

CarbonSAFE Illinois – Macon County

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 - BYU
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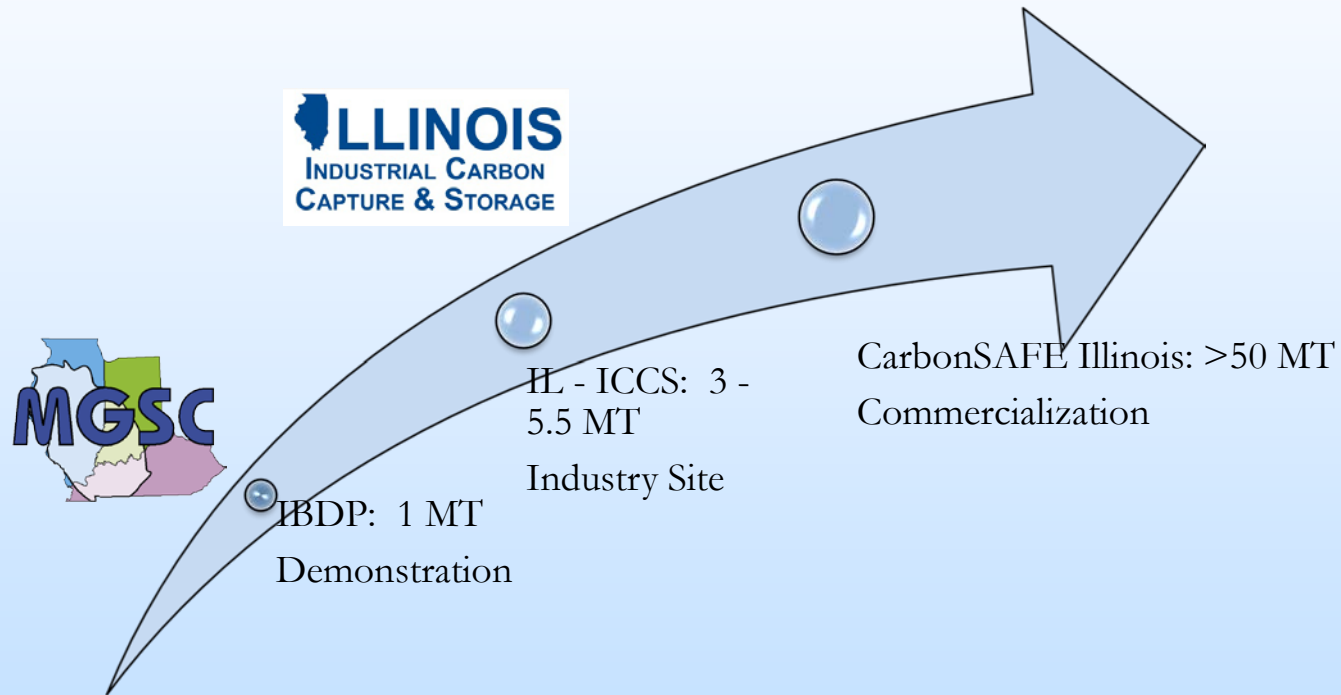
U.S. DEPARTMENT OF
ENERGY



Presentation Outline

- Project Objectives & Setting
- Technical Status
- Accomplishments
- Lessons
- Synergistic Opportunities
- Summary

CCS Progression to Commercialization in Illinois



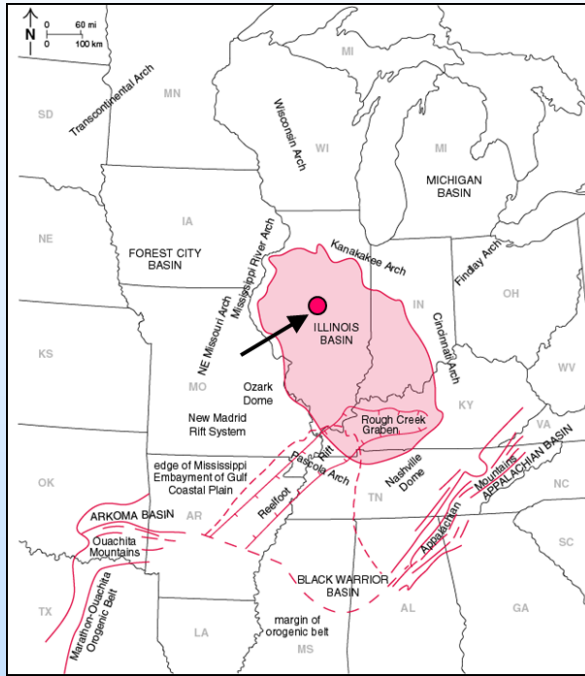
Project Aspects

Address technical and non-technical questions around developing commercial-scale storage complexes.

- Assess Public Outreach needs
- Characterize the Subsurface Storage Complex
- Analyze Infrastructure Needs
- Analyze Regulatory & Business Issues
- Site Development Plan

Technical Status

Storage options in Macon County



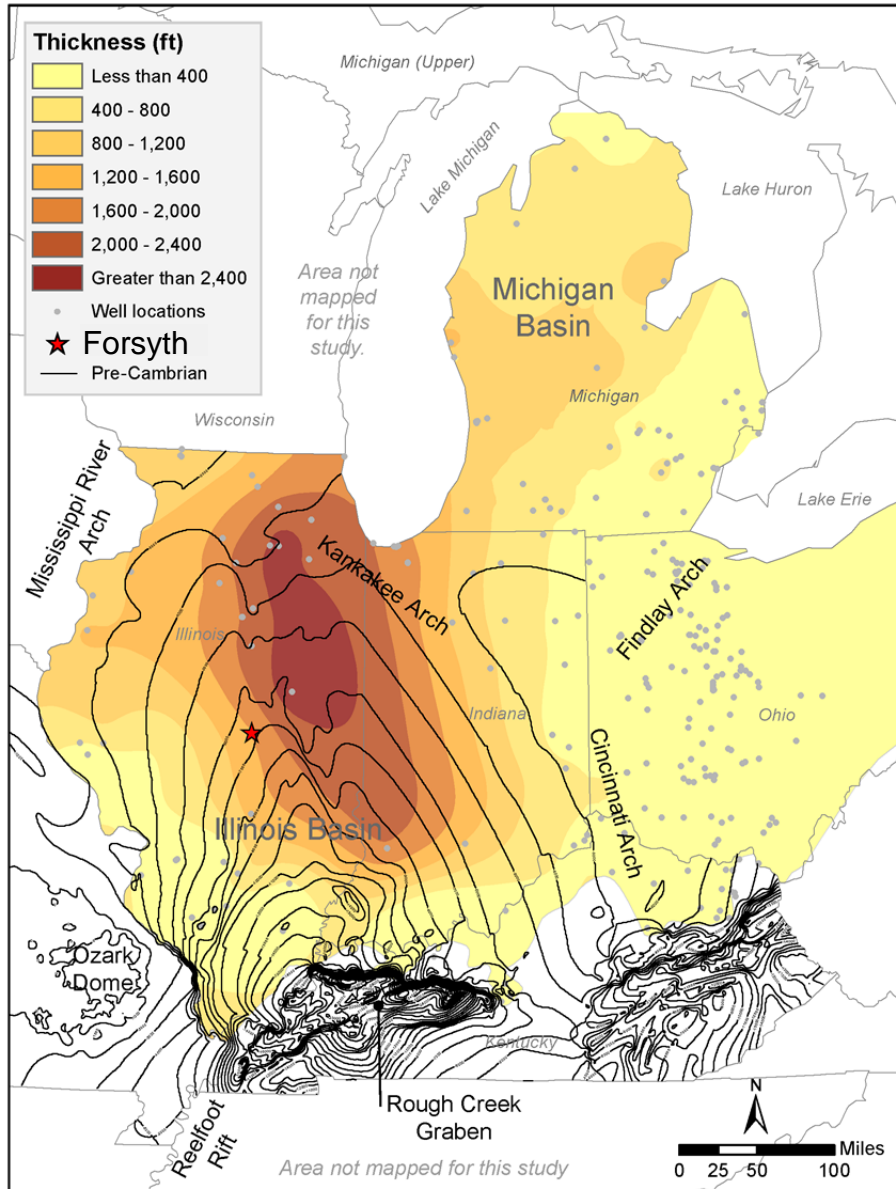
SYSTEM	GROUP	FORMATION	Storage Elements
Ordovician	Maquoketa	Brainard	Secondary Seal
		Ft. Atkinson	
		Scales	
	Galena	Kimmswick	
		Decorah	
	Plateville		
	Ancell	Joachim	Potential target
		St. Peter	
	Cambrian	Knox	Shakoppee
New Richmond			
Oneota			
Gunter			Potential target
Eminence			
Potosi			
Franconia			Primary Seal
Ironton-Galesville			
Eau Claire			
			Mt. Simon
Precambrian			

Mt. Simon Storage Complex

St. Peter-Knox Storage Complex

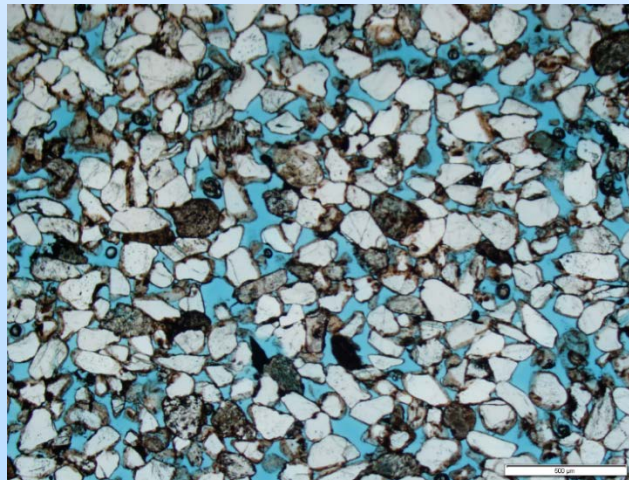
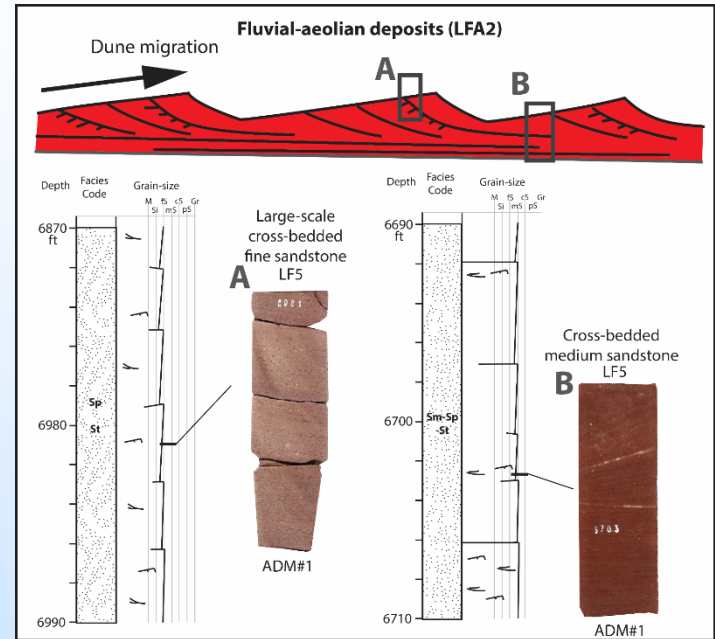
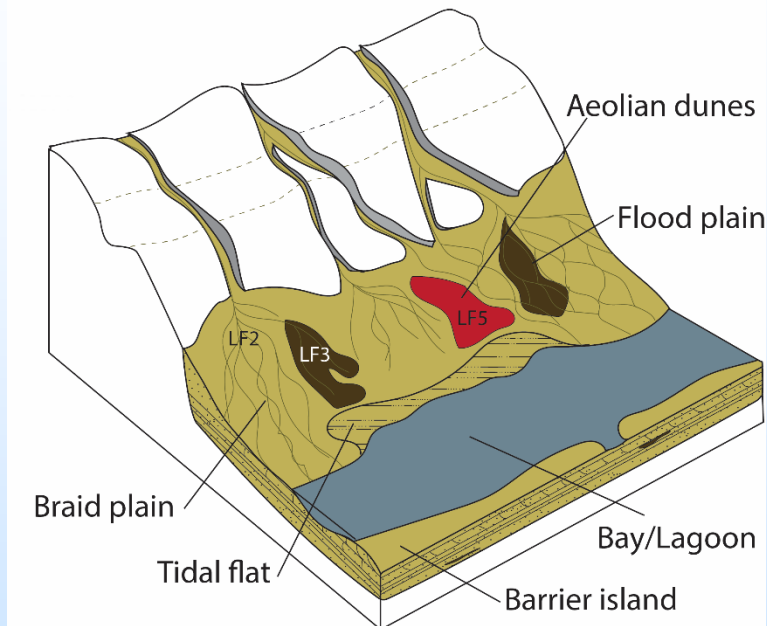
Cambro-Ordovician Storage Complex

Mt Simon Sandstone



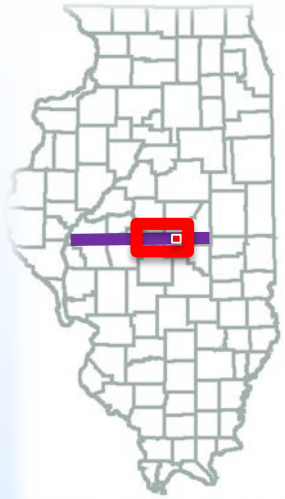
- Mt. Simon Sandstone is ~ 1500 ft thick at Forsyth Field, Macon County
- In Macon County (IBDP), the Mt. Simon can be divided into three major sections
- Underlying unit (Argenta), has highly variable thickness. Argenta is unconformably bound and overlies weathered Precambrian surface
- Seal is Eau Claire Shale

Mt Simon Depositional Environments



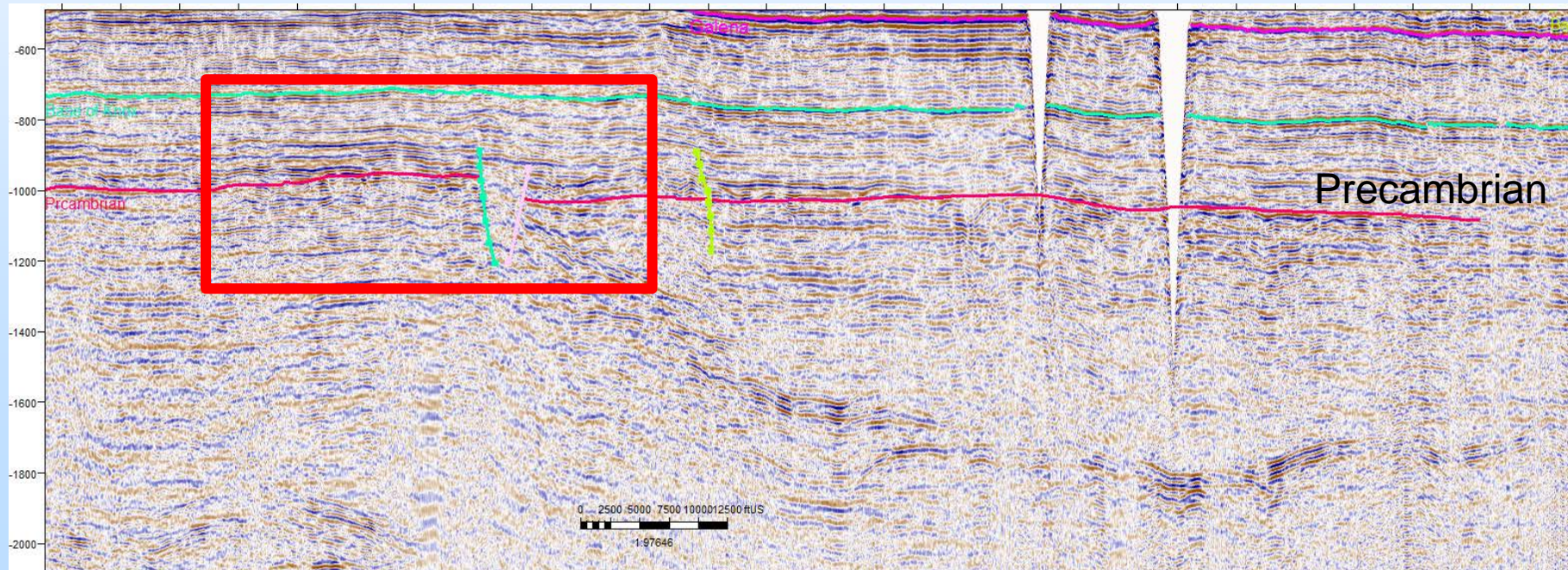
Lower Mt. Simon can have up to 30% porosity. Porosity largely secondary via feldspar dissolution.

Lateral Continuity and Basement Highs

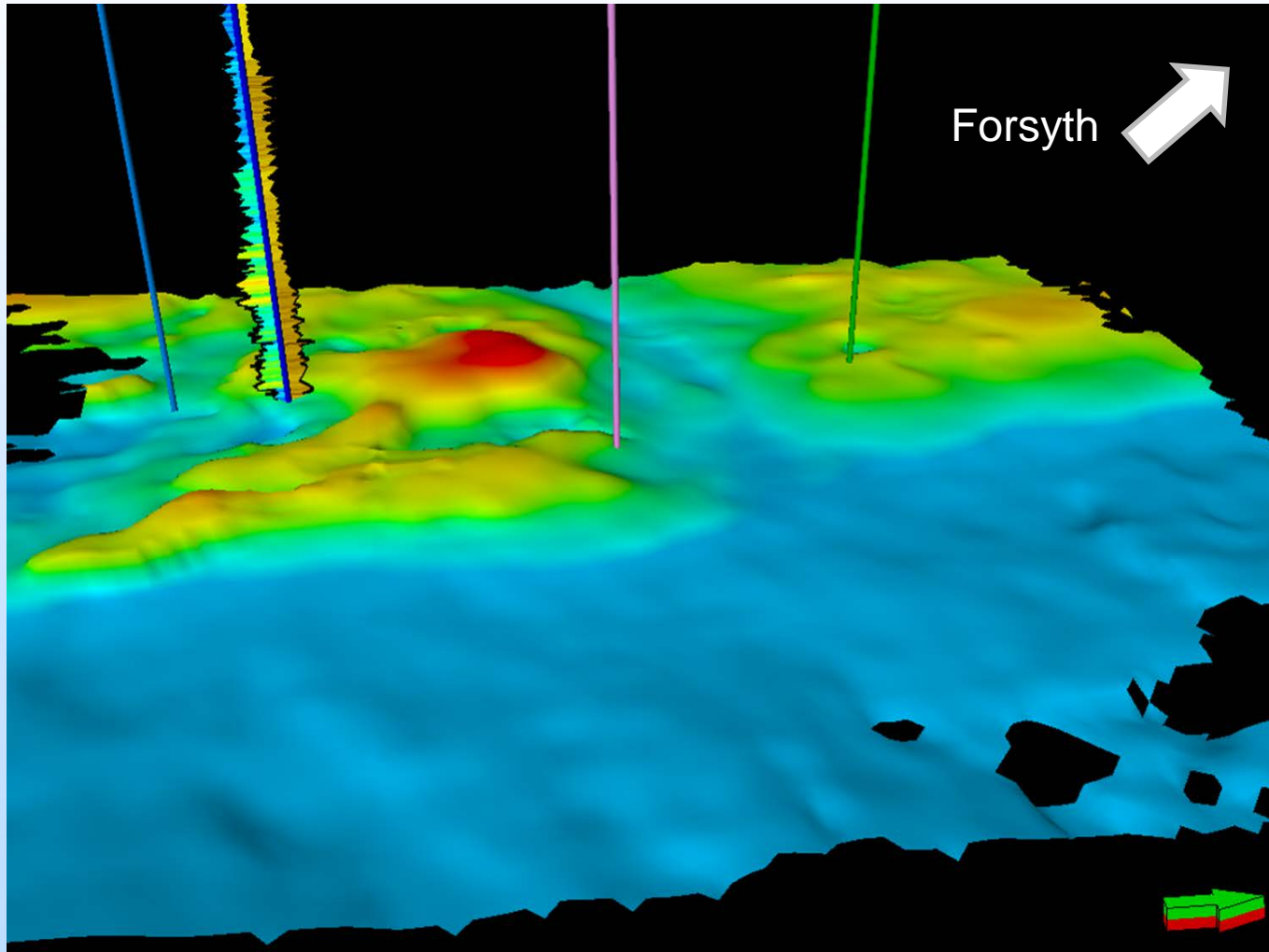


0 25 50 100 150 200
Miles

- What is the relationship of Precambrian highs and arkosic high porosity sands?
- Where is it thickest?



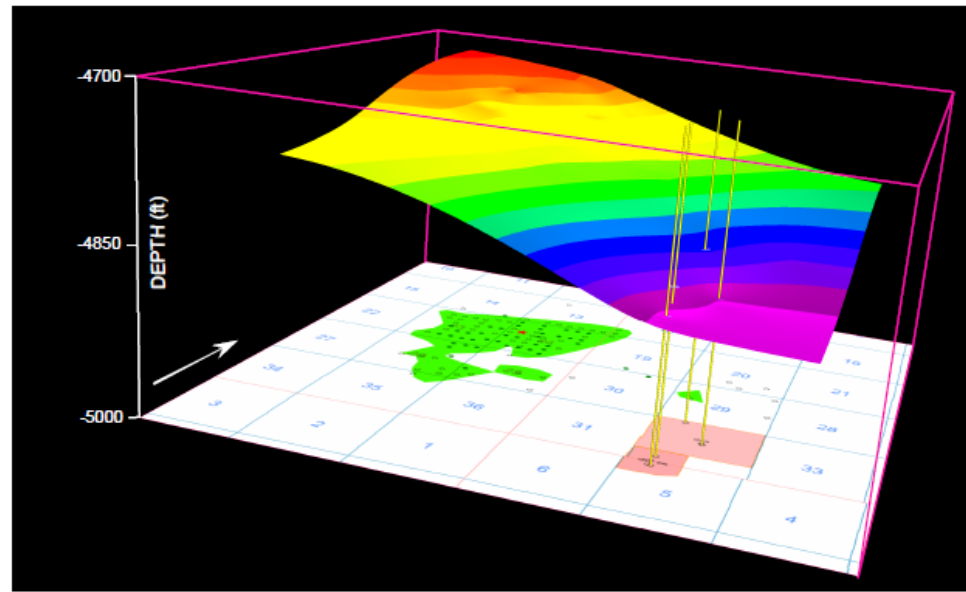
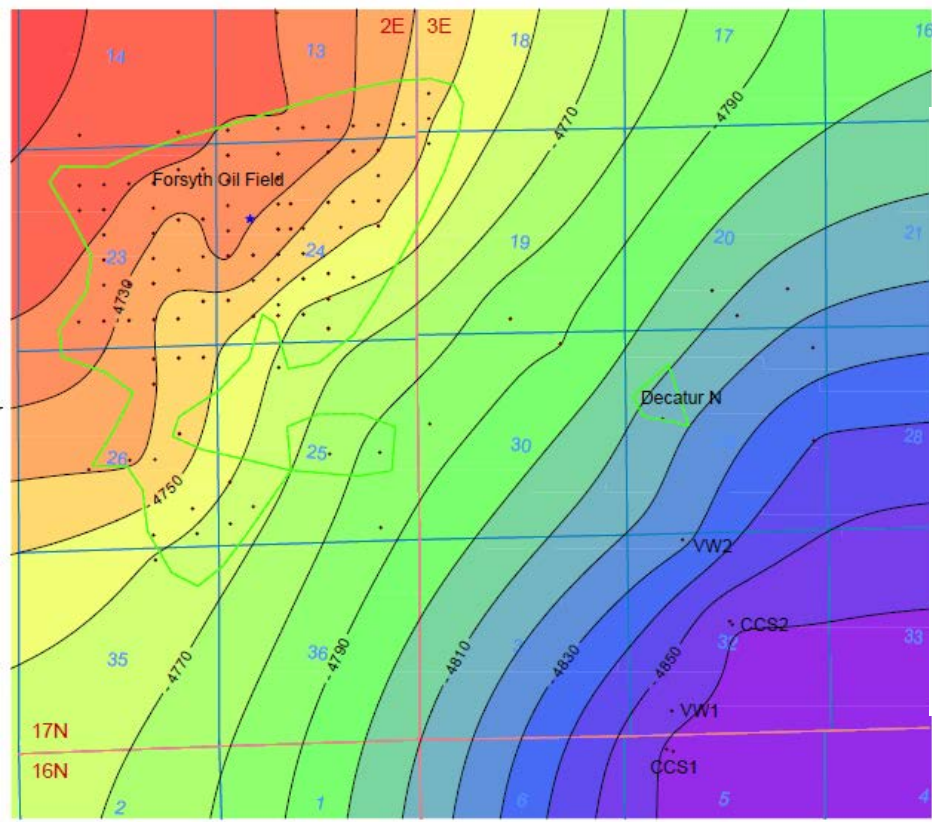
Basement Topography



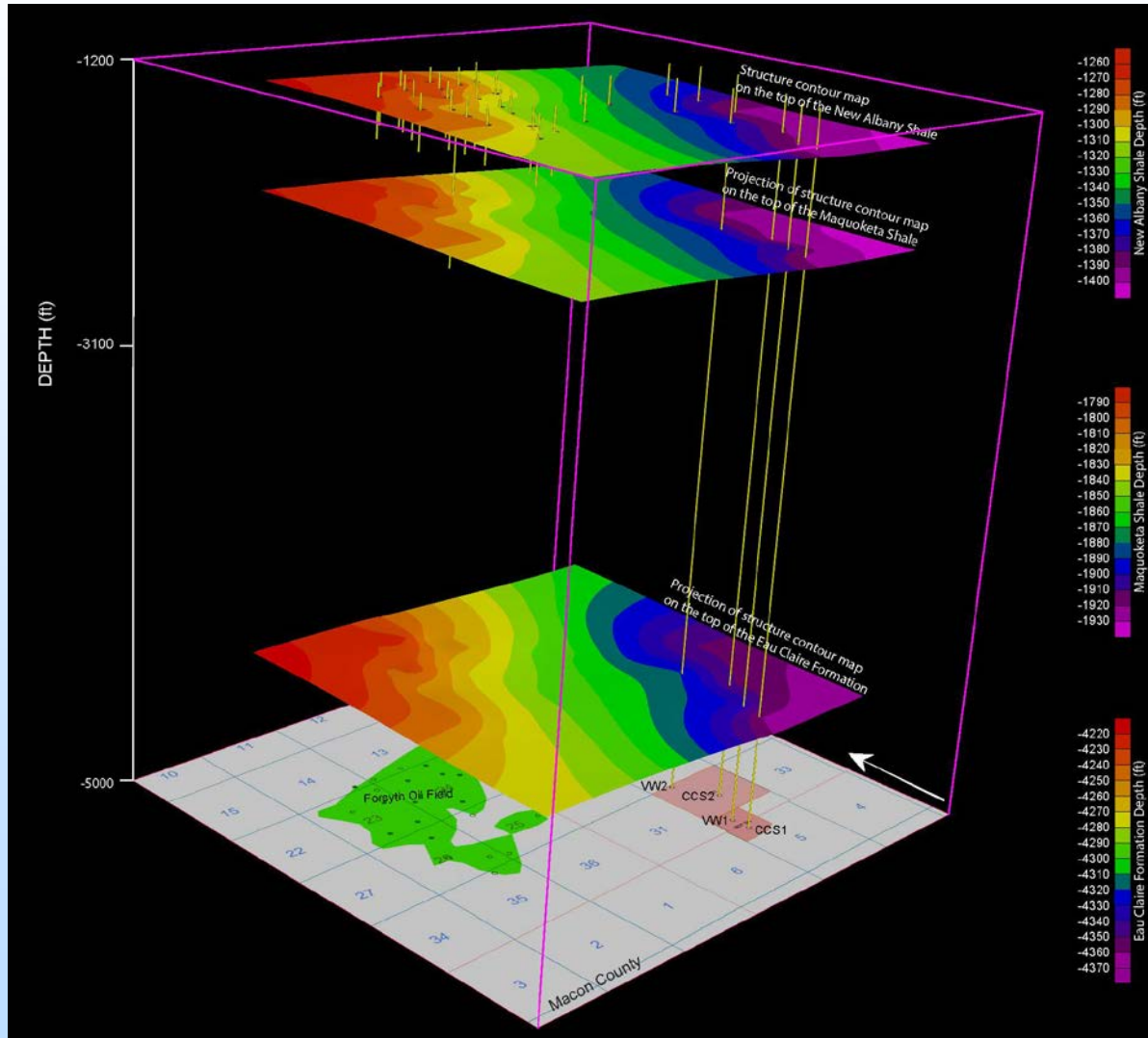
3D
Seismic
IBDP



Mt. Simon Structure at Forsyth



Structure on Seals



New Albany Shale

Maquoketa Shale

Eau Claire Fm

Stratigraphic Well

Drill ca 7500 ft depth

Core 4 to 5 intervals

Silurian;

Eau Claire – U Mt Simon;

L Mt Simon;

Argenta (pre-Mt Simon) TBD;

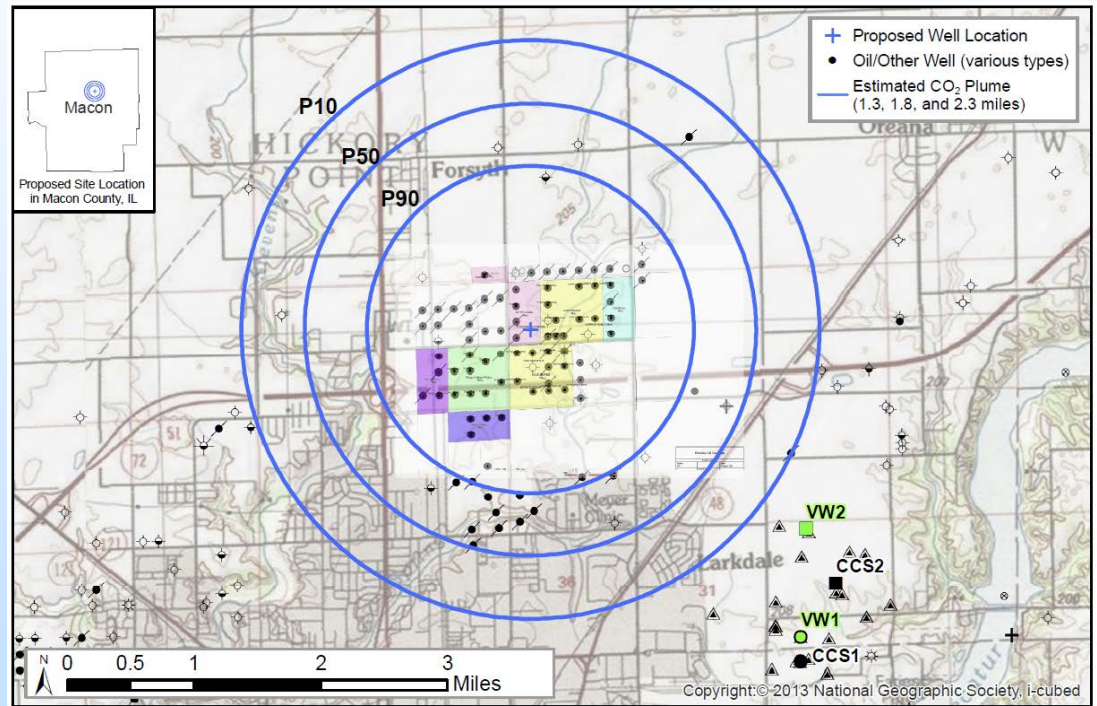
Precambrian

Sidewall core

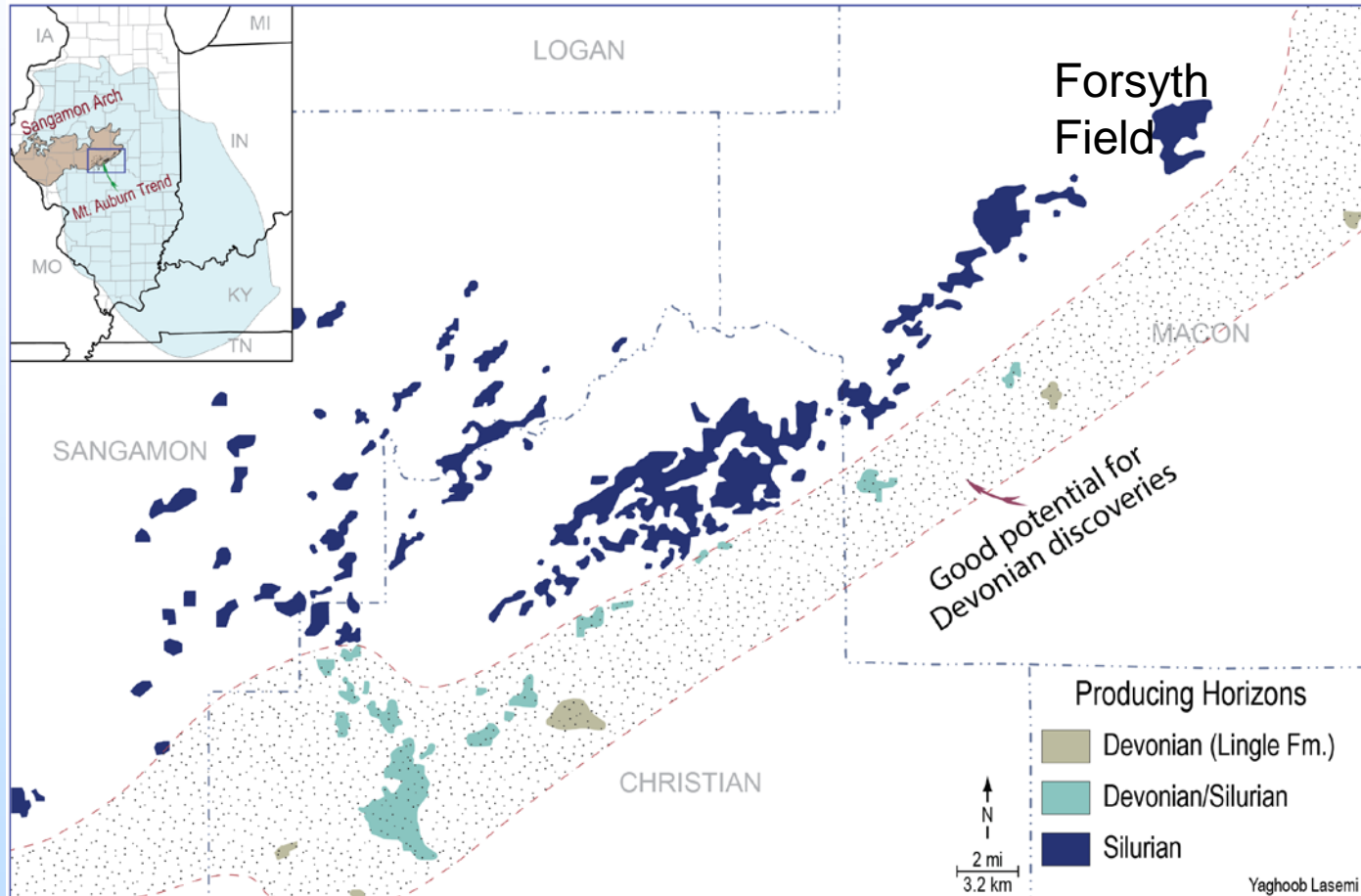
Extensive logging suite

Well tests

Core Studies & Measurements



Mt Auburn Trend – EOR potential

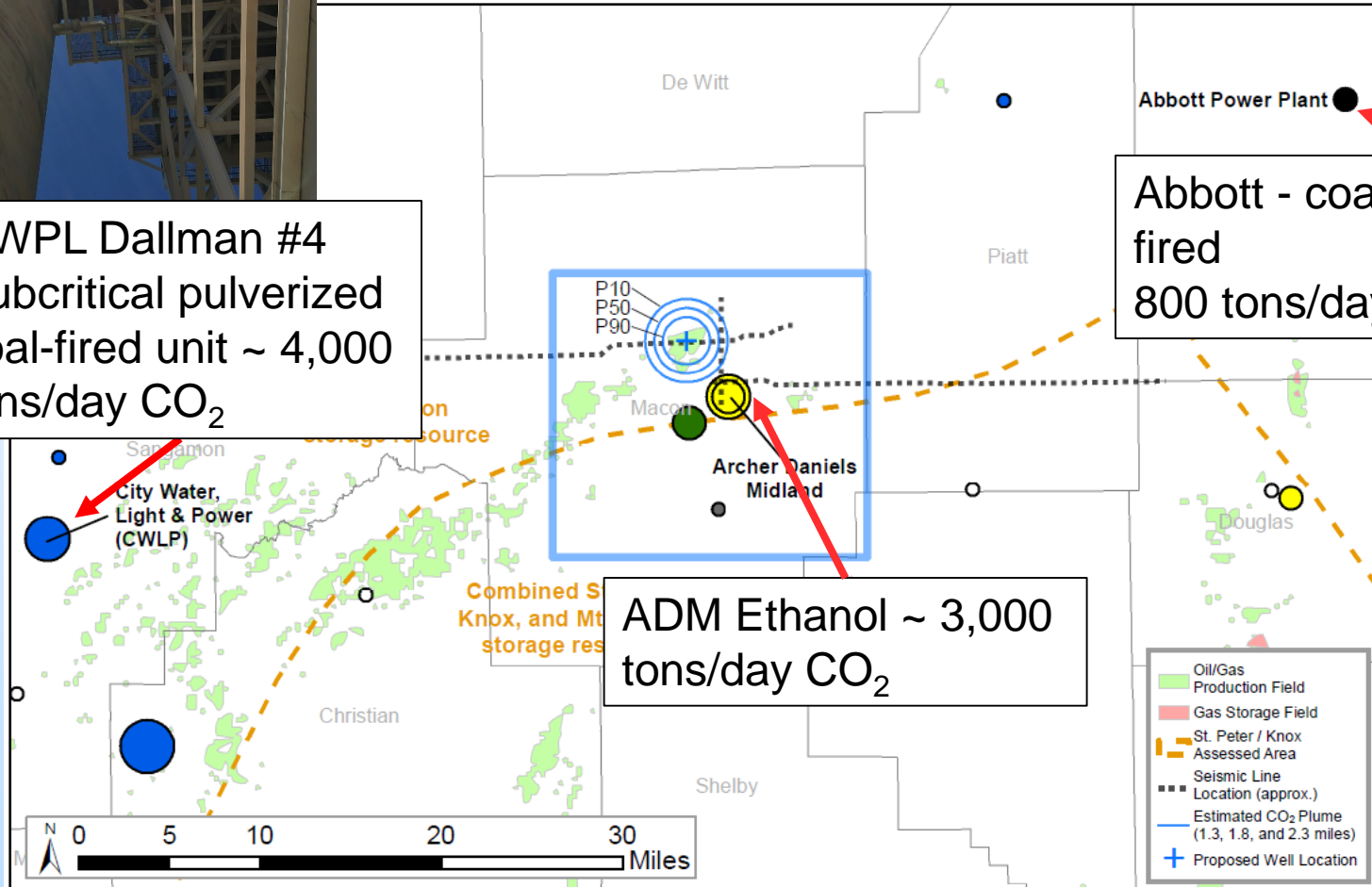


CO₂ Sources

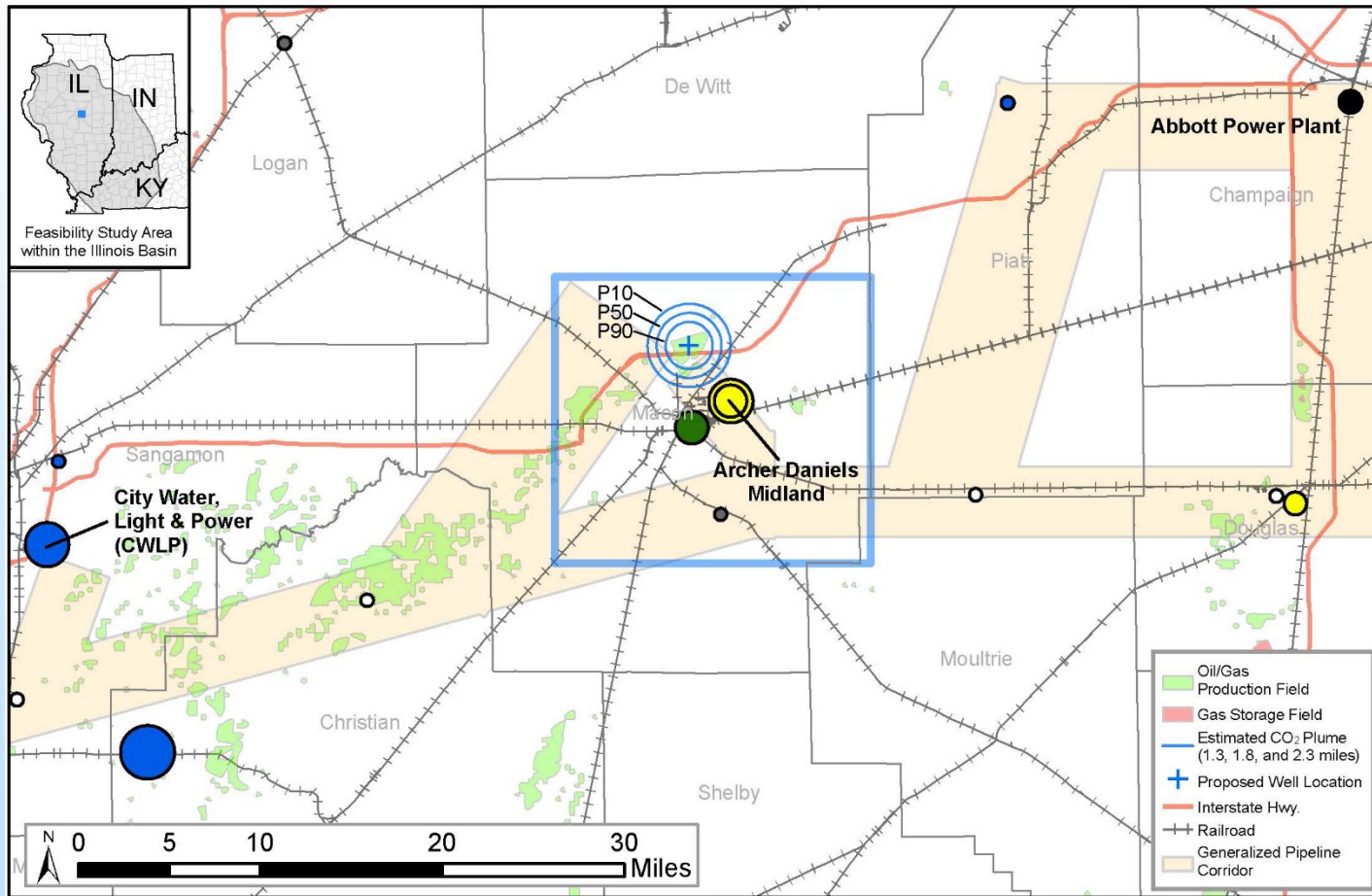
CWPL Dallman #4
Subcritical pulverized
coal-fired unit ~ 4,000
tons/day CO₂

Abbott - coal & gas
fired
800 tons/day CO₂

ADM Ethanol ~ 3,000
tons/day CO₂



Potential CO₂ Transportation Corridors



Accomplishments to Date

- Integrated stratigraphic and structural data from Forsyth Field
- Updated geological mapping and GIS with Forsyth Field data
- Developed geological model of target site
- Drilling plan advanced progress
- Assessment of Springfield CWPL CO₂ source
- Data exchange for NRAP

Lessons Learned

- Challenge in understanding lateral continuity of reservoir quality in Lower Mt Simon as step-out
- Seismic data interpretation of basement is a challenge
- Challenge in addressing economic questions from potential CO₂ sources

Synergistic Opportunities

- Business case development
- Addressing permitting, regulatory and policy issues
- Aspects of Stakeholder Engagement process
- Knowledge Sharing – NRAP screening
- Site development issues

Project Summary

- Drilling location identified for stratigraphic test well to evaluate feasibility of commercial-scale carbon storage in Macon County
- Geological mapping at drilling site near complete for well-drilling plan
- Gen1 static model
- Next Steps
 - permitting
 - detailed well design
 - Drilling plan
 - Contracts and agreements for site access

Appendix

- These slides will not be discussed during the presentation, **but are mandatory.**

Benefit to the Program

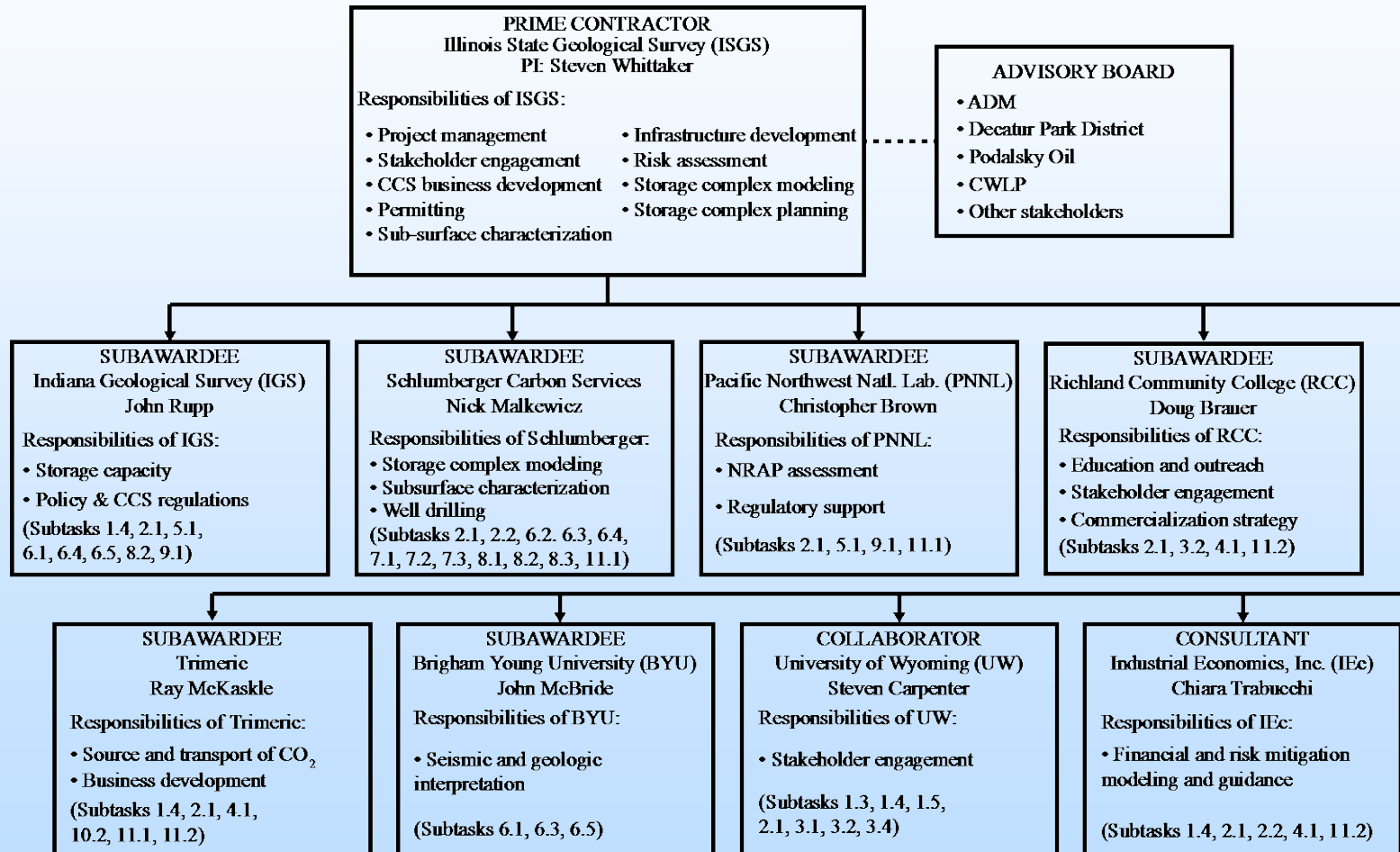
- Address gap in development knowledge around large-scale carbon storage.
- Validate technologies to ensure 99% storage
- Improve storage capacity estimates ($\pm 30\%$) for industry investment decisions.
- Project data will be used within the NRAP Toolkits for validating technologies for storage permanence and storage efficiency
- Contribute to best practice manuals to inform future commercialization efforts

Project Overview

Goals and Objectives

- Establish the feasibility of developing a commercial-scale geological storage complex in Macon County, IL, that could store up to 50 million tonnes or more of industrially sourced CO₂.
 - Address knowledge gaps for developing large-scale geological storage complexes
 - Improve storage capacity estimations for industry investment decision
 - provide input into best practices manuals
 - Validate NRAP toolkits using field site data
 - Validate technologies to ensure 99% storage

Organization Chart



Gantt Chart

Gantt Chart with Team Responsibilities by Task. Letters refer to milestones.				Budget Period												Team Responsibilities														
#	Task Name	Start	End	2017						2018						2019						UIUC	IGS	SLB	IEc	UW	PNNL	BYU	TRI	RCC
				Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar			
1.0 Project Management and Planning																														
1.1	Manage all project activities, objectives, and milestones	04/01/17	03/31/19	A																										
1.2	Project management plan	04/01/17	03/31/19	B																										
1.3	Project evaluation and assessment	04/01/17	03/31/19																											
1.4	Knowledge sharing and best practices manuals	04/01/17	03/31/19																											
1.5	Communications	04/01/17	03/31/19				C																							
1.6	Data management	04/01/17	03/31/19																											
2.0 Risk Assessment and Monitoring																														
2.1	Risk Assessment	8/7/17	2/28/19																											
2.2	Develop risk mitigation strategy	10/02/17	2/28/19																											
2.3	Identify risk pathways for storage complex development	9/03/18	2/28/19																											
3.0 Stakeholder Engagement and Public Outreach																														
3.1	Conduct stakeholder analysis	06/12/17	12/29/17																											
3.2	Develop stakeholder engagement and outreach plan	08/14/17	02/16/17																											
3.3	Develop outreach materials	08/14/17	10/31/18																											
3.4	Conduct stakeholder engagement and public outreach	06/05/17	03/29/19																											
4.0 Business and Economic Development Assessment																														
4.1	Business and Financial Case Study	6/05/17	1/18/19																											
5.0 Permitting and Compliance																														
5.1	Policy, Regulatory, Legal and Permitting Case Study	7/03/17	11/30/18																											
5.2	Obtain necessary permits for characterization activities	6/05/17	4/30/18					F																						
5.3	Develop UIC permitting plan	9/04/17	12/21/18																											
6.0 Subsurface Characterization																														
6.1	Collect, assemble, evaluate existing subsurface data	04/01/17	1/26/18																											
6.2	Pre-drilling site assessment	6/16/17	9/22/17																											
6.3	Assess data collected from stratigraphic well	1/08/18	12/14/18					G																						
6.4	Integrate well data with conceptual geologic models	1/08/18	2/21/19																											
6.5	Evaluate geologic data sources and identify data gaps	5/1/18	10/31/18																											
7.0 Well Drilling and Testing																														
7.1	Design well drilling program	7/17/17	10/13/17																											
7.2	Conduct drill on paper exercise	9/18/17	10/13/17																											
7.3	Drill and construct stratigraphic test well	10/23/17	11/24/17																											
7.4	Testing and data collection	11/25/17	12/15/17																											
8.0 Storage Complex Modeling																														
8.1	Development of static model	6/05/17	11/30/18																											
8.2	Development of dynamic reservoir model	8/1/17	1/31/19																											
8.3	Calibrate and test model outputs	10/1/18	3/29/19																											
9.0 National Risk Assessment Partnership (NRAP) Screening																														
9.1	NRAP toolkit assessment	10/2/17	2/28/19																											
10.0 Infrastructure Development																														
10.1	CO ₂ source assessment	5/1/17	11/23/18																											
10.2	Transportation and Infrastructure Assessment	6/19/17	11/23/18																											
10.3	Develop regional roadmap for source network & storage deployment	9/04/17	2/28/19																											
11.0 Storage Complex Development Planning																														
11.1	Detailed site characterization plan	6/03/18	3/15/19																											
11.2	Integrated regional overview for commercialization	6/03/18	3/15/19																											

Bibliography

- No peer reviewed publications have been produced to date.