC Class VI storage facility permits and permits to inject
- Pipeline FEED study
- NEPA compliance
- Community Benefits Plan implementation





# COMMUNITY BENEFITS PLAN

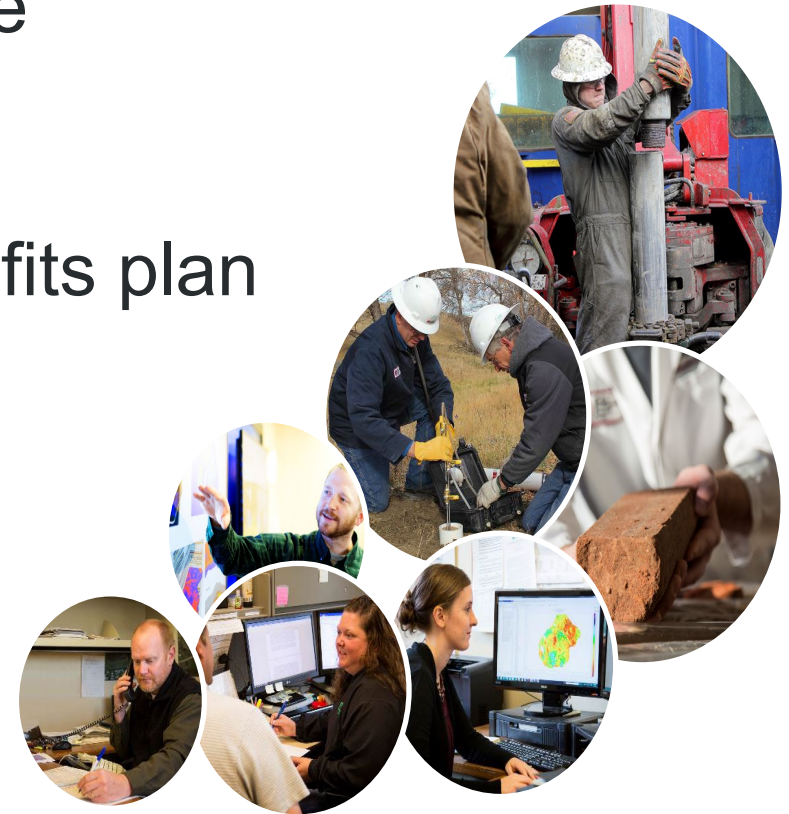
- Stakeholder engagement evaluation.
- Social characterization analysis.
- Open houses to gather community feedback.
- Evaluation of workforce needs and skills required for CCS implementation.
- Assessment of safety procedures required for CCS implementation.
- Training to advance understanding of DEIA among the project team.
- Development of effective partnership with a workforce diversity training partner to promote employment opportunities to underrepresented individuals and members of rural disadvantaged communities.
- Energy and environmental justice assessment.





# NEXT STEPS

- Detailed site characterization
  - Drill stratigraphic test well
  - Acquire 3D seismic survey
- NEPA compliance
  - Submit an EIV
- Community benefits plan implementation



# LESSONS LEARNED FROM PRIOR CarbonSAFE ND PHASE II AND III PROJECTS

- Reclaimed mine land represents a challenge for seismic collection.
- There are great landowners and industrial partners willing to help make a project successful!
- There is tremendous CO<sub>2</sub> storage potential in our area of investigation.
- The benefit of working in a state with Class VI primacy is immeasurable.







**Amanda Livers-Douglas**  
**Assistant Director for Integrated Subsurface Projects**  
alivers@undeerc.org  
701.777.5344

**Energy & Environmental  
Research Center**  
University of North Dakota  
15 North 23rd Street, Stop 9018  
Grand Forks, ND 58202-9018

www.undeerc.org  
701.777.5000

A wide-angle photograph of a university campus at sunset. The sun is low on the left, casting a warm glow over the scene. In the foreground, there are trees with yellowing leaves. In the background, there are several large, multi-story brick buildings, likely university halls or labs, and a parking lot filled with cars.

**THANK YOU**

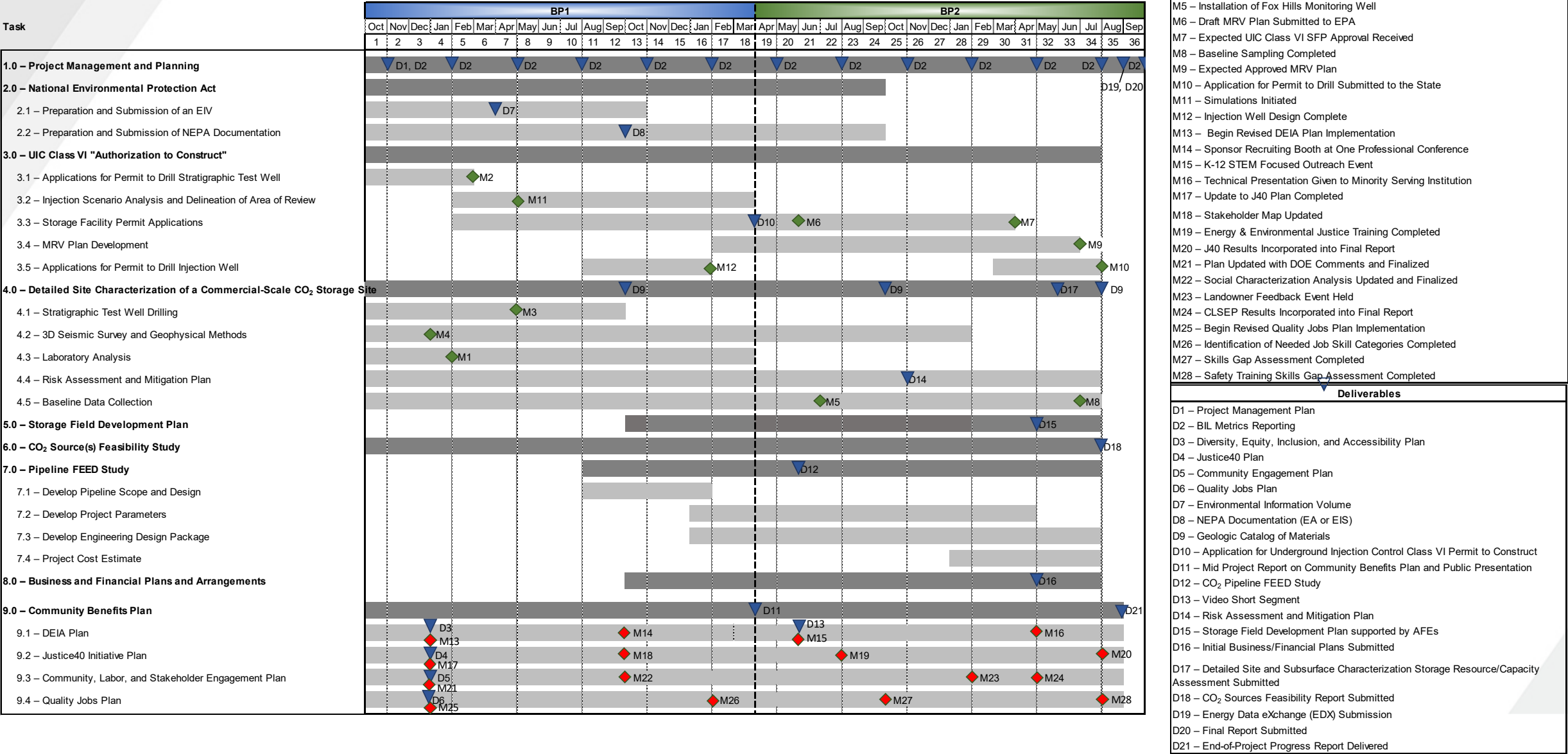
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# TECHNICAL APPROACH

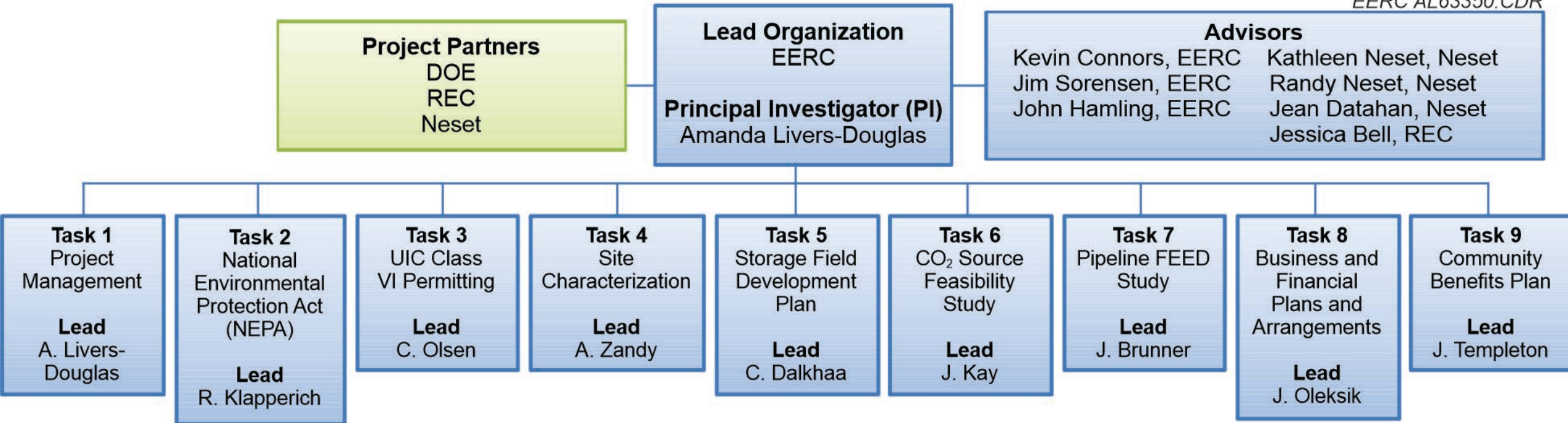
Major NDIC Permitting Requirements	Major Proposed Characterization Activities									
	Core	Logging	Downhole Testing	Lab Testing	Modeling	Simulation	Seismic Collection	Baseline Sampling	New Fox Hills Wells	
Determine Plume Extent	X	X	X	X	X	X	X			
Determine Pore Space Amalgamation	X	X	X		X	X	X			
Geologic Properties of Injection and Confining Zones	X	X	X	X						
Regional Faulting Assessment	X						X			
Potential for Seismic Activity			X		X		X			
Geologic Maps and Cross Sections		X			X		X		X	
Geomechanics of Confining Zones(s)		X	X	X	X					
Identify and Characterize Secondary Confining Zones		X	X		X		X			
Determine Area of Review		X	X	X	X	X	X	X	X	
Baseline Geochemical Data	X			X				X	X	
Baseline Water and Soil Data				X				X	X	

# PROJECT TIMELINE



# ORGANIZATION CHART

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