APPENDIX F

Cultural Surveys

F1 – Phase I – Site Characterization Locale Survey
F2 – Phase I – Meredosia Energy Center Survey
F3 – Phase I – Bluff Area Pipeline Right-of-Way Segment Survey
F4 – Phase I – Soil Gas Monitoring Locations Survey

for the

Final Environmental Impact Statement
FutureGen 2.0 Project
Meredosia, Illinois (Morgan County)

Note: This appendix was updated for the Final EIS.
The Final Programmatic Agreement can be viewed in Appendix B3.

DOE/EIS-0460
October 2013

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APPENDIX F1

PHASE I – SITE CHARACTERIZATION LOCALE SURVEY

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Archaeological Survey Short Report
Illinois Historic Preservation Agency
Old State Capitol Building
Springfield, Illinois 62701 (217) 785-4997

REVIEWER
Date:
Accepted Rejected
IHPA USE ONLY (Form ASSR0886)

PHASE I CULTURAL RESOURCE SURVEY

FUTUREGEN INDUSTRIAL ALLIANCE, INC.
SITE CHARACTERIZATION LOCALE
MORGAN COUNTY, ILLINOIS

Prepared For

FutureGen Industrial Alliance, Inc.
1101 Pennsylvania Avenue, NW
Sixth Floor
Washington, D.C. 20004

April 2011

Prairie Archaeology & Research

P.O. Box 5603 ● Springfield, Illinois 62705-5603 ● Phone 217.544.4881 / Fax 217.544.4988

Archaeological Survey Short Report
Illinois Historic Preservation Agency
Old State Capitol Building
Springfield, Illinois 62701 (217) 785-4997

REVIEWER
Date:
Accepted Rejected
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IHPA Log #: UNASSIGNED

LOCATIONAL INFORMATION AND SURVEY CONDITIONS

County: Morgan **Quadrangle:** Prentice, IL 7.5 minute USGS

Project Type/Title: FutureGen Industrial Alliance--Site Characterization Locale, Morgan County, IL

Funding and/or Permitting Federal/State Agencies: U.S. Department of Energy

Township: 16 North **Range:** 8 West **Section(s):** 30

Township: 16 North **Range:** 9 West **Section(s):** 25

Project Description: A phase I cultural resource investigation of the location for drilling and access routes for characterization activities related to the FutureGen project in Morgan County, Illinois

Topography: Uplands

Soils: Specific soils in the project area include: 36B - Tama silt loam, 2 to 5 percent slopes; 36C2 - Tama silt loam, 5 to 10 percent slopes, eroded; 43A - Ipava silt loam, 0 to 2 percent slopes; 68 – Sable silty clay loam; 259D2 - Assumption silt loam, 10 to 15 percent slopes, eroded; and 567C2 - Elkhart silt loam, 5 to 10 percent slopes, eroded (Figure 2).

Drainage: Indian Creek

Land Use/Ground Cover (Include % Visibility): The Area of Potential Effect (APE) consisted of approximately 15.3 acres of agricultural fields with 80 to 95 percent of the ground surface visible to surveyors.

Survey Limitations: Survey limitations were minimal.

ARCHAEOLOGICAL AND HISTORICAL INFORMATION

Historical Plats/Atlases/Sources: The following historical sources were examined: 1823 *United States General Land Office Plat* (T16N, R8-9W), 1872 *Atlas Map of Morgan County, Illinois* (Andreas, Lyter & Co.), 1894 *Plat Book of Morgan County, Illinois* (American Atlas Co.), and the 1983 *Prentice, IL 7.5' Topographic Map* (United States Geological Survey).

The 1823 General Land Office (GLO) plat shows no improvements or that the property was "applied for". When a parcel is indicated as "Applied for," the property was either occupied or intended to be occupied at the time of the survey. Typically, the occupant or "squatter" expressed, to the GLO surveyor, his interest in purchasing the property once it became available from the federal government. Usually it is unknown if the property was actually improved with a permanent building (such as a house or cabin) at the time the survey was conducted. The GLO plats that include the APE do not indicate any cultural landmarks (such as trails, fords, or roads), structures or farm fields within the project boundaries. This source does indicate that the majority of the parcel was situated within prairie (Figure 3).

The Illinois Public Domain Land Tract Database indicates the land parcels associated with the project areas were purchased by five individuals (William O'Rear, Isaac Robinson, Peter Robinson, Thomas F. Stout, and Jacob Yaple) between 1827 and 1833. All land was purchased from the federal government at the rate of $1.25 per acre (Figure 4).

The 1872 historical atlas indicates the parcels associated with the project areas as owned by William O'Rear, Joel Corrington, and Lucretia Green (Figure 5). This source does not indicate any structures within the APE.

The 1894 historical atlas indicates the parcels associated with the project areas as owned by L. M. Thomas, Henry W. Beilschmidt, and Lucretia Green (Figure 6). While this source indicates a structure intersecting the project area on the Beilschmidt property, this is most likely due to mapping inconsistencies. No evidence of a structure or associated materials was recovered during this investigation.

Previous Surveys/ Reported Sites: A review of IHPA records indicates that no previous surveys or sites have been reported within the APE.

Regional Archaeologists Contacted: Databases maintained by the Illinois State Museum, the Illinois Department of Natural Resources, and the Illinois Historic Preservation Agency were reviewed.

Investigation Techniques: Pedestrian reconnaissance at 5-meter intervals was conducted within the project area.

Field Time Expended: 10 man hours

Sites/Find Spots Located: NONE

Cultural Material: NONE

(Curated at): N/A

Collection Techniques: N/A

Area Surveyed (Acres & Square Meters): Approximately 15.3-acres (61935.36 m^2).

RESULTS OF INVESTIAGATIONS AND RECOMMENDATIONS (CHECK ONE)

■ **Phase I Archaeological Reconnaissance Has Located No Archaeological Material; Project Clearance is Recommended.**

☐ **Phase I Archaeological Reconnaissance Has Located Archaeological Materials: Site(s) Does (Do) Not Meet requirements for the National Register Eligibility; Project Clearance is Recommended.**

☐ **Phase I Archaeological Reconnaissance Has Located Archaeological Materials; Site(s) May Meet Requirements for National Register Eligibility; Phase II Testing is Recommended.**

☐ **Phase II Archaeological Investigations Has Indicated that Site(s) Does (Do) Not Meet Requirements for National Register Eligibility; Project Clearance is Recommended.**

☐ **Phase II Archaeological Investigations Has Indicated that Site(s) Meet Requirements for National**

Register Eligibility; Formal Report is Pending and a Determination of Eligibility is Recommended.

Comments: An intensive cultural resource survey of the area proposed to be impacted by site characterization activities associated the FutureGen project in Morgan County, Illinois was conducted on April 25, 2011. The project area is composed of approximately 15.3-acres in agricultural use where 80-95 percent of the ground surface was visible to field investigators.

The current investigation included an examination of historical maps and atlases pertinent to the subject property, a computer database search of the archaeological site files maintained by the Illinois State Museum, a review of the National Register of Historic Places (NRHP), and a review of the Illinois Register of Historic Sites (IRHS) maintained by the Illinois Historic Preservation Agency. Examination of archival and historical sources and resource databases did not identify that known prehistoric or historic sites, areas, or artifacts may be present within the boundaries of the APE or within the immediate vicinity of the APE.

Archaeological and cultural resource field examination of the APE included the use of pedestrian reconnaissance at 5-meter intervals to located evidence of unknown or unreported archaeological, historical or cultural sites, area, and artifacts. Under excellent field conditions and ground surface exposure, field surveyors failed to find evidence of archaeological or historical resources, sites, or structures within the boundaries where characterization activities will be conducted. Due to the APE's location within the interior uplands of Morgan County, it is unlikely that alluvial or colluvial depositional conditions have resulted in the deep burial of cultural deposits or remains. As a result, geomorphological investigative techniques to locate and assess deeply buried archaeological and historical resources or artifacts were deemed unnecessary.

Management Summary and Conclusions

A cultural resource inventory of the area proposed for characterization activities related to the FutureGen Industrial Alliance facility in Morgan County, Illinois included an examination of historical maps and atlases pertinent to the subject property, a computer database search of the archaeological site files maintained by the Illinois State Museum, and a review of the National Register of Historic Places (NRHP), a review of the Illinois Register of Historic Sites (IRHS) maintained by the Illinois Historic Preservation Agency, and field investigations utilizing a pedestrian reconnaissance at 5-meter intervals.

Based on the results of field investigations and on information collected during archival and background research, the APE does not contain evidence for the presence of archaeological, historical, or cultural resources, sites, areas, or artifacts. As presently conceptualized, activities related to the characterization of the Morgan County, IL FutureGen facility will not impact cultural resources. Further, additional cultural resource investigations are neither warranted nor recommend. State Historic Preservation Officer concurrence and approval is requested.

Archaeological Contractor Information

Archaeological Contractor: Prairie Archaeology & Research.
Address/Phone: P.O. Box 5603, Springfield, IL 62705-5603 (217) 544-4881
Surveyors(s): Joseph Craig and Jason Rein
Survey Date(s): April 25, 2011
Report Completed By: Jason Rein and Joseph Craig
Date: April 26, 2011
Submitted By (Signature and Title):

<u>*Attachment Check List: (#1 through #4 are **MANDATORY**)*</u>

- ■ 1. Relevant Portion of USGS 7.5’ Topographic Quadrangle Map(s) showing Project Location and Recorded Sites;
- ■ 2. Project Map(s) depicting Survey Limits and, when Applicable, Approximate Survey Limits, and Concentrations of Cultural Materials;
- ■ 3. Site Form(s); Two Copies of Each Form;
- ■ 4. All Relevant Project Correspondence;
- ☐ 5. Additional Information Sheets As Necessary

Address of Owner/Agent/Agency To Whom SHPO Comment Should Be Mailed

FutureGen Industrial Alliance, Inc.
1101 Pennsylvania Avenue, NW
Sixth Floor
Washington, D.C. 20004

Contact Person: Mr. Ken Humphreys, CEO
Phone Number: (202) 280-6019
Fax Number: n/a

U. S. Department of Energy
National Technology Laboratory
3610 Collins Ferry Road
P. O. Box 880
Morgantown, WV 26507-0880

Contact Person: Mr. Cliff Whyte, NEPA Compliance Officer
Phone Number: (304) 285-2098
Fax Number: n/a

Review Comments:

REFERENCES

Andreas, Lyter & Co.
1872 Atlas Map of Morgan County, Illinois. Davenport.

American Atlas Co.
1894 Plat Book of Morgan County, Illinois. Chicago.

United States Department of Agriculture
2011 http://websoilsurvey.nrcs.usda.gov

United States General Land Office
1823 General Land Survey Plats, T16N, R8-9W. Plats on file at the Illinois State Library, Springfield, Illinois.

United States Geological Survey
1983 Prentice, IL 7.5 Minute Topographic Map

FIGURES

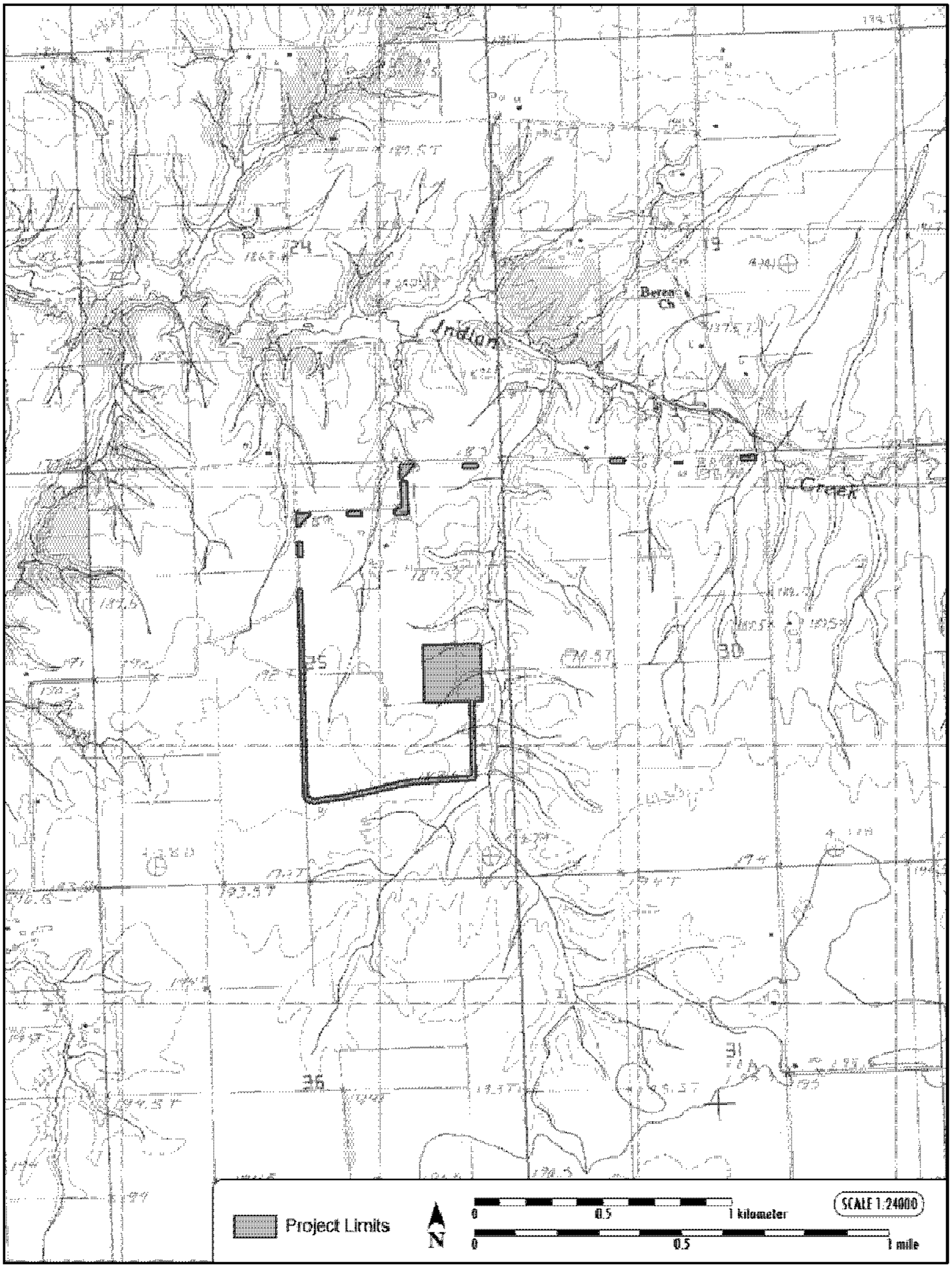

Figure 1. Location of the project area, Morgan County, Illinois (1983 Prentice, IL 7.5’ USGS Topographic Map).

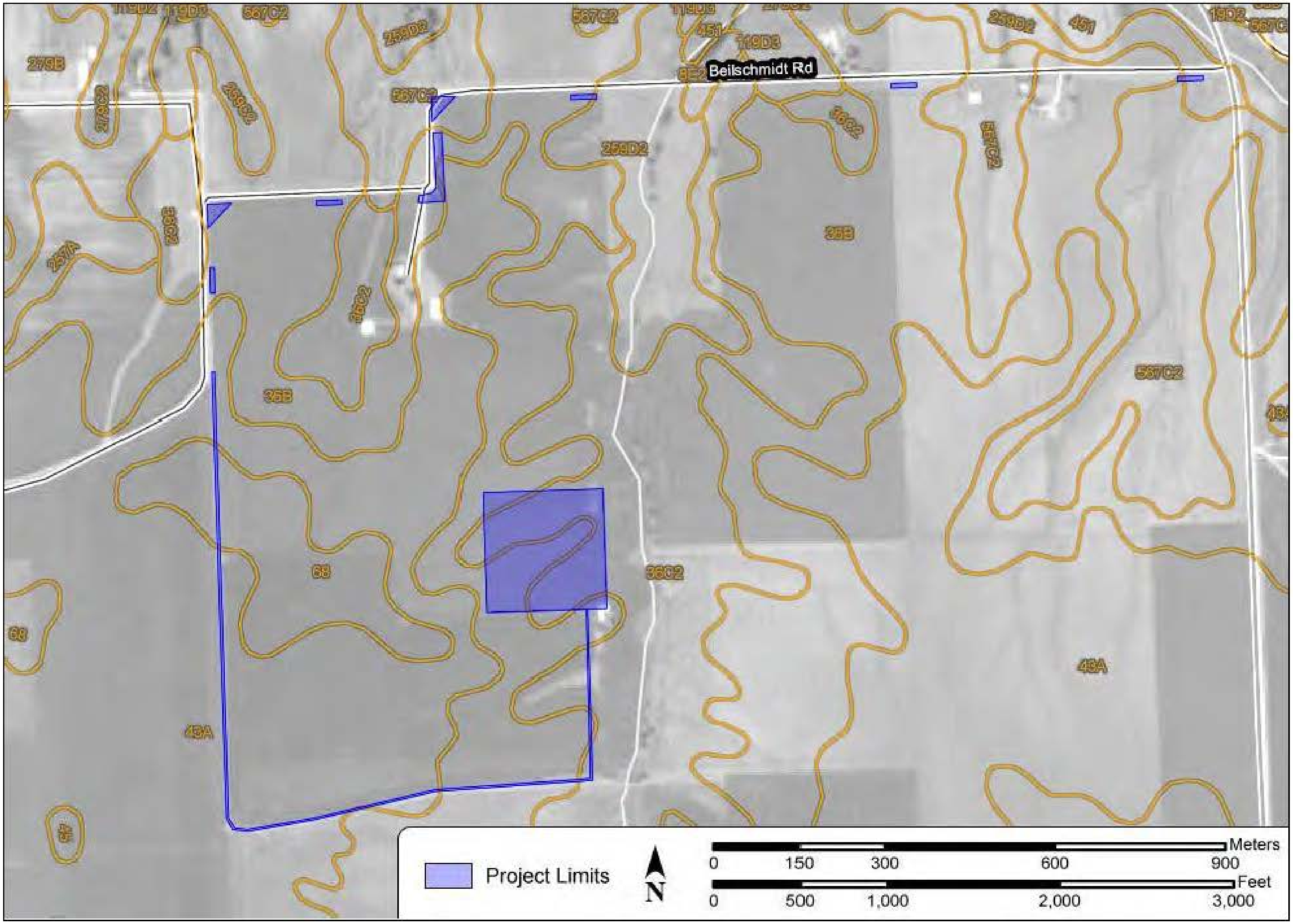

Figure 2. Location of the project area, Morgan County, Illinois (http://websoilsurvey.nrcs.usda.gov).

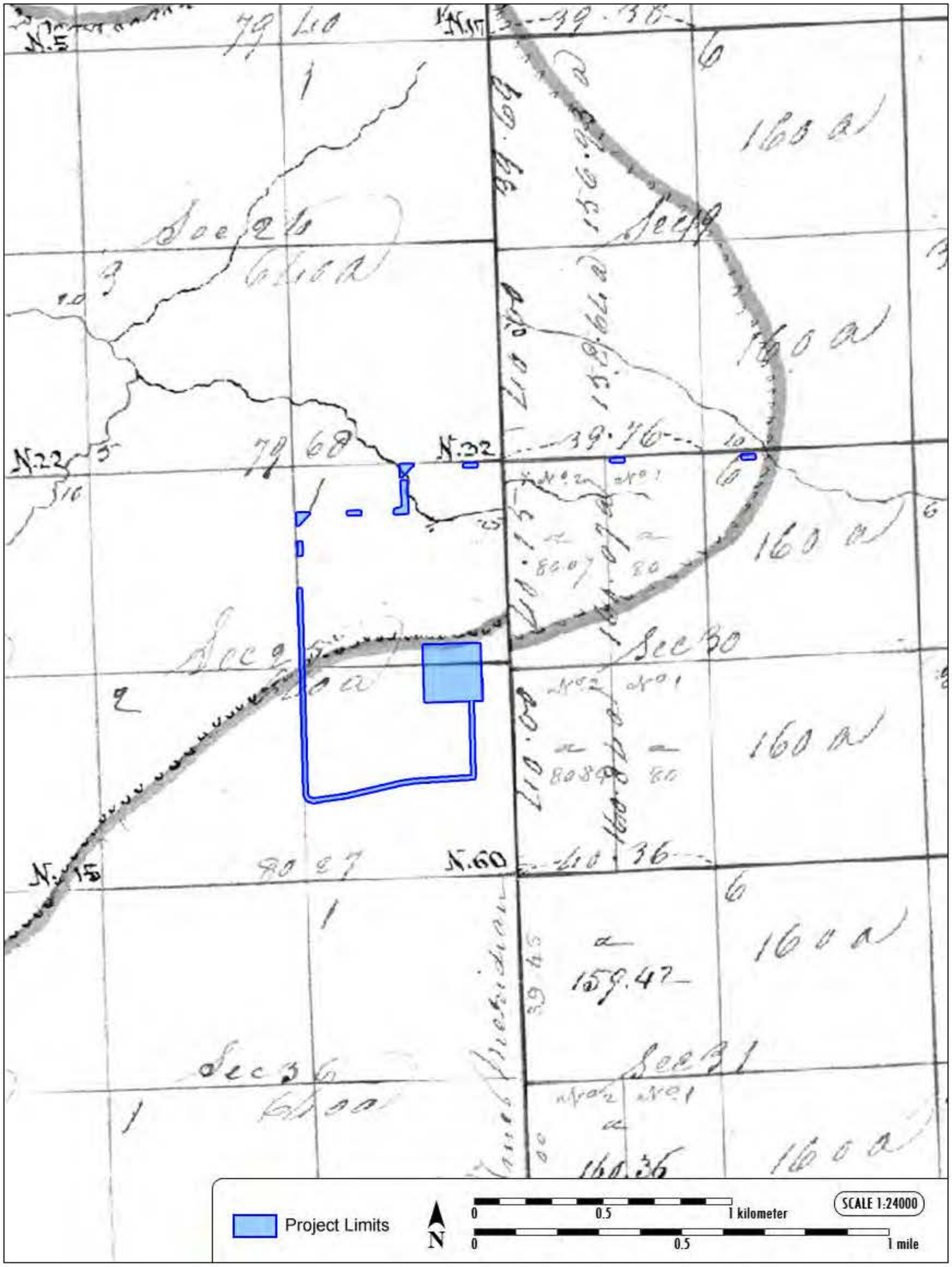

Figure 3. Location of the project area, Township 16 North, Ranges 8-9 West (1823 United States General Land Office Survey)

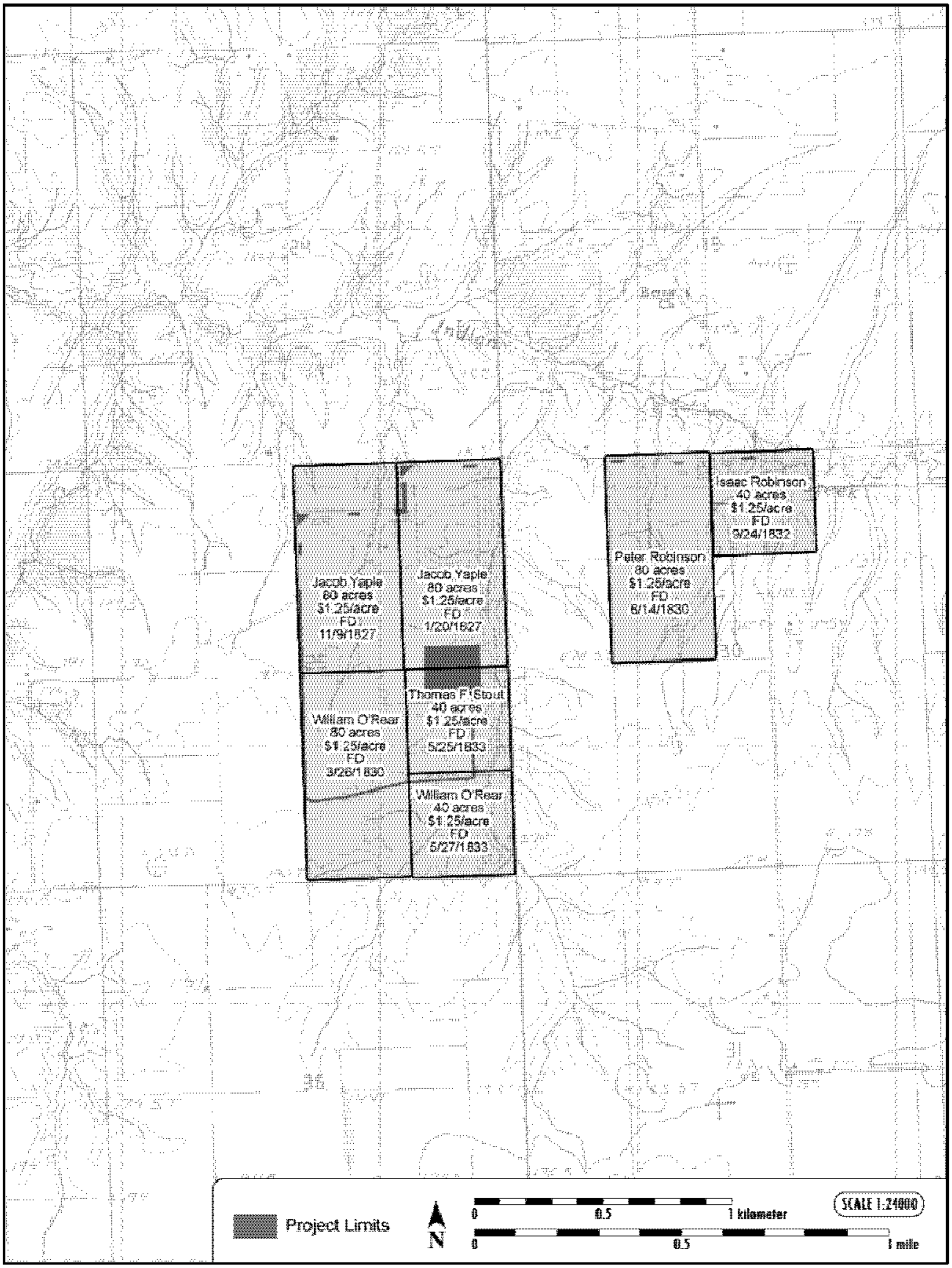

Figure 4. Initial land purchases within the project area.

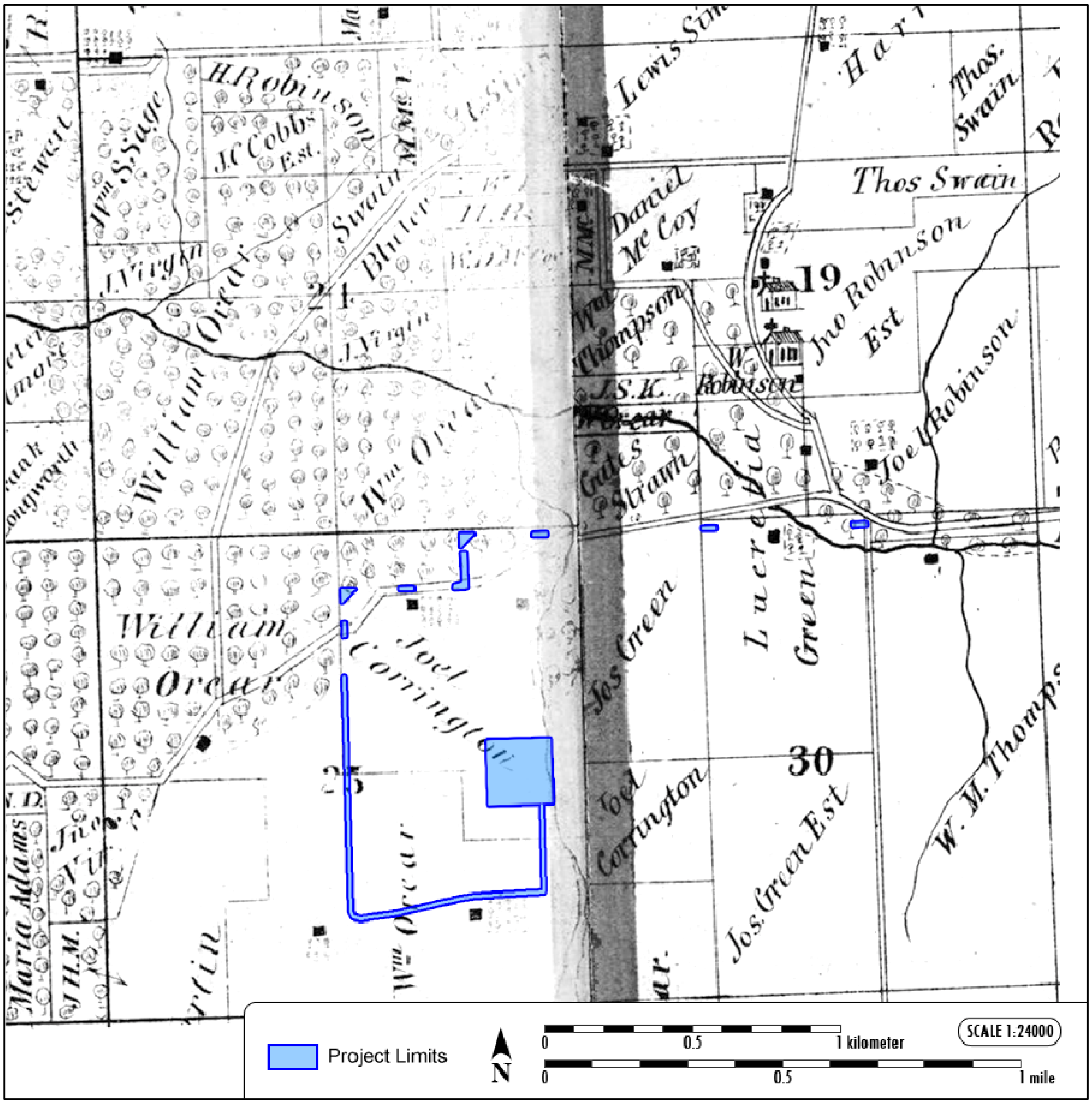

Figure 5. Location of the project area, Morgan County, Illinois (1872 Atlas Map of Morgan County, Illinois).

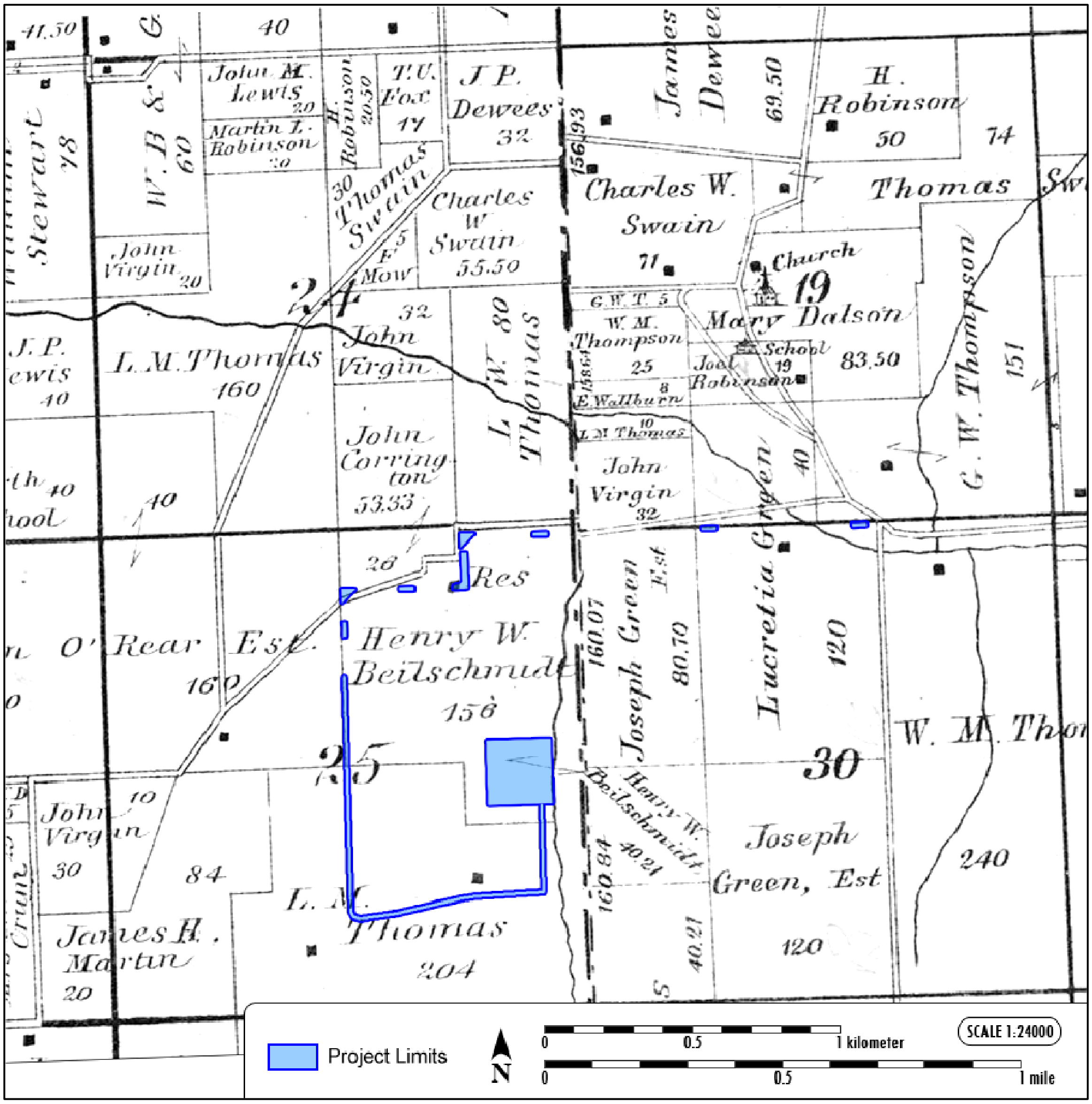

Figure 6. Location of the project area, Morgan County, Illinois (1894 Plat Book of Morgan County, Illinois).

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APPENDIX F2

PHASE I – MEREDOSIA ENERGY CENTER SURVEY

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Archaeological Survey Short Report
Illinois Historic Preservation Agency
Old State Capitol Building
Springfield, Illinois 62701 (217) 785-4997

REVIEWER	
Date:	
Accepted	Rejected
IHPA USE ONLY (Form ASSR0886)	

PHASE I CULTURAL RESOURCE SURVEY

147-ACRE FUTUREGEN 2 POWER PLANT SITE
NEAR THE VILLAGE OF MEREDOSIA
MORGAN COUNTY, ILLINOIS

DRAFT

Prepared For

Potomac-Hudson Engineering, Inc.
One Washingtonian Center
9801 Washingtonian Boulevard, Suite 350
Gaithersburg, Maryland 20878

April 2012

Prairie Archaeology & Research
P.O. Box 5603 ● Springfield, Illinois 62705-5603 ● Phone 217.544.4881
www.prairiearchaeology.com

Archaeological Survey Short Report
Illinois Historic Preservation Agency
Old State Capitol Building
Springfield, Illinois 62701 (217) 785-4997

REVIEWER
Date:
Accepted Rejected
IHPA USE ONLY (Form ASSR0886)

IHPA Log #: ***unassigned***

LOCATIONAL INFORMATION AND SURVEY CONDITIONS

County: Morgan **Quadrangle:** Meredosia, IL 7.5 minute USGS

Project Type/Title: FutureGen 2 Power Plant Site, Morgan County, Illinois (Figure 1).

Funding and/or Permitting Federal/State Agencies: U.S. Department of Energy

Township: 16 North **Range:** 13 West **Section(s):** 21, 22, 27 and 28

Project Description: A phase I cultural resource investigation of the existing Meredosia Energy Center and surrounding areas related to the FutureGen 2 Power Plant Site project in Morgan County, Illinois.

Topography: Floodplain

Soils: Specific soils in the project area include: 54B - Plainfield loamy sand, 2 to 7 percent slopes; 54D - Plainfield loamy sand, 7 to 15 percent slopes; and 533 - Urban land.

Drainage: Illinois River

Land Use/Ground Cover (Include % Visibility): The project area consisted of 100 acres of previously developed and disturbed areas, 18 acres of woods with 0-percent ground surface visibility, 24 acres of agricultural fields with 100-percent ground surface visibility, and 5 acres of grassy/fallow areas with 40-percent ground surface visibility.

Survey Limitations: Survey limitations were minimal.

ARCHAEOLOGICAL AND HISTORICAL INFORMATION

Historical Plats/Atlases/Sources: The following historical sources were examined: 1862 *United States General Land Office Plat* (T16N, R13W), 1872 *Atlas Map of Morgan County, Illinois* (Andreas, Lyter & Co.), 1894 *Plat Book of Morgan County, Illinois* (American Atlas Co.), and the 1980 *Meredosia, IL 7.5' Topographic Map* (United States Geological Survey).

The 1833 GLO shows the project vicinity to be situated within barrens, prairie, and wet, swampy areas. This source does not indicate any cultural landmarks (such as trails, fords, or roads) within the project boundaries (Figure 2). The Illinois Public Domain Land Tract Database indicates the land parcels associated with the project area were purchased by several individuals from the federal government between 1831 and 1835 (Appendix A: Historical Research).

The 1872 historical atlas indicates the parcels associated with the project area as owned by R. S. Lord, Lusk & Brady, and Daniel Waldo (Figure 3). The following 1894 atlas indicates the parcels associated with the project area as owned by E. E. Potter, J. W. Thompson, the Wabash R.R. Company, B. Dunn, and J. S. Knowles (Figure 4). The 1872 atlas indicates a structure within the project area on the R. S. Lord property.

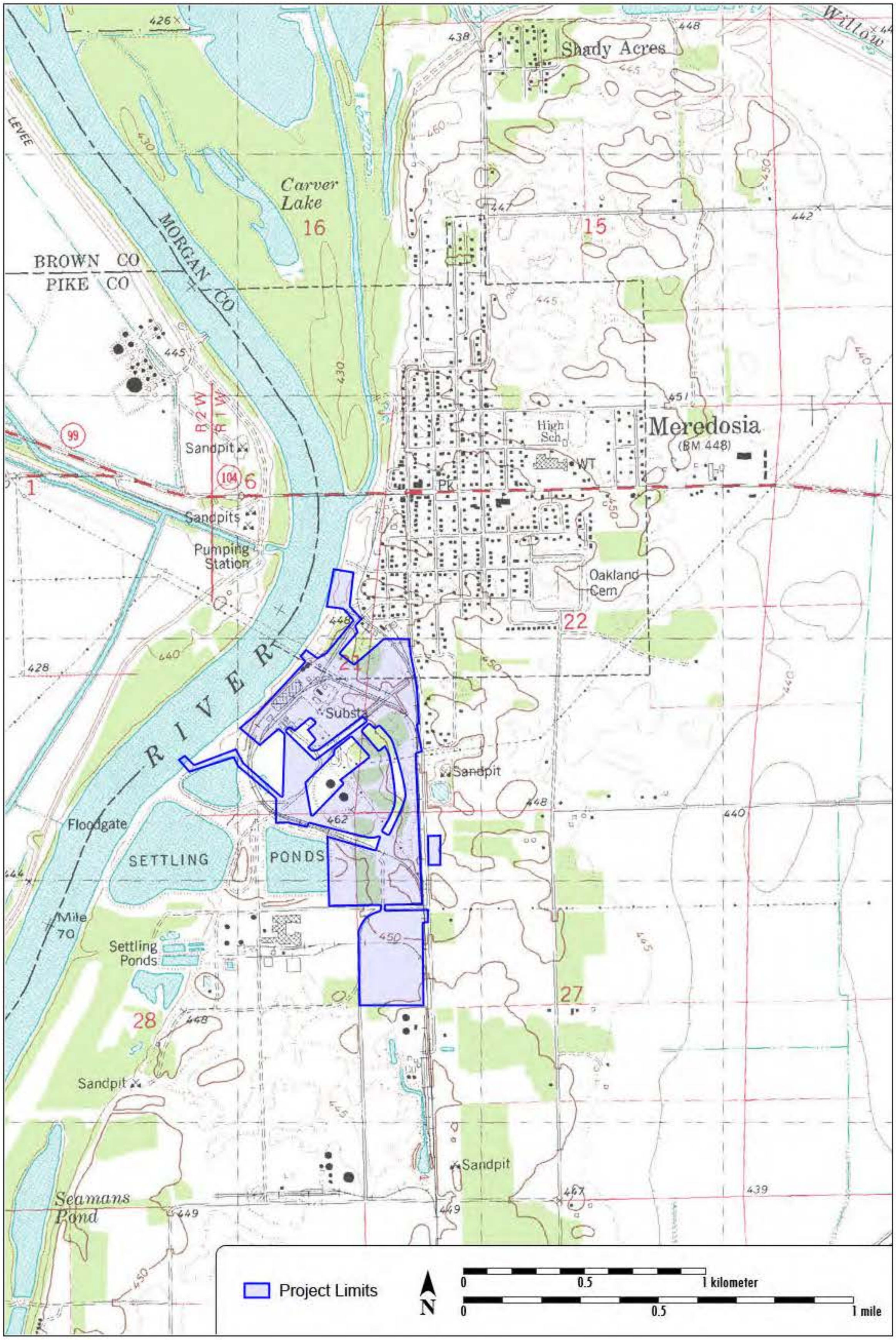

Figure 1. Location of the project area, Morgan County, Illinois (1980 Meredosia, IL 7.5’ USGS Topographic Map).

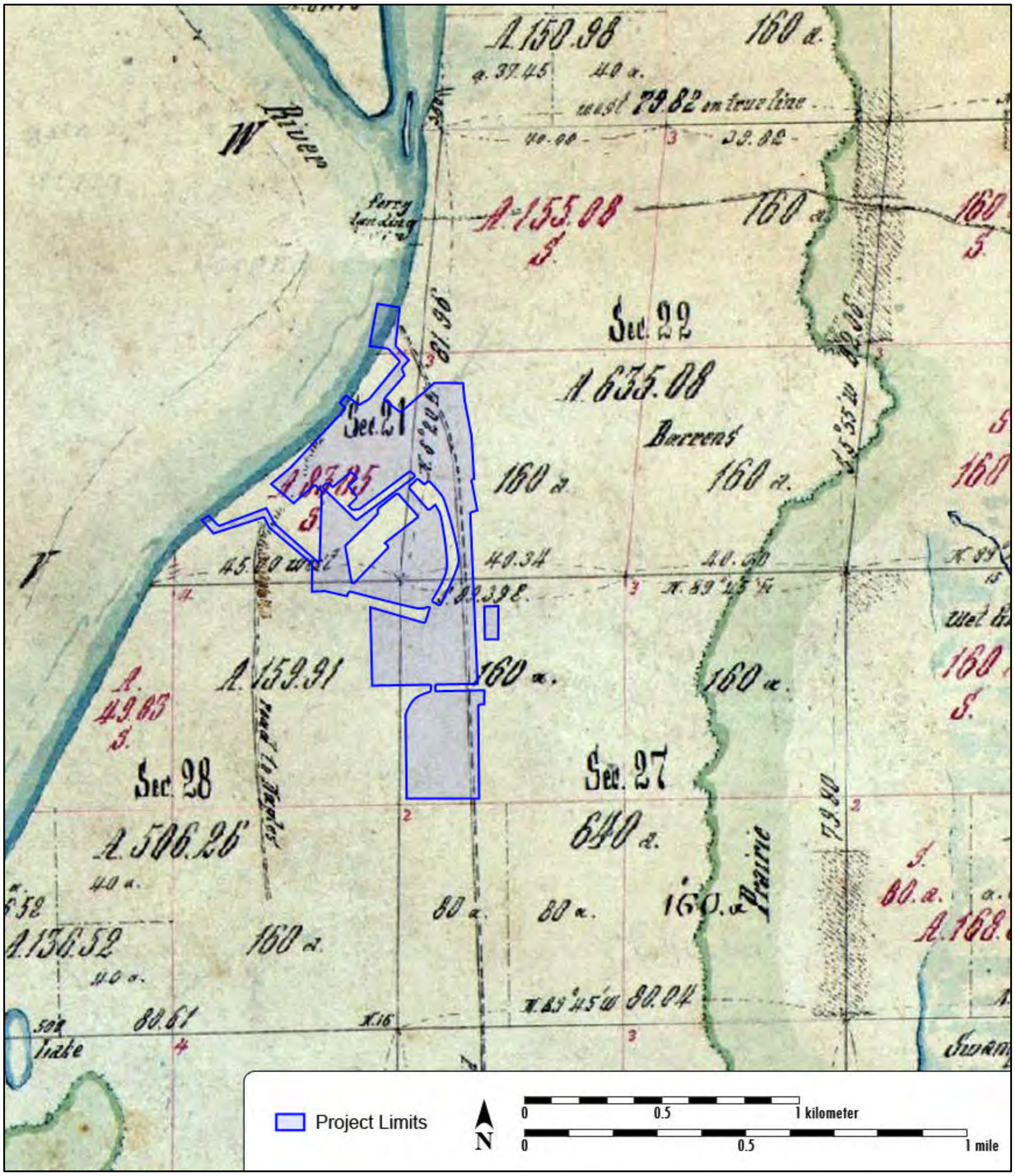

Figure 2. Location of the project area, Township 16 North, Range 13 West (1862 United States General Land Office Survey)

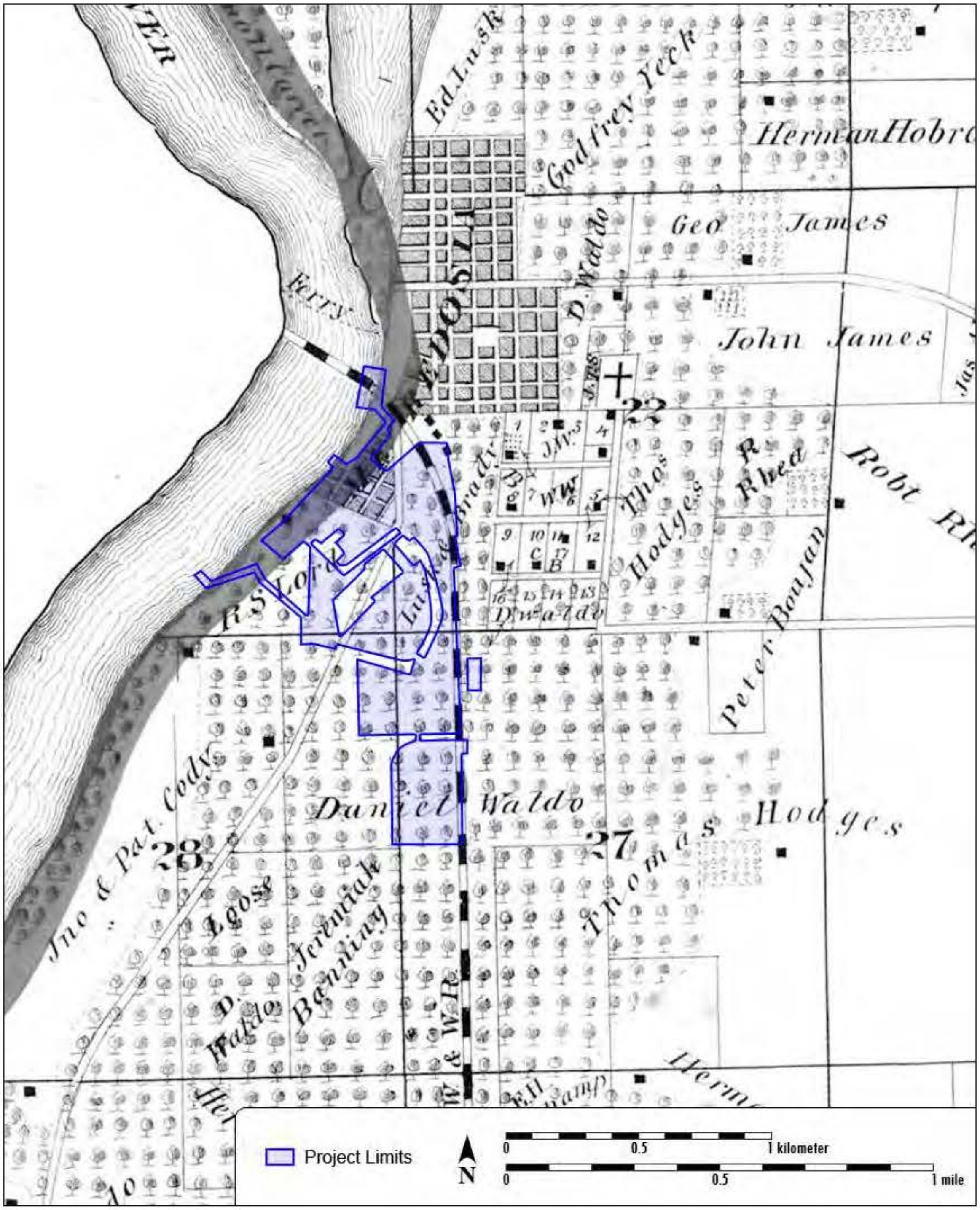

Figure 3. Location of the project area, Morgan County, Illinois (1872 Atlas Map of Morgan County, Illinois).

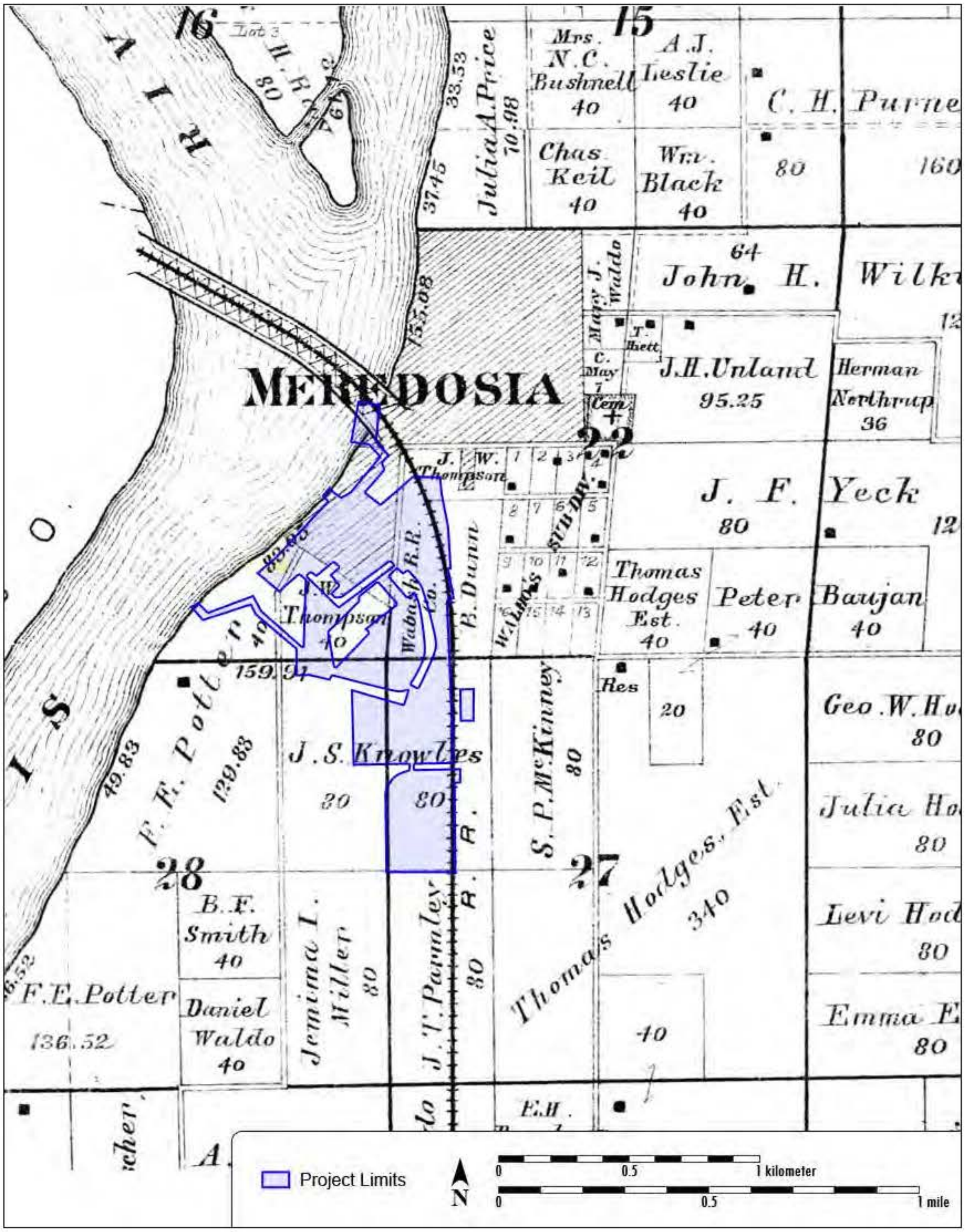

Figure 4. Location of the project area, Morgan County, Illinois (1894 Plat Book of Morgan County, Illinois).

Previous Surveys/ Reported Sites: A review of IHPA records indicates that a portion of the project area was surveyed by the Center for American Archaeology in 1991 (Appendix B). This source also indicates an unknown survey was conducted in the southern portions of the project area. One site, 11Mg473, was reported within northeast portions of the project area. In addition, site 11Mg22 was reported by A. Berkson in 1976. This Early Woodland site is situated adjacent to the project limits along the riverbank. According to IHPA records, a small portion of this site intersects the project limits within an area that has been heavily modified and disturbed by construction activities at the Meredosia Energy Center.

Regional Archaeologists Contacted: Databases maintained by the Illinois State Museum, the Illinois Department of Natural Resources, and the Illinois Historic Preservation Agency were reviewed.

Investigation Techniques: Pedestrian reconnaissance at 5-meter intervals was conducted within grassy areas with 40-percent ground surface visibility. Shovel-probe reconnaissance at 15-meter intervals was conducted within grassy and wooded areas (Figure 5).

Field Time Expended: 57 man hours

Sites/Find Spots Located: none

Cultural Material: none

(Curated at): n/a

Collection Techniques: n/a

Area Surveyed (Acres & Square Meters): Approximately 147-acres (594,890 m^2).

RESULTS OF INVESTIAGATIONS AND RECOMMENDATIONS (CHECK ONE)

■ **Phase I Archaeological Reconnaissance Has Located No Archaeological Material; Project Clearance is Recommended.**

☐ **Phase I Archaeological Reconnaissance Has Located Archaeological Materials: Site(s) Does (Do) Not Meet requirements for the National Register Eligibility; Project Clearance is Recommended.**

☐ **Phase I Archaeological Reconnaissance Has Located Archaeological Materials; Site(s) May Meet Requirements for National Register Eligibility; Phase II Testing is Recommended.**

☐ **Phase II Archaeological Investigations Has Indicated that Site(s) Does (Do) Not Meet Requirements for National Register Eligibility; Project Clearance is Recommended.**

☐ **Phase II Archaeological Investigations Has Indicated that Site(s) Meet Requirements for National Register Eligibility; Formal Report is Pending and a Determination of Eligibility is Recommended.**

Comments: An intensive cultural resource survey of the proposed area to be impacted by construction activities associated with the FutureGen 2 Power Plant Site project in Meredosia, Morgan County, Illinois was conducted on March 5-8, 2012. The project's Area of Potential Effect (APE) is comprised of approximately 100 acres of previously disturbed and developed areas, 18 acres of woods, 24 acres of agricultural areas, and 5 acres of grassy/fallow areas (Figure 5). Shovel-probe reconnaissance at 15-meter intervals was conducted within the wooded areas. Pedestrian reconnaissance at 5-meter intervals was conducted within the agricultural fields and grassy/fallow areas.

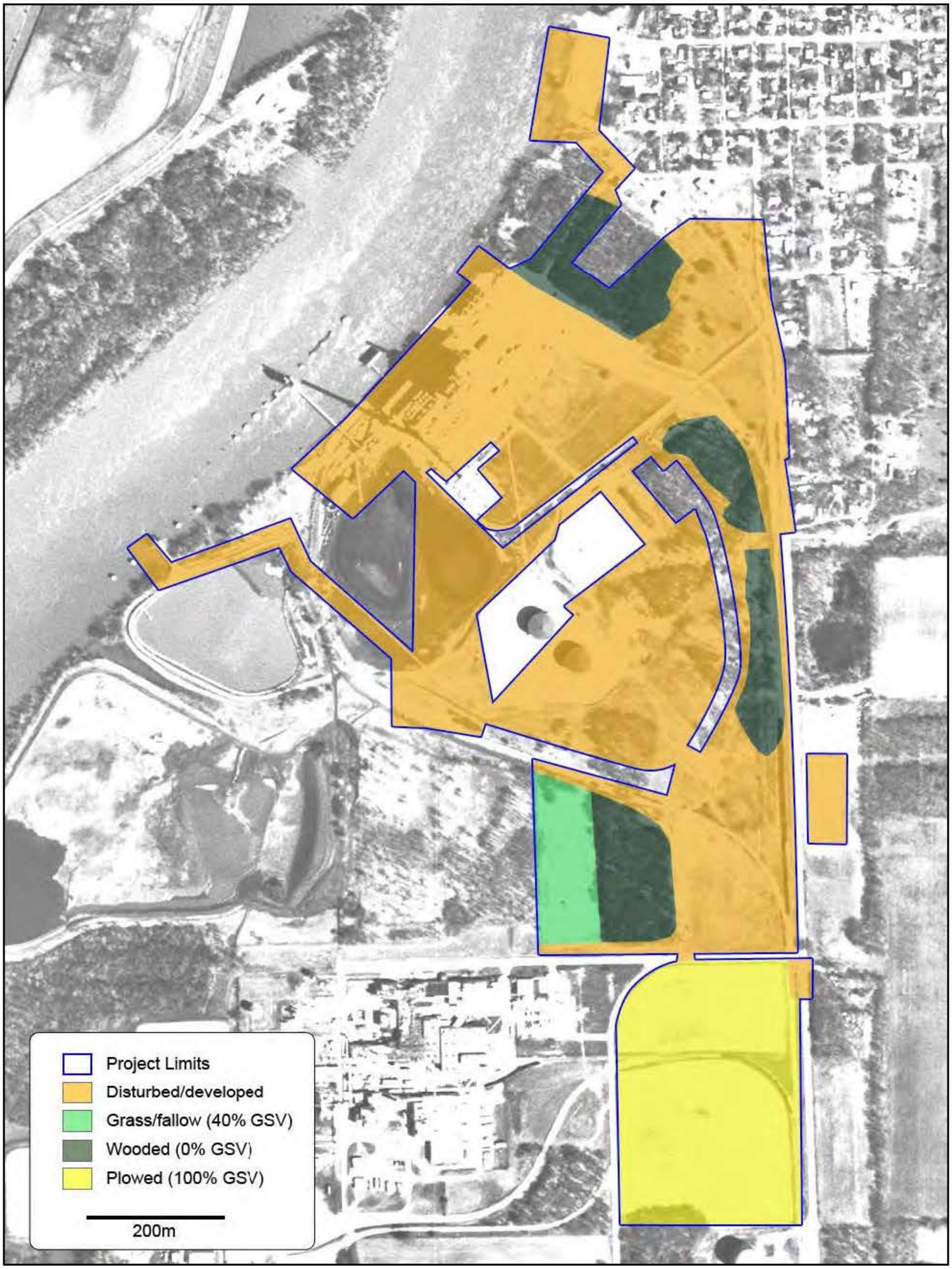

Figure 5. Ground surface visibility within the project area, Morgan County, Illinois.

The current investigation included an examination of historical maps and atlases pertinent to the subject property, a computer database search of the archaeological site files maintained by the Illinois State Museum, a review of the National Register of Historic Places (NRHP), and a review of the Illinois Register of Historic Sites (IRHS) maintained by the Illinois Historic Preservation Agency. Examination of archival and historical sources and resource databases did not identify that known prehistoric or historic sites, areas, or artifacts may be present within the boundaries of the APE or within the immediate vicinity of the APE.

Assessment of Buried Resources

The Meredosia Energy Center and surrounding project area is mapped as a terrace associated with catastrophic flood landscape (Hajic 2000). The erosional surface of the terrace is as old as 15,500-16,000 BP and no younger than 12,000 BP (Hajic 2000). The surface of the terraces has a low potential for buried archaeological deposits beneath eolian sand. The bulk of the sandy dune deposits are estimated by Hajic (2000) to be no younger than 10,550 BP with localized reactivation during the Holocene. The terrace is mapped as part Bluffs Terrace and part Bath Terrace. Interestingly, the dune morphology appears to be confined to the older Bath Terrace (late Wisconsinan). Soils mapped in the vicinity of the project area are the sandy Plainfield and Sparta series (USDA Web Soil Survey nd). These soils are formed in outwash and wind-reworked outwash. The Plainfield series is an excessively drained entisol with a thick Bw subsoil horizon. The Sparta series is an excessively drained mollisol with a Bw horizon over a lamellar E/Bt horizon in the subsoil. The erosional event that created the catastrophic flood terrace occurred prior to human occupation in the area (16,000 BP - ± 12,000 BP). A dune cap ranging from 0.7 to 1.3 m thick covers the remainder of the terrace in the project area. The age of the dunes is not known with certainty. Hajic (2000) estimates dunes on the terrace tops are no younger than 10,500 BP. Soils are relatively well developed which is consistent with this late Wisconsinan age. Certainly some or all of the dunes date to this time interval. There is also the possibility (albeit low) for localized reactivation during drier periods of the Holocene.

NATIONAL REGISTER OF HISTORIC PLACES ELIGIBILITY ASSESSMENT

In addition to the inventorying of resources within the proposed development area, Prairie Archaeology & Research offers the following recommendations regarding the eligibility potential for inclusion on the National Register of Historic Places (NRHP). The Advisory Council on Historic Preservation has established inclusion eligibility criteria. According to the Advisory Council on Historic Preservation, a resource is considered eligible for inclusion if it meets at least one of the following conditions:

A. It is associated with events that have made a significant contribution to the broad patterns of history; or
B. It is associated with the lives of persons significant in the past; or
C. It embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master or possesses high artistic value or represents a significant and distinguishable entity whose components may lack individual distinction; or
D. It has yielded, or may be likely to yield, information important in prehistory or history.

To be listed on or determined eligible for listing on the NRHP, a property must meet at least one of the above criteria and must possess integrity. Integrity is defined as the authenticity of a property's historic identity as evidenced by the survival of physical characteristics that existed during the property's historic or prehistoric occupation or use. Physical characteristics may include: integrity of location, design, setting, materials, workmanship, feeling, and association. If a property retains the physical characteristics it possessed in the past, it has the capacity to convey information about a culture or people, historical patterns, or architectural or engineering design and technology.

HISTORICAL CONTEXT

History of the Meredosia Energy Center and the Central Illinois Public Service Company

The Meredosia Energy Center was constructed in the 1940s and operated by the Central Illinois Public Service Company (CIPSCO). The facility is located south of the Town of Meredosia adjacent to the Illinois River.

As a private business enterprise, CIPSCO began in 1902 as the Mattoon City Railway Company which was organized to provide streetcar service in Mattoon, Illinois. Between 1903 and 1904, Mattoon City Railway quickly diversified its services and assets to include an electric generating plant and distribution system supplying both Mattoon and the surrounding region. Additional acquisitions and diversification followed during the first decade of the 20th century. In 1912, the company's name was changed to Central Illinois Public Service Company in a move that more accurately reflected the company's activities and plans to provide light and power to Mattoon and Charleston, Illinois, a heating service in Mattoon, separate electric street railway systems in Mattoon and Charleston, and an electric interurban railway system joining the two cities (CIPSCO 1989).

By 1914 CIPSCO was operating eight generating stations and serving 232 communities, including over 100,000 electric customers. In addition to its electric, gas, and heat utility businesses, the company's service included supplying water, selling ice wholesale to some communities, and operating a retail ice businesses in select cities. CIPSCO retained its transportation division and the company's transportation system included a network of five railway systems and interurban lines serving nine Central Illinois communities.

Business continued expanding rapidly in the 1920s, with corporate growth following suit. In 1921 CIPS moved its general offices from Mattoon to Springfield. By 1924, construction was completed on the company's Grand Tower Power Station in Jackson County, Illinois. The following year CIPSCO completed the acquisition of electric, gas, and heat companies serving the City of Quincy, Illinois and became the largest community in CIPSCO service territory. Also in 1925, CIPS began furnishing street railway service in Joliet, Illinois which linked interurban railroad service from Joliet to Chicago. During the late 1920s and in spite of the impending national Great Depression, CIPSCO continued acquiring minor electric and ice properties and extending both electric and gas service to previously un-served communities and rural areas.

However by 1931, the impact of the economic decline brought on by the Depression resulted in significant reductions in profit and CIPSCO reduced most classes of service to its customers. Financial conditions worsened in 1932 and the company was in the throes of rapidly declining sales. In order to reduce its expenditures, CIPSCO abandoned all railway and bus operations, sold off water supply divisions, and retired ice properties. As economic conditions improved by 1937, CIPSCO resumed its program of extending utility service into un-served portions of its service territory where business expansion would likely follow (CIPSCO 1989). CIPSCO entered the 1940s continuing a policy of withdrawing from activities not directly related to the electric and gas utility business.

In 1941 preliminary construction began on a steam electric generating plant on the Illinois River south of the Town of Meredosia in Morgan County, Illinois. However, due to the United States entering into World War II, construction of the Meredosia Energy Center was brought to a quick halt in 1942 by a directive of the War Production Board. As a matter of national safety, the War Production Board effectively suspended all construction at facilities not vital to the war effort including the Meredosia facility. Construction materials originally intended for the Meredosia Energy Center were redirected to support America's military needs. Specifically, the turbo-generator and related equipment initially destined for the plant were shipped by the War Production Board to assist the US's World War II ally Russia.

Construction resumed at Meredosia following the war, and the station's first generating unit was completed in 1946 and went into service in 1948. As a result of postwar increases in power demand, during the late 1940s CIPS added generating units at Grand Tower, Meredosia, and Hutsonville. CIPS's continued construction program during the 1950s was largely limited to the addition of generating units at Hutsonville and Grand Tower and completion of an interconnection program linking its Meredosia, Hutsonville, and Grand Tower power stations. CIPSCO continued operating and expanding the Meredosia facility through the 1960s, 70s, and 80s. In 1995, shareholders of CIPSCO and the Union Electric Company approved the merger of the two companies, which were combined as Ameren Corporation. Ameren continued power generation at Meredosia until 2011 when the corporation decided to close and shutter the Meredosia Energy Center.

Physical Layout of the Energy Center

The Meredosia Energy Center has four generating units including an oil-fired steam generator and encompasses a campus totaling 263-acres. As initially planned, the Meredosia Energy Center included a single generating unit (Unit 1) intended to supply 60 megawatts of power. However, to accommodate the growing, post-war demand for electricity, Unit 2 was constructed and placed in operation on Jan. 1, 1949, which doubled the plant's generating power output to 100 megawatts. Unit 3 was constructed and placed in operation in 1960 and produced 229 megawatts of electricity. The plant expanded in 1975 with the construction of the oil-fired Unit 4. Fuel oil for Unit 4 is delivered to the plant by barge and the generating capacity Unit 4 is 200 megawatts. At maximum capacity, the station can generate a total of 549 gross megawatts of energy. The plant has three emissions stacks. The tallest, built in 1979, served Units 1 and 2 and is 526 feet tall. The other two emissions stacks are 301 feet (Unit 3) and 186 feet (Unit 4) tall.

The Meredosia Energy Center operations were similar to many coal-powered generating facilities. Fuel for the plant has historically been coal derived from a wide variety of Illinois and Wyoming coal source types. Coal was delivered via truck and barge and the station drew water needed for power generation from the Illinois River. When in operation, the plant typically burned between 600,000 to 800,000 tons of coal annually, peaking at 1.15 million tons of coal in 2007. After delivery to the plant, coal is pulverized into a powder the consistency of talcum powder and is blown into the boiler furnace. In simple terms, electricity is produced when the boiler heats water creating steam. The steam then flows into a turbine and turns a shaft. On the end of the shaft is a magnet that revolves inside a coil creating electricity. At full capacity, when all units were in service, the plant's boilers burned more than 160 tons of coal per hour and 200 gallons of fuel oil per minute to produce about 4.2 million pounds of steam per hour.

The power plant consists of several sections that correspond to its interior functional divisions and phases of construction. The long brick façade along the river-side of the plant, built as part of the first construction project, visually unifies the portions of the plant built in the late1940s. All of the sections of the steel-framed building built prior to the 1960s are enclosed with red brick curtain walls. The southwest wing of the plant built in the 1960s is enclosed with ribbed sheet metal and has a fenestration pattern different from that of the earlier portions of the plant. The power plant floors are concrete; steel trusses support its roof. In 1960, Unit 3 was also built with red brick to match the 1940s section of the plant. The Unit 3 boiler room is about 60 feet higher and the turbine room was extended nearly identically to house

Unit 3. Sheet metal sided sections of the turbine building were built in the 1970s and are associated with Unit 4.

The bays are filled with tall windows that span several floor levels of the turbine and boiler rooms of the 1947 section. The majority of these tall multi-section windows that angle out are in the Unit 3 boiler room, with a few on the West side of the turbine room. Windows in the office and substation portions of the plant and in the 1940s portion of the boiler room do not span several floor levels. Original industrial steel sash with operable awning units remains in place in some of the windows. Openings in the areas used as offices, machine shop, and some of the boiler room windows have replacement aluminum-framed sash. A stone band course sets off the windows and the edge the plant's flat roofs**.** Roof monitors with wire-glass side walls light some of the interior spaces.

The coal that fueled the boilers in the plant was brought into the facility in rail cars that were emptied outdoors into the west section of the reclaim hopper to the east of the fuel-handling breaker house, which is identified as the brick building south of the plant to where the conveyors route. The reclaim hopper is situated in the northwest corner of the coal yard. Several spurs were originally planned to make room for more cars. The spur over the reclaim hopper extended along the east side of the main plant. The last coal received by rail was in 1978. The 1960 portion of the boiler room has a taller section adjacent to the 1940s boiler room**.** The 1940s chimney positioned adjacent to the boiler room has been removed and is surrounded by the steel framework that supports the precipitators that served the units in that section of the plant. The turbine room is located west of the boiler rooms and runs along the river. This portion of the plant, though not expressed clearly on the exterior of the plant, is a distinctive interior space**.** The narrow, rectangular space was extended with no dividing walls as the plant was enlarged in the 1960s and 1970s. The turbine room is approximately 400 feet in length and houses four generators.

Much of the original circa 1940s and early 1960s portions of the plant are obscured by subsequent remodeling and updating, the addition of generating units, and installation of emission control equipment. Considered as a single structure, the generating plant exhibits little evidence of its original structure, use, and purpose. Modernization of the Meredosia Energy Center over the course of the last 60 years since the plant was build retains little of its original structural integrity and is not eligible for nomination to the NRHP under criteria A or C.

In addition to the power generating units and emission stacks, the campus includes a range of offices, maintenance buildings, storage yards, garages, and a number of temporary storage buildings. None of the buildings are considered architecturally or historically significant and are not eligible for nomination to the NRHP.

Photographs of standing structures are shown presented in Appendix C.

MANAGEMENT SUMMARY AND CONCLUSIONS

A cultural resource inventory of the proposed development included an examination of historical maps and atlases pertinent to the subject property, a computer database search of the archaeological site files maintained by the Illinois State Museum, and a review of the National Register of Historic Places (NRHP) and the Illinois Register of Historic Sites (IRHS) maintained by the Illinois Historic Preservation Agency. In addition to archival records and database examination, the subject property was examined by archaeologists utilizing shovel-probe reconnaissance at 15-meter intervals and pedestrian reconnaissance at 5-meter intervals. Due to the presence of a number of waste water lagoons, bulk coal storage fields, ash and by-product storage, and electrical transmission facilities, barge loading facilities, roads, and railway lines, the entire campus has experienced dramatic ground disturbance due to it construction and continued operation and expansion over the last 60 years. Investigations failed to identify the presence of archaeological resources. In addition, examination of the standing structures occupying the facility did not document any existing structures greater than 50 years in age that are of architectural or historical merit.

Based on the results of field investigations and information derived during archival and background research conducted by Prairie Archaeology & Research for the proposed FutureGen 2 Power Plant Site activities located in Meredosia, Morgan County, Illinois, additional cultural resource investigations are neither warranted nor recommend. It is our recommendation to State Historic Preservation Officer that concurrence and approval be provided.

Archaeological Contractor Information
Archaeological Contractor: Prairie Archaeology & Research.
Address/Phone: P.O. Box 5603, Springfield, IL 62705-5603 (217) 544-4881
Surveyors(s): Joseph Craig and Jason Rein
Survey Date(s): March 5-8, 2012
Report Completed By: Joseph Craig
Date: April 9, 2012
Submitted By (Signature and Title): ______________________________

*Attachment Check List: (#1 through #4 are **MANDATORY**)*

■ 1. Relevant Portion of USGS 7.5' Topographic Quadrangle Map(s) showing Project Location and Recorded Sites;
■ 2. Project Map(s) depicting Survey Limits and, when Applicable, Approximate Survey Limits, and Concentrations of Cultural Materials;
■ 3. Site Form(s); Two Copies of Each Form;
■ 4. All Relevant Project Correspondence;
☐ 5. Additional Information Sheets As Necessary

Address of Owner/Agent/Agency To Whom SHPO Comment Should Be Mailed

Potomac-Hudson Engineering, Inc.
One Washingtonian Center
9801 Washingtonian Boulevard, Suite 350
Gaithersburg, Maryland 20878

Contact Person: Ms. Robin Griffin
Phone Number: (301) 907-9078, x3010
Fax Number: n/a

Review Comments:

REFERENCES

Andreas, Lyter & Co.
1872 Atlas Map of Morgan County, Illinois. Davenport.

American Atlas Co.
1894 Plat Book of Morgan County, Illinois. Chicago.

Central Illinois Public Service Company
1989 It Started with a Streetcar: Central Illinois Public Service Company, 1902-1989. Springfield, Illinois.

Hajic, Edwin R.
2000 Landform Sediment Assemblage (LSA) Units in the Illinois River Valley. Illinois State Museum Quaternary Studies Program Technical Report No. 95-1255-16.

United States Department of Agriculture
2012 http://websoilsurvey.nrcs.usda.gov

United States General Land Office
1862 General Land Survey Plats, T16N, R13W. Plats on file at the Illinois State Library, Springfield, Illinois.

United States Geological Survey
1980 Meredosia, IL 7.5 Minute Topographic Map

FIGURES

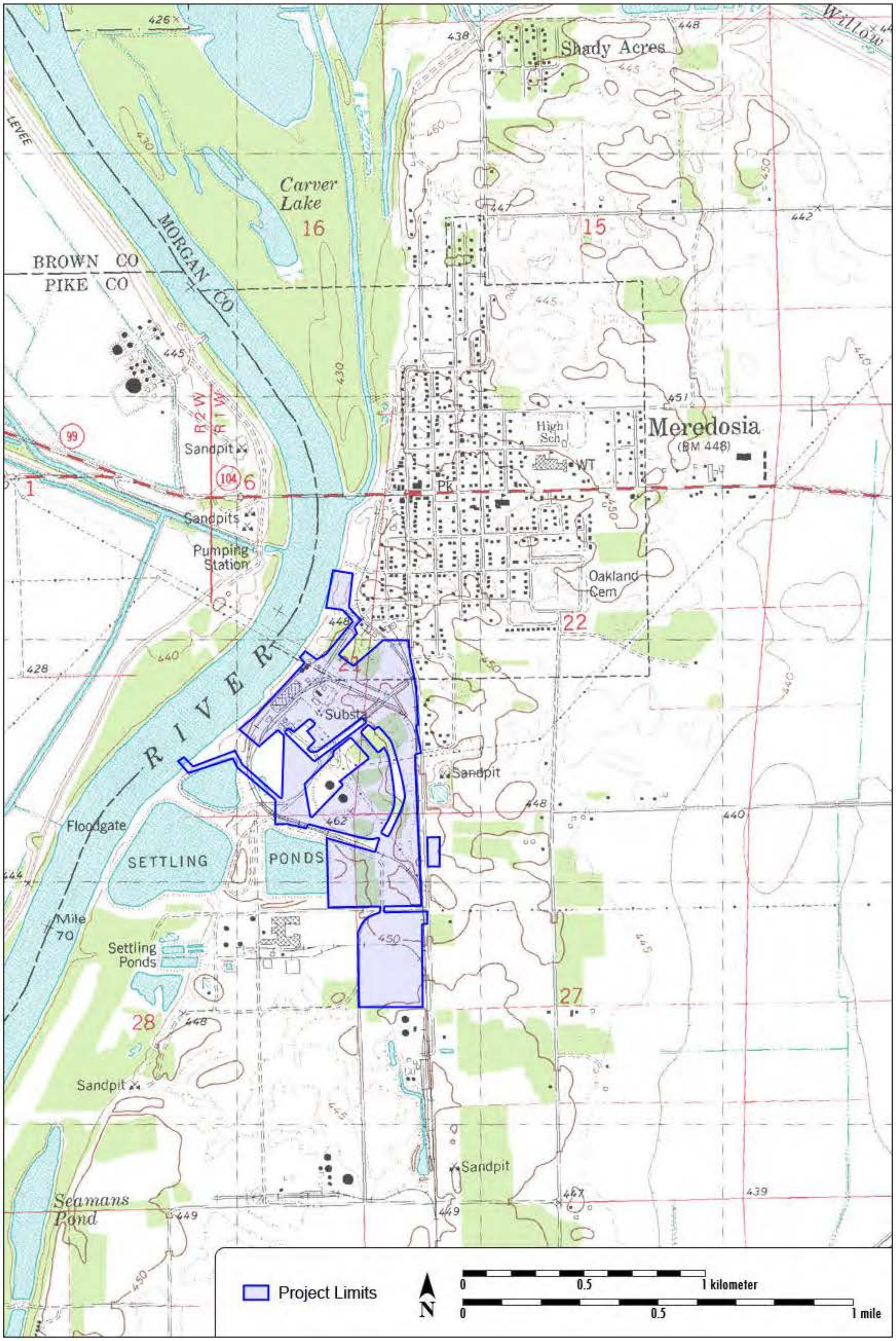

Figure 1. Location of the project area, Morgan County, Illinois (1980 Meredosia, IL 7.5' USGS Topographic Map).

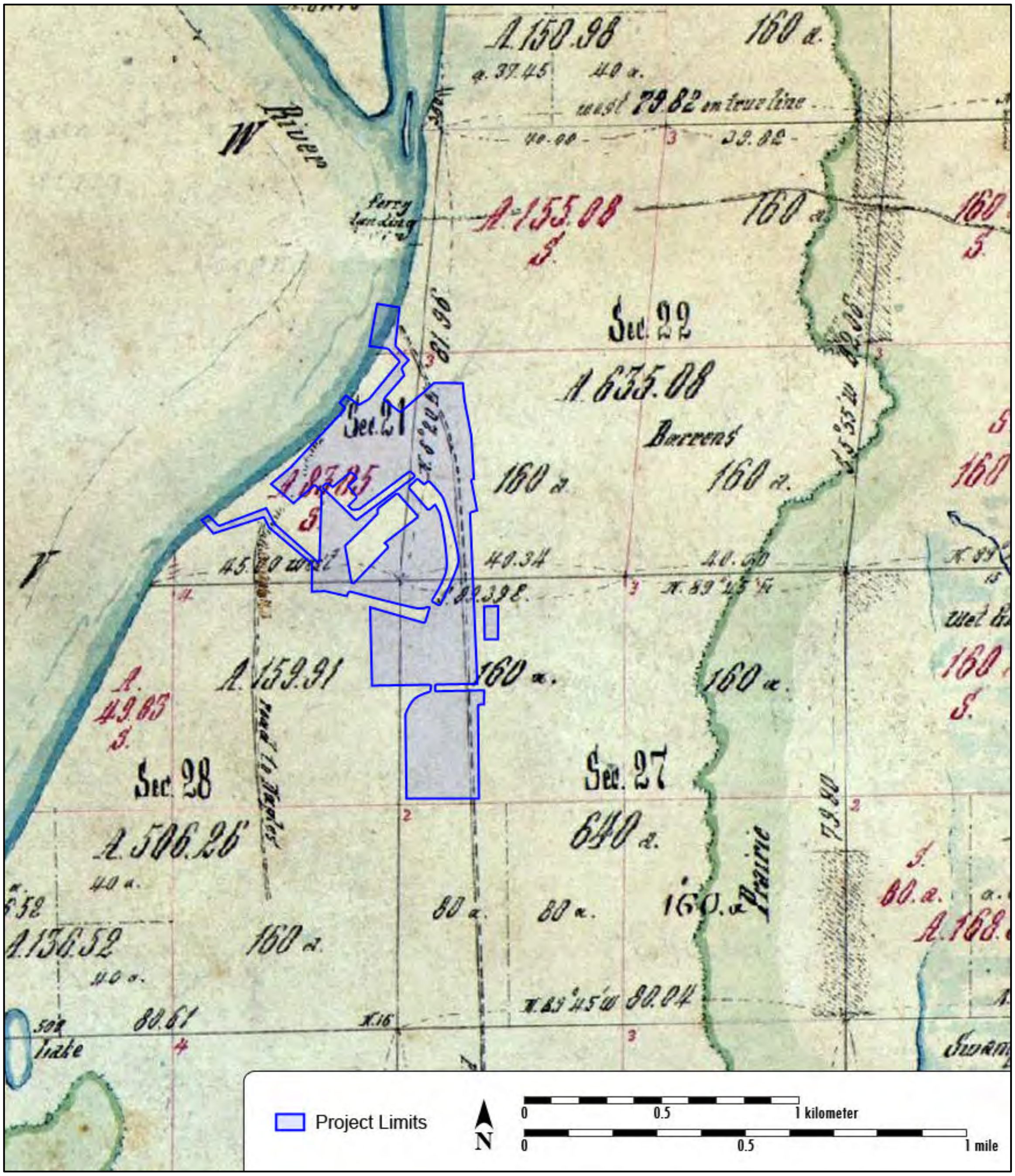

Figure 2. Location of the project corridor, Township 16 North, Range 13 West (1862 United States General Land Office Survey)

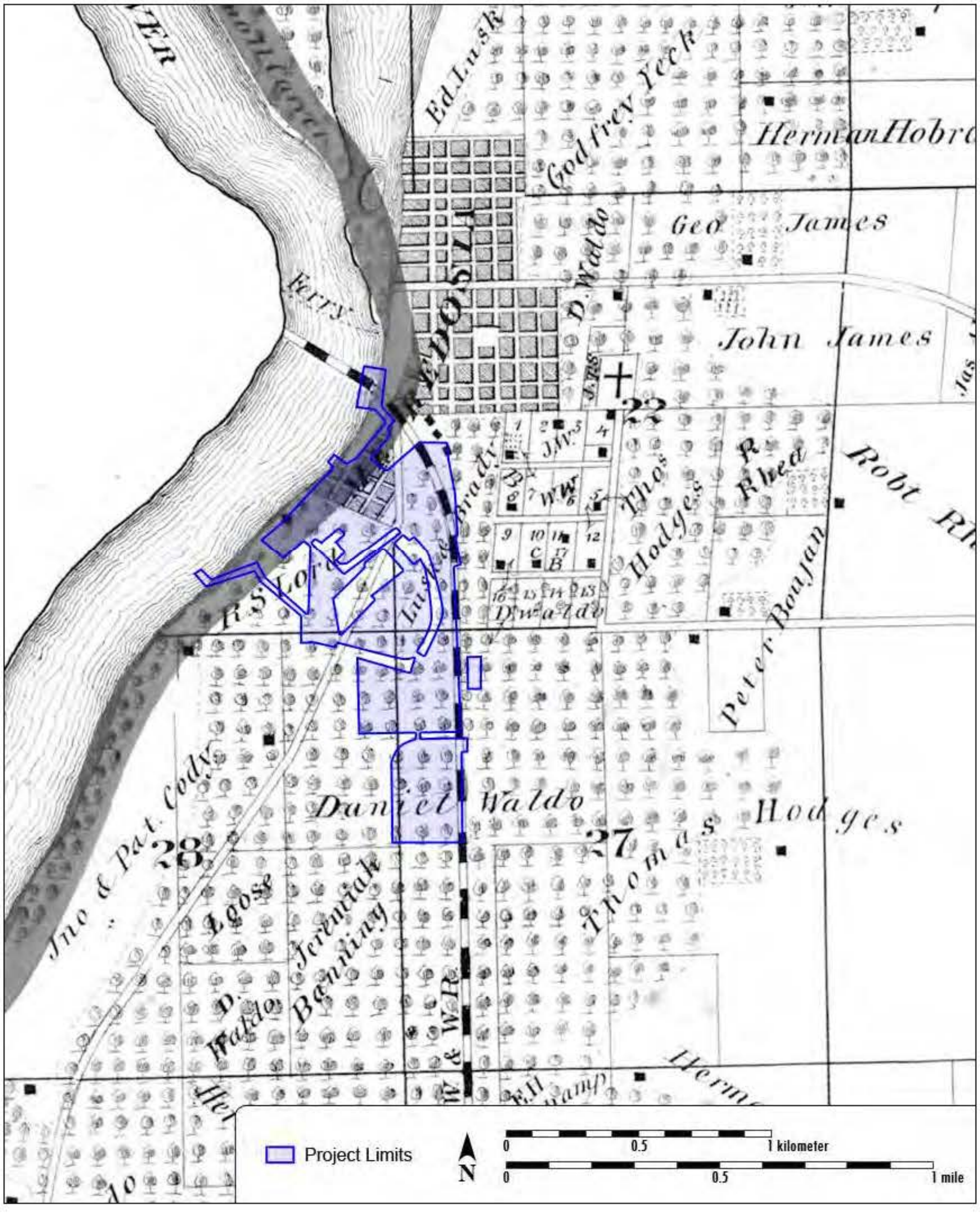

Figure 3. Location of the project corridor, Morgan County, Illinois (1872 Atlas Map of Morgan County, Illinois).

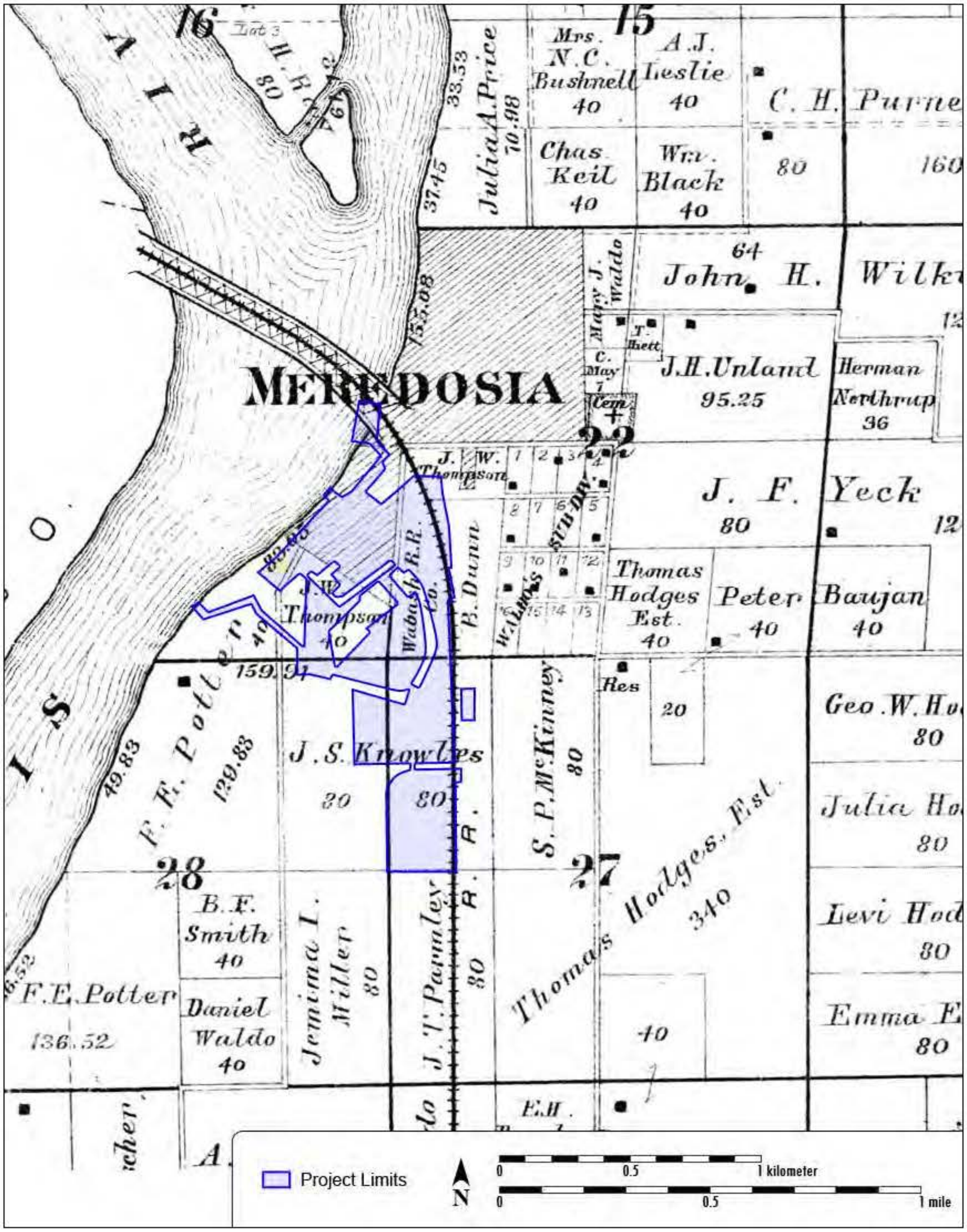

Figure 4. Location of the project area, Morgan County, Illinois (1894 Plat Book of Morgan County, Illinois).

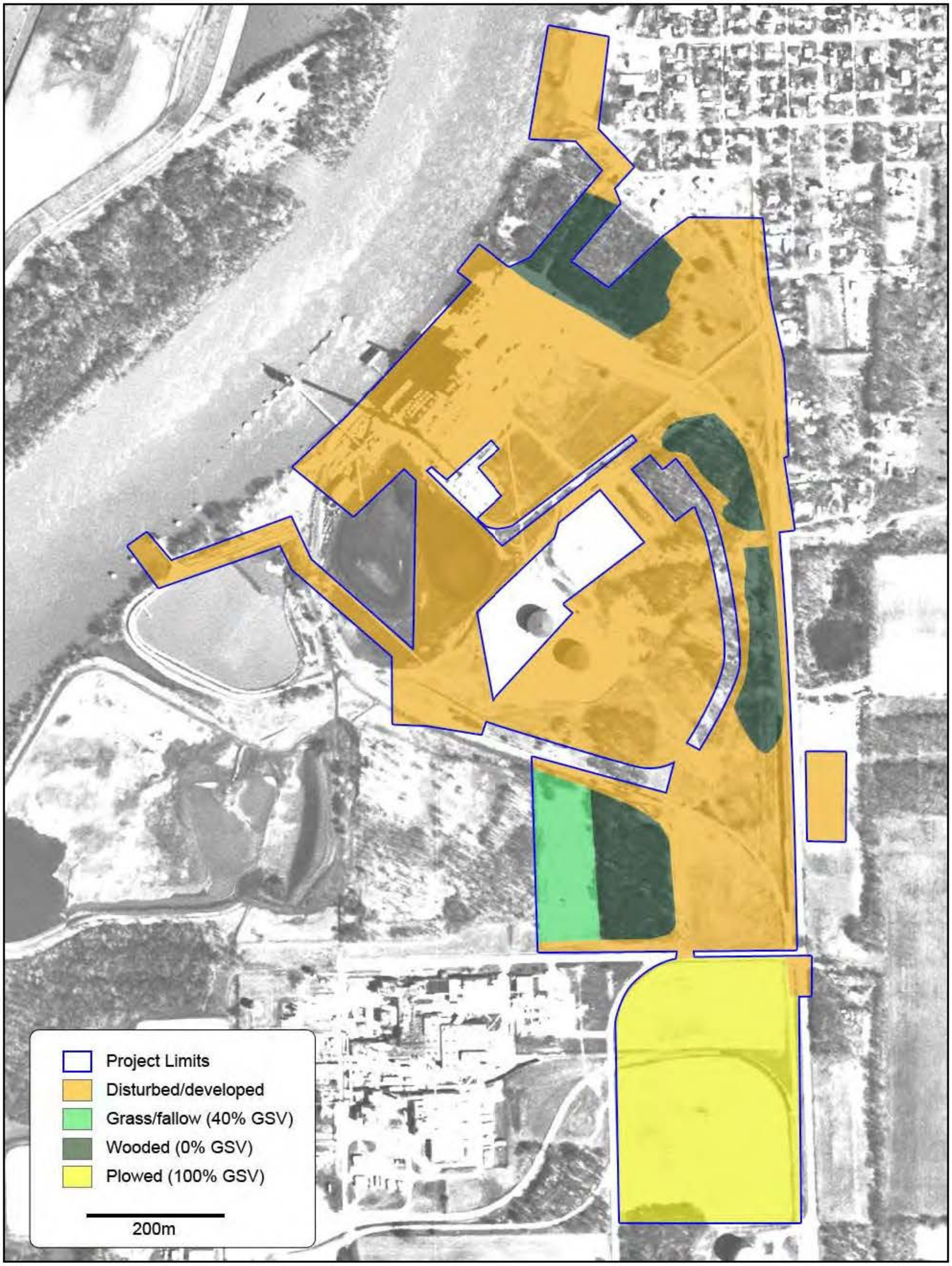

Figure 5. Ground surface visibility within the project area, Morgan County, Illinois.

APPENDIX A

Historical Research

Purchaser STEWART PETER
Residence of Purchaser MORGAN
Social Status

Legal Description
Aliquot Parts or Lot FRSEC
Section Number 21
Township 16N
Range 13W
Meridian 3
County of Purchase MORGAN

Details of Sale
Acres 41.52
Price per Acre 1.25
Total Price 51.90
Type of Sale FD
Date of Purchase 12/13/1831
Volume 068
Page 116

Purchaser STEWART WILLIAM
Residence of Purchaser MORGAN
Social Status

Legal Description
Aliquot Parts or Lot FRSEC
Section Number 21
Township 16N
Range 13W
Meridian 3
County of Purchase MORGAN

Details of Sale
Acres 41.53
Price per Acre 1.25
Total Price 51.91
Type of Sale FD
Date of Purchase 12/13/1831
Volume 068
Page 116

Purchaser BOSWELL WENNEY
Residence of Purchaser TAZEWELL
Social Status

Legal Description
Aliquot Parts or Lot W2SW
Section Number 22
Township 16N
Range 13W
Meridian 3
County of Purchase MORGAN

Details of Sale
Acres 80.00
Price per Acre 1.25
Total Price 100.00
Type of Sale FD
Date of Purchase 07/03/1832
Volume 068
Page 125

Purchaser WILLIAM JESSE
Residence of Purchaser SANGAMON
Social Status

Legal Description
Aliquot Parts or Lot W2NWPRE
Section Number 27
Township 16N
Range 13W
Meridian 3
County of Purchase MORGAN

Details of Sale
Acres 80.00
Price per Acre 1.25
Total Price 100.00
Type of Sale FD
Date of Purchase 09/07/1835
Volume 068
Page 255

ILLINOIS STATE ARCHIVES

JESSE WHITE
SECRETARY OF STATE
AND STATE ARCHIVIST

Purchaser TURNER LYDIA
Residence of Purchaser SANGAMON
Social Status F

Legal Description
Aliquot Parts or Lot NEFRPRE
Section Number 28
Township 16N
Range 13W
Meridian 3
County of Purchase MORGAN

Details of Sale
Acres 79.95
Price per Acre 1.25
Total Price 99.94
Type of Sale FD
Date of Purchase 09/02/1835
Volume 068
Page 254

Purchaser TURNER WALTER
Residence of Purchaser SANGAMON
Social Status

Legal Description
Aliquot Parts or Lot NEFRPRE
Section Number 28
Township 16N
Range 13W
Meridian 3
County of Purchase MORGAN

Details of Sale
Acres 79.96
Price per Acre 1.25
Total Price 99.95
Type of Sale FD
Date of Purchase 09/02/1835
Volume 068
Page 254

APPENDIX B

ISM Site Form

ILLINOIS ARCHAEOLOGICAL SITE RECORDING FORM

County: Morgan **Site Name:** Northern Cross Railroad **Revisit:** N
Field Number: 08016-177 **State Site No.:** 473
Quadrangle (7.5'): Meredosia **Date Recorded:** 2010.07.20

LEGAL DESCRIPTION (to quarter quarter quarter section)

Align: SE **1/4s:** NENESE SESENW **Section:** 21 **Township:** 16 N **Range:** 13 W
Align: SW **1/4s:** NWNWSW **Section:** 22 **Township:** 16 N **Range:** 13 W
Align: **1/4s:** **Section:** 0 **Township:** 0 **Range:** 0
Align: **1/4s:** **Section:** 0 **Township:** 0 **Range:** 0

UTM Coordinates (by ISM): **UTM Zone:** 15 **UTM North:** 4411007 **UTM East:** 708531

Ownership: Private

ENVIRONMENT

Topography: Floodplain **Elevation (in meters):** 131
Nearest Water Supply: Illinois **Drainage:** Lower Illinois
Soil Association: Oakville-Lamont-Alvin
Description: The site is located next to the Illinois River, just south of Meredosia.

SURVEY

Project Name: IL 104 Bridge **Site Area (square meters):** 30952
Ground Cover (List up to 3): Forest Brush Grass **Visibility (%):** 0
Survey Methods (List up to 2): Shovel Test **Standing Structures:** Y
Site Type (List up to 2): Commercial

SITE CONDITION

Extent of Damage: Moderate
Main Cause of Damage: Development

MATERIAL OBSERVED

Number of Prehistoric Artifacts (count or estimate): 0 **Number of Historic Artifacts (count or estimate):** 60
Prehistoric Diagnostic Artifacts: N **Historic Diagnostic Artifacts:** Y
Prehistoric Surface Features: N **Historic Surface Features:** N
Description: glass, metal, decorated ceramics, military button

TEMPORAL AFFILIATION (check all that apply)

Prehistoric Unknown:
Paleoindian:
Archaic:
Early Archaic:
Middle Archaic:

Late Archaic:
Woodland:
Early Woodland:
Middle Woodland:
Late Woodland:

Mississippian:
Upper Mississippian:
Protohistoric:
Historic Native American:
Historic (generic):

Colonial (1673-1780):
Pioneer (1781-1840):
Frontier (1841-1870): Y
Early Industrial (1871-1900): Y
Urban Industrial (1901-1945): Y
Post-War (1946-present):

Description: Train depot dates to the 1870's. A sponge ware ceramic fragment appears to be from the 1850's. Military button dates post-1905.

Surveyor: Edwards-Ring **Institution:** ISA **Survey Date:** 6/30/2010 **Curation Facility:** UIU
Site Report by: J. Edwards-Ring **Institution:** ISA **Date:** 7/6/2010
IHPA Log No.: **IHPA First Sur. Doc. No.:**
Compliance Status: **NRHP Listing:** N

APPENDIX C

Photographs of Standing Structures[1]

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[1] Ameren approves the release of photographs A through K associated with this report.

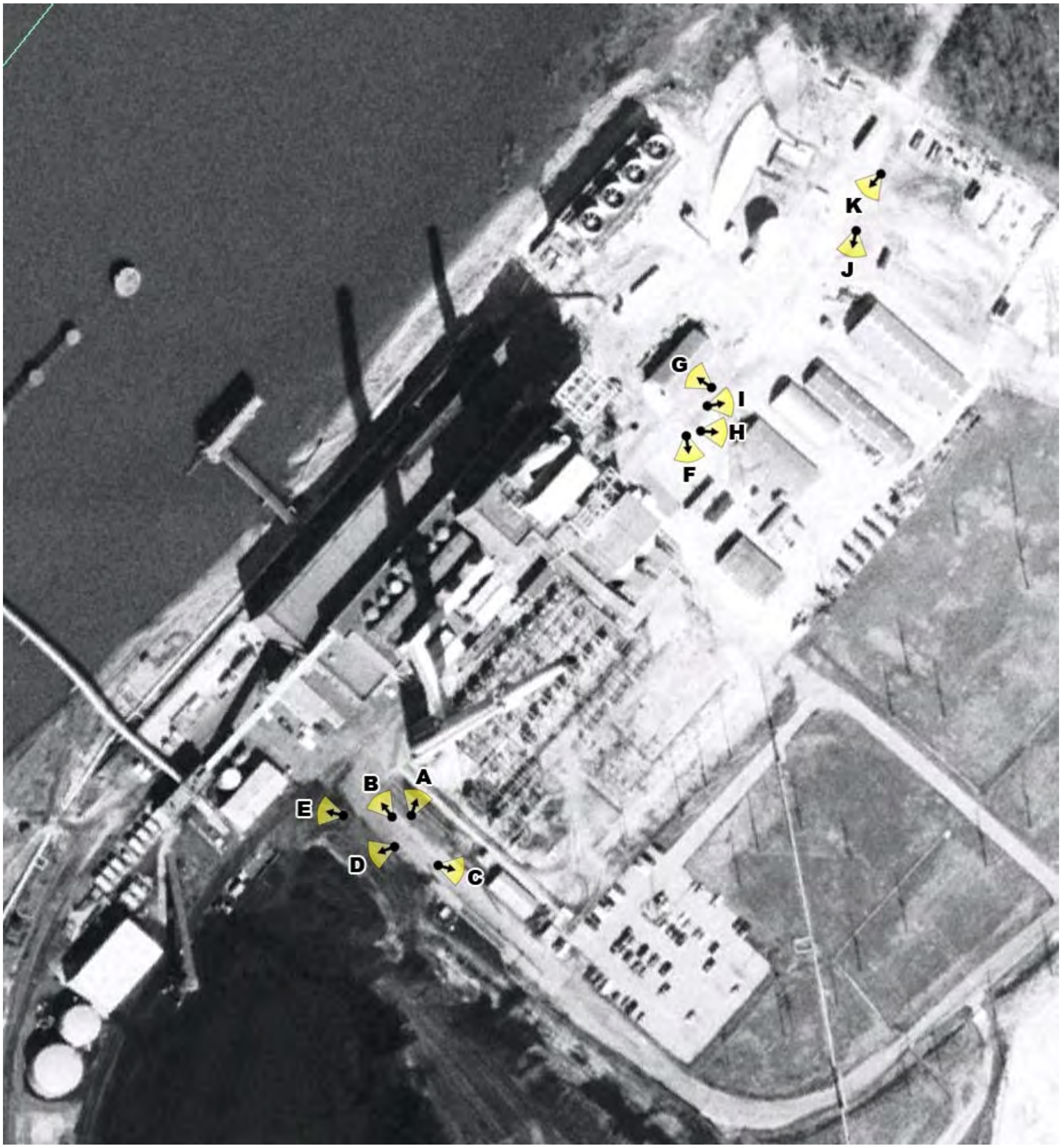

Photo index key


A


B

C

D


E


F


G


H

I

J


K

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APPENDIX F3

PHASE I – BLUFF AREA PIPELINE RIGHT-OF-WAY SEGMENT SURVEY

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Archaeological Survey Short Report
Illinois Historic Preservation Agency
Old State Capitol Building
Springfield, Illinois 62701 (217) 785-4997

REVIEWER
Date:
Accepted Rejected
IHPA USE ONLY (Form ASSR0886)

PHASE I CULTURAL RESOURCE SURVEY

FUTUREGEN INDUSTRIAL ALLIANCE, INC.
BLUFF AREA PIPELINE RIGHT-OF-WAY SEGMENT
MORGAN COUNTY, ILLINOIS

Prepared For

Patrick Engineering, Inc.
300 West Edwards Street, Suite 200
Springfield, Illinois 62704

January 2012

Prairie Archaeology & Research

P.O. Box 5603 ● Springfield, Illinois 62705-5603 ● Phone 217.544.4881
www.prairiearchaeology.com

Archaeological Survey Short Report
Illinois Historic Preservation Agency
Old State Capitol Building
Springfield, Illinois 62701 (217) 785-4997

REVIEWER
Date:
Accepted Rejected
IHPA USE ONLY (Form ASSR0886)

IHPA Log #: 004042811

LOCATIONAL INFORMATION AND SURVEY CONDITIONS

County: Morgan **Quadrangle:** Meredosia, IL and Chapin, IL 7.5 minute USGS

Project Type/Title: FutureGen Industrial Alliance pipeline, Morgan County, Illinois (Figure 1).

Funding and/or Permitting Federal/State Agencies: U.S. Department of Energy

Township: 16 North **Range:** 12 West **Section(s):** 30
Township: 16 North **Range:** 13 West **Section(s):** 25

Project Description: A phase I cultural resource investigation of the approximately 990 m pipeline related to the FutureGen project in Morgan County, Illinois.

Topography: Bluff Slope/Uplands

Soils: Specific soils in the project area include: 30F – Hamburg silt loam, 20 to 35 percent slopes; 30G – Hamburg silt loam, 35 to 60 percent slopes; 53E – Bloomfield loamy sand, 18 to 35 percent slopes; 131B – Alvin fine sandy loam, 2 to 7 percent slopes; and 131D – Alvin fine sandy loam, 7 to 15 percent slopes.

Drainage: Coon Run to Illinois River

Land Use/Ground Cover (Include % Visibility): The project area consisted of 1-acre of woods and 4.6-acres of grass and fallow with no ground surface visibility. In total, approximately 1.4-acres of the project corridor were within sloping areas with a ten percent or greater grade.

Survey Limitations: Survey limitations were minimal.

ARCHAEOLOGICAL AND HISTORICAL INFORMATION

Historical Plats/Atlases/Sources: The following historical sources were examined: 1862 *United States General Land Office Plat* (T16N, R12W & R13W), 1872 *Atlas Map of Morgan County, Illinois* (Andreas, Lyter & Co.), 1894 *Plat Book of Morgan County, Illinois* (American Atlas Co.), and the 1983 *Chapin, IL* and 1980 *Meredosia, IL 7.5' Topographic Maps* (United States Geological Survey).

The 1833 GLO shows the project vicinity to be situated within timber. This source does not indicate any cultural landmarks (such as trails, fords, or roads) within the project boundaries (Figure 2).

The Illinois Public Domain Land Tract Database indicates the land parcels associated with the project corridor were purchased by several individuals. Absalom Smith and James Smith each purchased 80-acres of the northeast quarter of Section 25 from the federal government at the rate of $1.25 per acre on April 16, 1832. Absalom Smith also purchased the southwest quarter of the northwest quarter of Section 30 from the federal government at the rate of $1.25 per acre on

August 15, 1835. Additionally, the west half of the southwest quarter of Section 30 was purchased by Philip Aylesworth from the federal government at the rate of $1.25 per acre on September 23, 1835 (Appendix A: Historical Research).

The 1872 historical atlas indicates the parcels associated with the project corridor as owned by Emily Beagle and W. H. Wilday (Figure 3). The following 1894 atlas indicates all property as being owned by W. H. Wilday (Figure 4). Neither source indicates any structures in line with the project corridor.

Previous Surveys/ Reported Sites: A review of IHPA records indicates that no previous surveys or sites have been reported within the APE.

Regional Archaeologists Contacted: Databases maintained by the Illinois State Museum, the Illinois Department of Natural Resources, and the Illinois Historic Preservation Agency were reviewed.

Investigation Techniques: Shovel-probe reconnaissance at 15-meter intervals was conducted along the project corridor.

Field Time Expended: 32 man hours

Sites/Find Spots Located: none.

Cultural Material: none

(Curated at): n/a

Collection Techniques: n/a.

Area Surveyed (Acres & Square Meters): Approximately 5.6-acres (22,631.4 m^2).

RESULTS OF INVESTIAGATIONS AND RECOMMENDATIONS (CHECK ONE)

■ **Phase I Archaeological Reconnaissance Has Located No Archaeological Material; Project Clearance is Recommended.**

☐ **Phase I Archaeological Reconnaissance Has Located Archaeological Materials: Site(s) Does (Do) Not Meet requirements for the National Register Eligibility; Project Clearance is Recommended.**

☐ **Phase I Archaeological Reconnaissance Has Located Archaeological Materials; Site(s) May Meet Requirements for National Register Eligibility; Phase II Testing is Recommended.**

☐ **Phase II Archaeological Investigations Has Indicated that Site(s) Does (Do) Not Meet Requirements for National Register Eligibility; Project Clearance is Recommended.**

☐ **Phase II Archaeological Investigations Has Indicated that Site(s) Meet Requirements for National Register Eligibility; Formal Report is Pending and a Determination of Eligibility is Recommended.**

Comments: An intensive cultural resource survey of the area proposed to be impacted by site characterization activities associated the FutureGen project in Morgan County, Illinois was conducted on December 1 and 2, 2011. The project area's Area of Potential Effect (APE) is composed of a 23 meter wide corridor approximately 990 linear meters in length in wooded and grassy/fallow areas where 0 percent of the ground surface was visible to field investigators. Shovel-probe reconnaissance at 15-meter intervals was conducted within the wooded and fallow areas.

The current investigation included an examination of historical maps and atlases pertinent to the subject property, a computer database search of the archaeological site files maintained by the Illinois State Museum, a review of the National Register of Historic Places (NRHP), and a review of the Illinois Register of Historic Sites (IRHS) maintained by the Illinois Historic Preservation Agency. Examination of archival and historical sources and resource databases did not identify that known prehistoric or historic sites, areas, or artifacts may be present within the boundaries of the APE or within the immediate vicinity of the APE.

Due to the APE's location along the bluff and uplands of Morgan County, it is unlikely that alluvial or colluvial depositional conditions have resulted in the deep burial of cultural deposits or remains. As a result, geomorphological investigative techniques to locate and assess deeply buried archaeological and historical resources or artifacts were deemed unnecessary.

Management Summary and Conclusions

A cultural resource inventory of the proposed development included an examination of historical maps and atlases pertinent to the subject property, a computer database search of the archaeological site files maintained by the Illinois State Museum, and a review of the National Register of Historic Places (NRHP) and the Illinois Register of Historic Sites (IRHS) maintained by the Illinois Historic Preservation Agency. In addition to archival records and database examination, the subject property was examined by archaeologists utilizing shovel-probe reconnaissance at 15-meter intervals.

Based on the results of field investigations and information derived during archival and background research conducted by Prairie Archaeology & Research for the proposed FutureGen facility located in Morgan County, Illinois, additional cultural resource investigations are neither warranted nor recommend. It is our recommendation to State Historic Preservation Officer that concurrence and approval be provided.

Archaeological Contractor Information
Archaeological Contractor: Prairie Archaeology & Research.
Address/Phone: P.O. Box 5603, Springfield, IL 62705-5603 (217) 544-4881
Surveyors(s): Joseph Craig and Jason Rein
Survey Date(s): December 1 & 2, 2011
Report Completed By: Joseph Craig
Date: February 6, 2012
Submitted By (Signature and Title): ____________________

*Attachment Check List: (#1 through #4 are **MANDATORY)***

- ■ 1. Relevant Portion of USGS 7.5' Topographic Quadrangle Map(s) showing Project Location and Recorded Sites;
- ■ 2. Project Map(s) depicting Survey Limits and, when Applicable, Approximate Survey Limits, and Concentrations of Cultural Materials;
- ■ 3. Site Form(s); Two Copies of Each Form;
- ■ 4. All Relevant Project Correspondence;
- ☐ 5. Additional Information Sheets As Necessary

Address of Owner/Agent/Agency To Whom SHPO Comment Should Be Mailed

FutureGen Industrial Alliance, Inc.
1101 Pennsylvania Avenue, NW
Sixth Floor
Washington, D.C. 20004

Contact Person: Mr. Ken Humphreys, CEO
Phone Number: (202) 280-6019
Fax Number: n/a

U. S. Department of Energy
National Technology Laboratory
3610 Collins Ferry Road
P. O. Box 880
Morgantown, WV 26507-0880

Contact Person: Mr. Cliff Whyte, NEPA Compliance Officer
Phone Number: (304) 285-2098
Fax Number: n/a

Review Comments:

REFERENCES

Andreas, Lyter & Co.
1872 Atlas Map of Morgan County, Illinois. Davenport.

American Atlas Co.
1894 Plat Book of Morgan County, Illinois. Chicago.

United States Department of Agriculture
2012 http://websoilsurvey.nrcs.usda.gov

United States General Land Office
1862 General Land Survey Plats, T16N, R12W & R13W. Plats on file at the Illinois State Library, Springfield, Illinois.

United States Geological Survey
1980 Meredosia, IL 7.5 Minute Topographic Map
1983 Chapin, IL 7.5 Minute Topographic Map

FIGURES

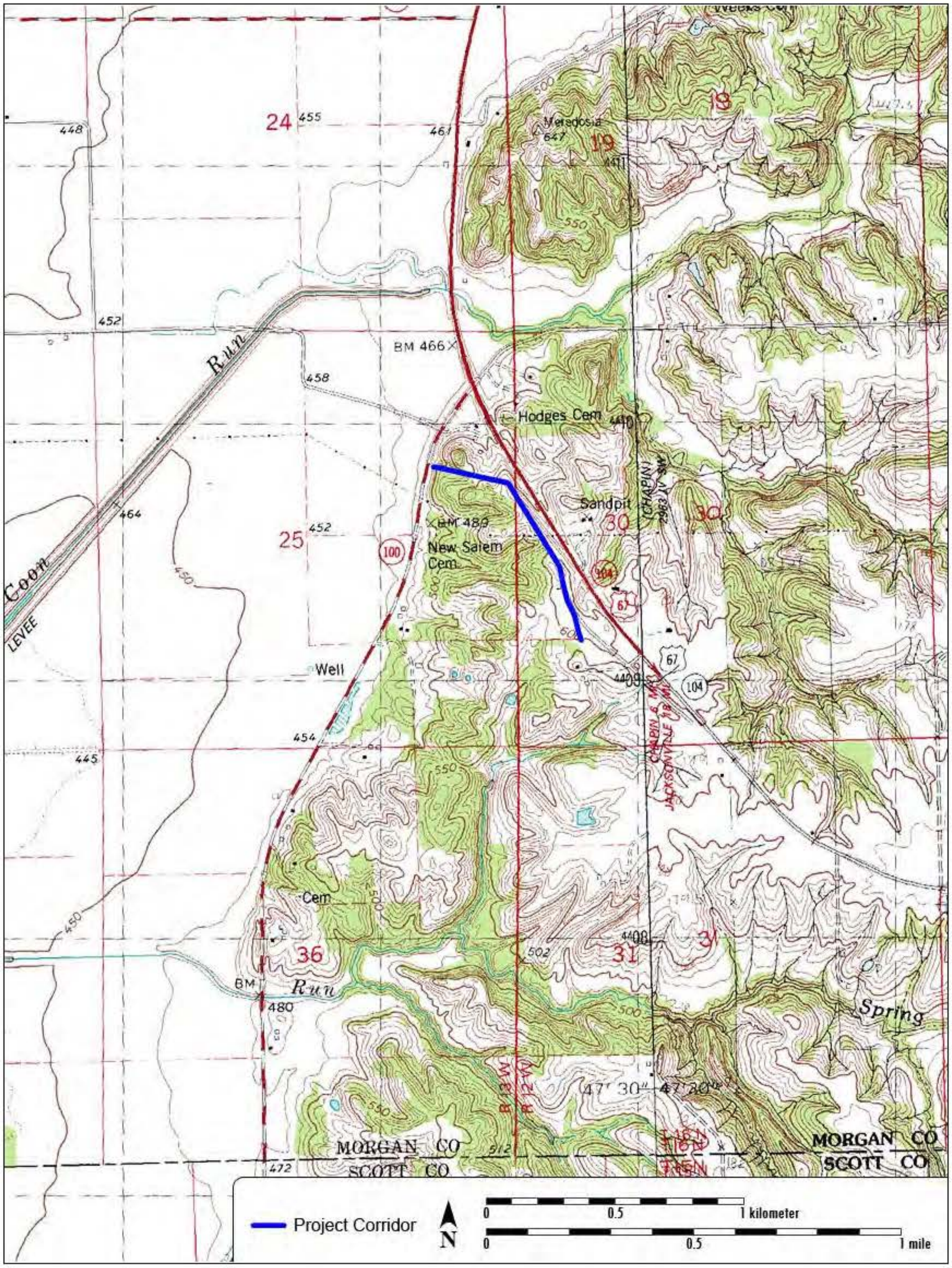

Figure 1. Location of the project corridor, Morgan County, Illinois (1980 Meredosia, IL and 1983 Chapin, IL 7.5' USGS Topographic Maps).

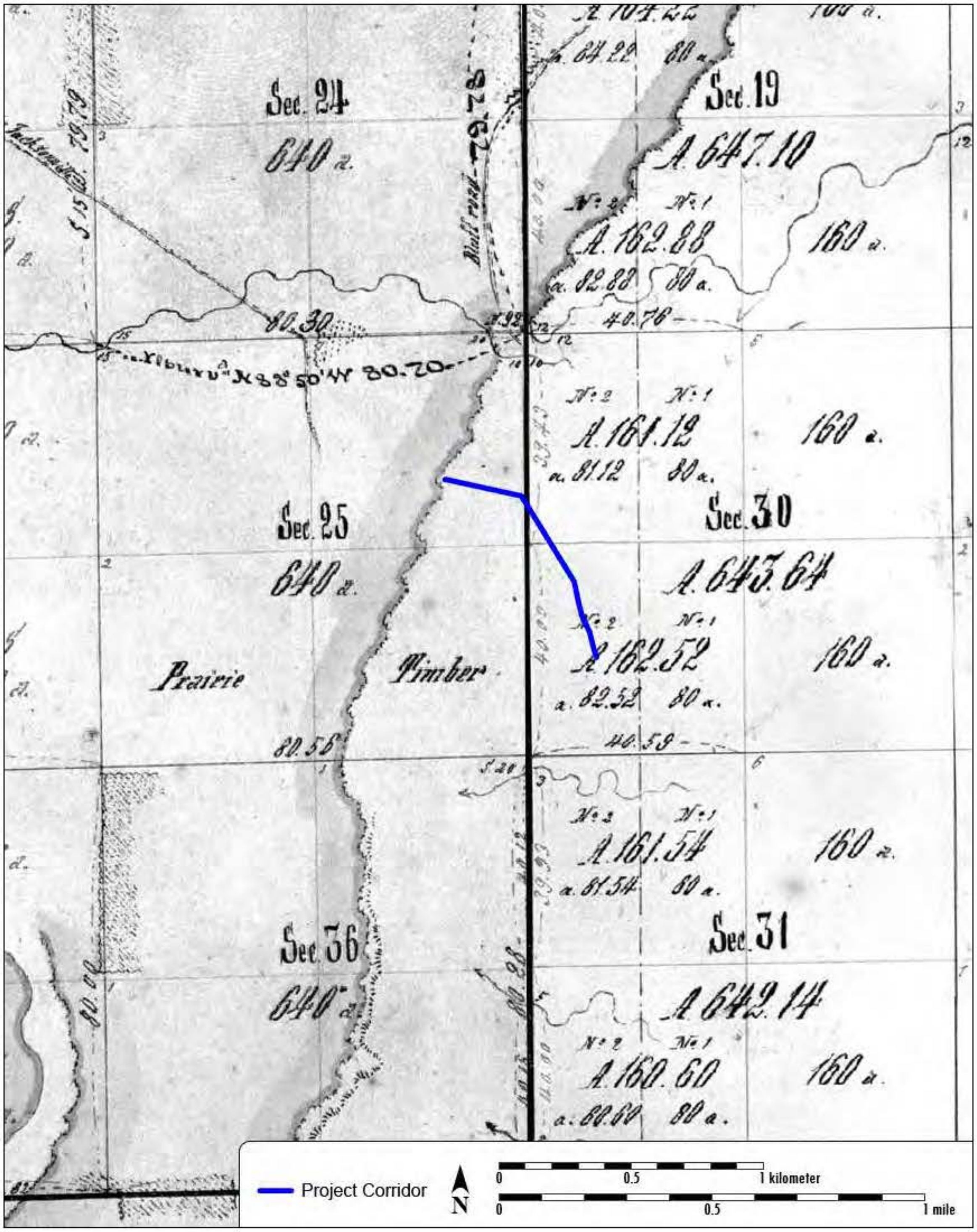

Figure 2. Location of the project corridor, Township 16 North, Range 12 & 13 West (1862 United States General Land Office Survey)

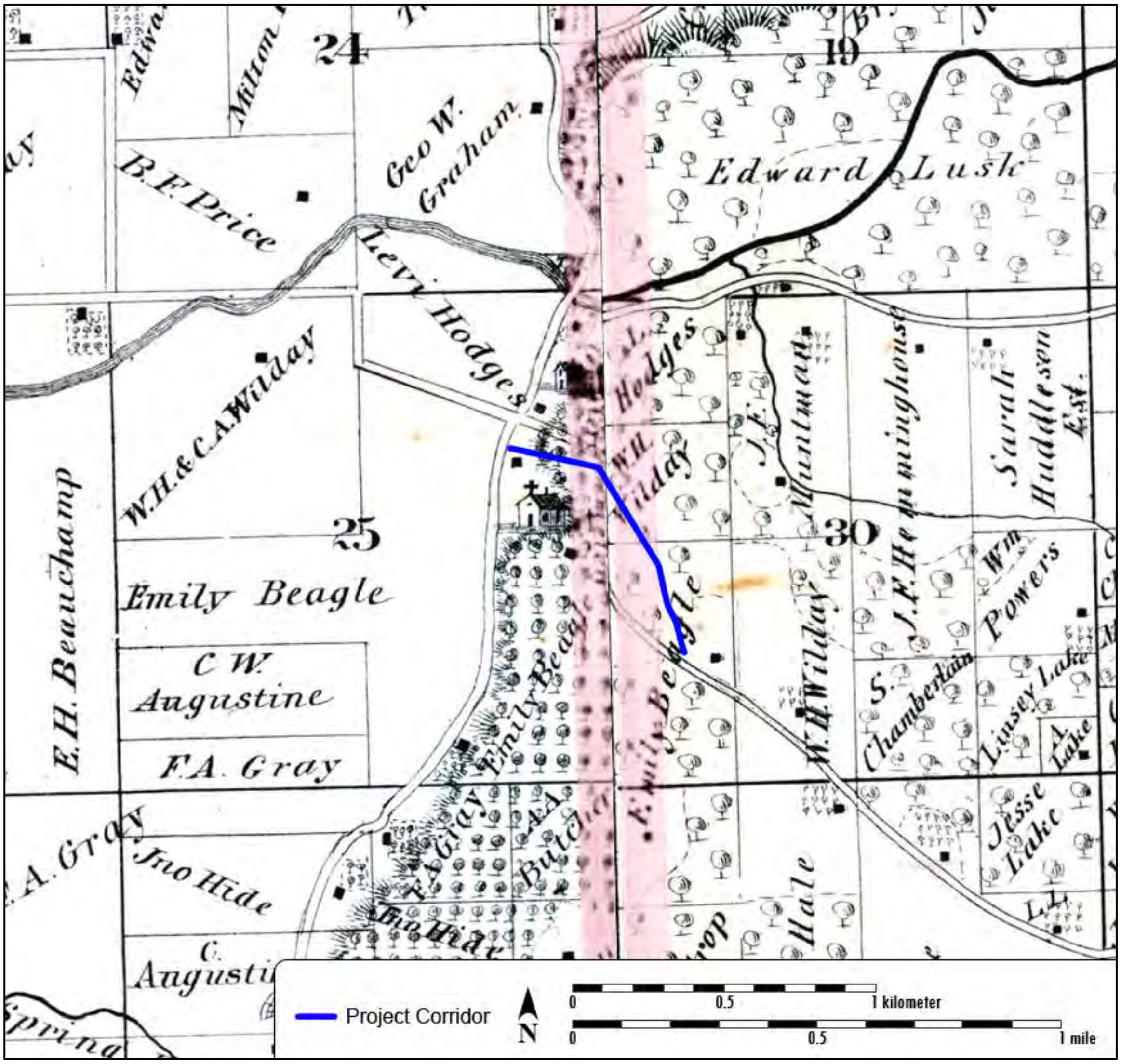

Figure 3. Location of the project corridor, Morgan County, Illinois (1872 Atlas Map of Morgan County, Illinois).

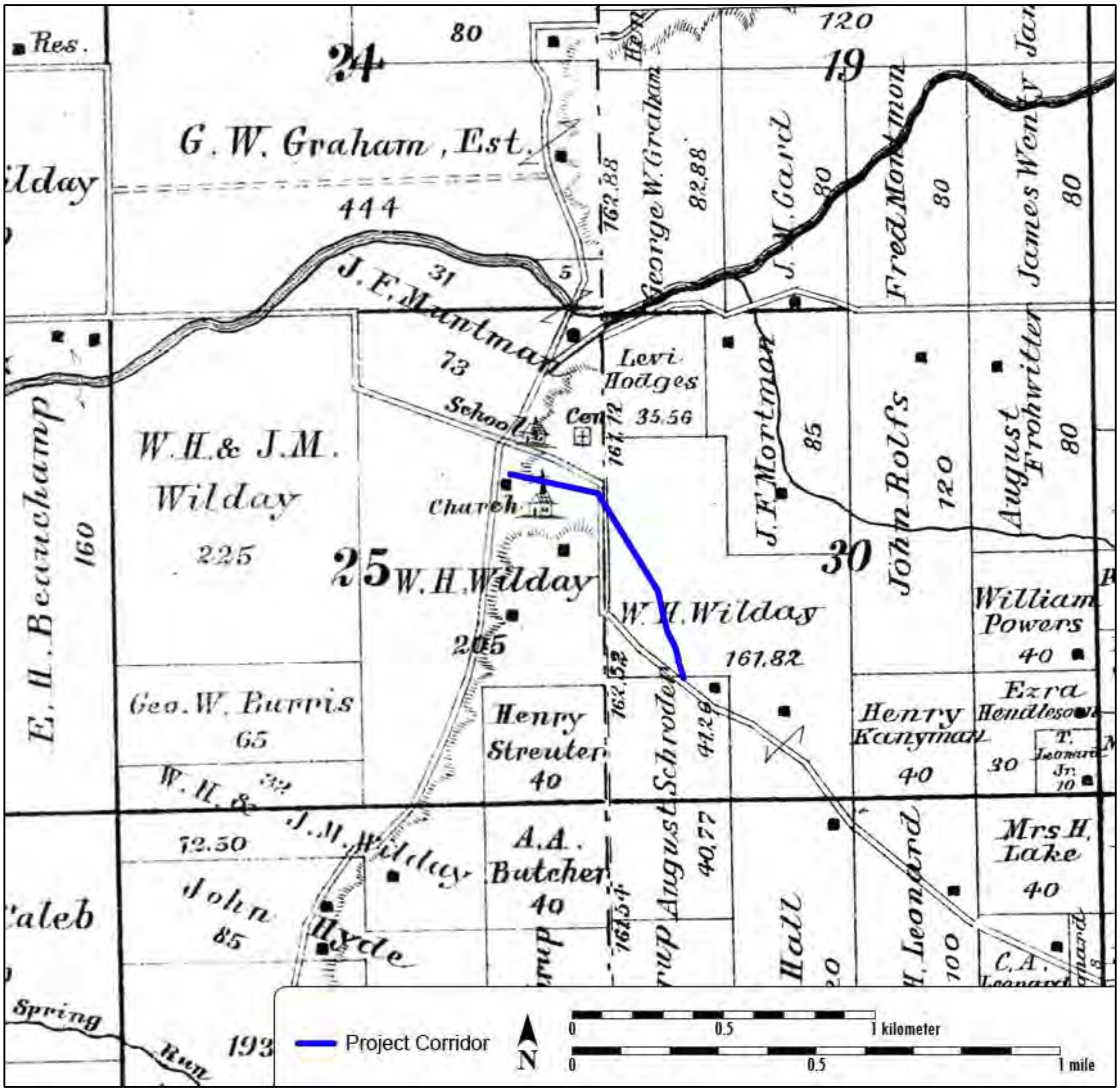

Figure 4. Location of the project area, Morgan County, Illinois (1894 Plat Book of Morgan County, Illinois).

APPENDIX A

Historical Research

Purchaser: SMITH ABSALOM
Residence of Purchaser: MORGAN
Social Status:

Legal Description:
Aliquot Parts or Lot: NEPRE
Section Number: 25
Township: 16N
Range: 13W
Meridan: 3
County of Purchase: MORGAN

Details of Sale:
Acres: 80.00
Price per Acre: 1.25
Total Price: 100.00
Type of Sale: FD
Date of Purchase: 03/16/1832
Volume: 068
Page: 119

Purchaser: SMITH JAMES
Residence of Purchaser: MORGAN
Social Status:

Legal Description:
Aliquot Parts or Lot: NEPRE
Section Number: 25
Township: 16N
Range: 13W
Meridan: 3
County of Purchase: MORGAN

Details of Sale:
Acres: 80.00
Price per Acre: 1.25
Total Price: 100.00
Type of Sale: FD
Date of Purchase: 03/16/1832
Volume: 068
Page: 119

Purchaser: SMITH ABSALOM
Residence of Purchaser: MORGAN
Social Status:

Legal Description:
Aliquot Parts or Lot: SWNW
Section Number: 30
Township: 16N
Range: 12W
Meridan: 3
County of Purchase: MORGAN

Details of Sale:
Acres: 40.50
Price per Acre: 1.25
Total Price: 50.62
Type of Sale: FD
Date of Purchase: 08/15/1835
Volume: 068
Page: 250

Purchaser: AYLESWORTH PHILIP
Residence of Purchaser: MORGAN
Social Status:

Legal Description:
Aliquot Parts or Lot: W2SW
Section Number: 30
Township: 16N
Range: 12W
Meridan: 3
County of Purchase: MORGAN

Details of Sale:
Acres: 82.52
Price per Acre: 1.25
Total Price: 103.15
Type of Sale: FD
Date of Purchase: 07/23/1835
Volume: 068
Page: 242

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APPENDIX F4

PHASE I – SOIL GAS MONITORING LOCATIONS SURVEY

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Archaeological Survey Short Report
Illinois Historic Preservation Agency
Old State Capitol Building
Springfield, Illinois 62701 (217) 785-4997

REVIEWER
Date:
Accepted Rejected
IHPA USE ONLY (Form ASSR0886)

PHASE I CULTURAL RESOURCE SURVEY

FUTUREGEN INDUSTRIAL ALLIANCE, INC.
SOIL GAS MONITORING LOCATIONS
MORGAN COUNTY, ILLINOIS

Prepared For

FutureGen Industrial Alliance, Inc.
1101 Pennsylvania Avenue, NW
Sixth Floor
Washington D.C. 20004

November 2011

Prairie Archaeology & Research

P.O. Box 5603 ● Springfield, Illinois 62705-5603 ● Phone 217.544.4881 / Fax 217.544.4988
www.prairiearchaeology.com

Archaeological Survey Short Report
Illinois Historic Preservation Agency
Old State Capitol Building
Springfield, Illinois 62701 (217) 785-4997

REVIEWER
Date:
Accepted Rejected
IHPA USE ONLY (Form ASSR0886)

IHPA Log #: UNASSIGNED

LOCATIONAL INFORMATION AND SURVEY CONDITIONS

County: Morgan **Quadrangle:** Prentice, IL 7.5 minute USGS

Project Type/Title: FutureGen Industrial Alliance—Soil Gas Monitoring Locations, Morgan County, IL

Funding and/or Permitting Federal/State Agencies: U.S. Department of Energy

Township: 16 North **Range:** 9 West **Section(s):** 25, 26

Project Description: A phase I cultural resource investigation of the location for soil gas monitoring locations related to the FutureGen project in Morgan County, Illinois

Topography: Uplands

Soils: Specific soils in the project area include: 36C2 - Tama silt loam, 5 to 10 percent slopes, eroded; 43A - Ipava silt loam, 0 to 2 percent slopes; and 279B - Rozetta silt loam, 2 to 5 percent slopes.

Drainage: Indian Creek

Land Use/Ground Cover (Include % Visibility): The Area of Potential Effect (APE) consisted of approximately 5-acres of agricultural fields and 1-acre of fallow fields. Ground surface visibility within the agricultural fields ranged from 20 to 50 percent in harvested beans to 100 percent in plowed fields (Figure 6).

Survey Limitations: Survey limitations were minimal.

ARCHAEOLOGICAL AND HISTORICAL INFORMATION

Historical Plats/Atlases/Sources: The following historical sources were examined: 1823 *United States General Land Office Plat* (T16N, R9W), 1872 *Atlas Map of Morgan County, Illinois* (Andreas, Lyter & Co.), 1894 *Plat Book of Morgan County, Illinois* (American Atlas Co.), and the 1983 *Prentice, IL 7.5' Topographic Map* (United States Geological Survey).

The 1823 General Land Office (GLO) plat shows the project vicinity to be situated mostly within timber. This source does not indicate any cultural landmarks (such as trails, fords, or roads) within the project boundaries (Figure 2).

The Illinois Public Domain Land Tract Database indicates the land parcels associated with the project areas were purchased by four individuals (William O'Rear, Jacob Adams, and William Brown) between 1826 and 1836. All land was purchased from the federal government at the rate of $1.25 per acre (Figure 3).

The 1872 historical atlas indicates the parcels associated with the project areas as owned by William O'Rear, N. D., Maria Adams, and G. D. Strawn (Figure 4). This source does not indicate any structures within the APE.

The 1894 historical atlas indicates the parcels associated with the project areas as owned by the William O'Rear Estate, John Virgin, L. M. Thomas, James H. Martin, and D. G. Strawn (Figure 5). While this source indicates a structure adjacent to monitor location SG-2 on the O'Rear property, this is most likely due to mapping inconsistencies. No evidence of a structure or associated materials was recovered during this investigation.

Previous Surveys/ Reported Sites: A review of IHPA records indicates that no previous surveys or sites have been reported within the APE.

Regional Archaeologists Contacted: Databases maintained by the Illinois State Museum, the Illinois Department of Natural Resources, and the Illinois Historic Preservation Agency were reviewed.

Investigation Techniques: Pedestrian reconnaissance at 5-meter intervals was conducted within the agricultural fields. Shovel-probe reconnaissance at 15-meter intervals was conducted within fallow areas (Figure 7).

Field Time Expended: 1 man hour

Sites/Find Spots Located: None

Cultural Material: None

(Curated at): N/A

Collection Techniques: N/A

Area Surveyed (Acres & Square Meters): Approximately 6-acres (24,281 m^2).

RESULTS OF INVESTIAGATIONS AND RECOMMENDATIONS (CHECK ONE)

■ **Phase I Archaeological Reconnaissance Has Located No Archaeological Material; Project Clearance is Recommended.**

☐ **Phase I Archaeological Reconnaissance Has Located Archaeological Materials: Site(s) Does (Do) Not Meet requirements for the National Register Eligibility; Project Clearance is Recommended.**

☐ **Phase I Archaeological Reconnaissance Has Located Archaeological Materials; Site(s) May Meet Requirements for National Register Eligibility; Phase II Testing is Recommended.**

☐ **Phase II Archaeological Investigations Has Indicated that Site(s) Does (Do) Not Meet Requirements for National Register Eligibility; Project Clearance is Recommended.**

☐ **Phase II Archaeological Investigations Has Indicated that Site(s) Meet Requirements for National Register Eligibility; Formal Report is Pending and a Determination of Eligibility is Recommended.**

Comments: An intensive cultural resource survey of the area proposed to be impacted by soil gas monitoring activities associated the FutureGen project in Morgan County, Illinois was conducted on November 2, 2011. The project area is composed of approximately 5-acres in agricultural use where 20-50 percent of the ground surface was visible to field investigators and 1-acre of fallow fields with 0 percent ground surface visibility.

The current investigation included an examination of historical maps and atlases pertinent to the subject property, a computer database search of the archaeological site files maintained by the Illinois State Museum, a review of the National Register of Historic Places (NRHP), and a review of the Illinois Register of Historic Sites (IRHS) maintained by the Illinois Historic Preservation Agency. Examination of archival and historical sources and resource databases did not identify that known prehistoric or historic sites, areas, or artifacts may be present within the boundaries of the APE or within the immediate vicinity of the APE.

Archaeological and cultural resource field examination of the APE included the use of pedestrian reconnaissance at 5-meter intervals and shovel-probe investigations at 15-meter intervals to locate evidence of unknown or unreported archaeological, historical or cultural sites, area, and artifacts. Field surveyors failed to find evidence of archaeological or historical resources, sites, or structures within the boundaries where soil gas monitoring activities will be conducted. Due to the APE's location within the interior uplands of Morgan County, it is unlikely that alluvial or colluvial depositional conditions have resulted in the deep burial of cultural deposits or remains. As a result, geomorphological investigative techniques to locate and assess deeply buried archaeological and historical resources or artifacts were deemed unnecessary.

Management Summary and Conclusions

A cultural resource inventory of the area proposed for soil gas monitoring activities related to the FutureGen Industrial Alliance facility in Morgan County, Illinois included an examination of historical maps and atlases pertinent to the subject property, a computer database search of the archaeological site files maintained by the Illinois State Museum, and a review of the National Register of Historic Places (NRHP), a review of the Illinois Register of Historic Sites (IRHS) maintained by the Illinois Historic Preservation Agency, and field investigations utilizing a pedestrian reconnaissance at 5-meter intervals.

Based on the results of field investigations and on information collected during archival and background research, the APE does not contain evidence for the presence of archaeological, historical, or cultural resources, sites, areas, or artifacts. As presently conceptualized, activities related to the soil gas monitoring of the Morgan County, IL FutureGen facility will not impact cultural resources. Further, additional cultural resource investigations are neither warranted nor recommend. State Historic Preservation Officer concurrence and approval is requested.

Archaeological Contractor Information

Archaeological Contractor: Prairie Archaeology & Research.
Address/Phone: P.O. Box 5603, Springfield, IL 62705-5603 (217) 544-4881
Surveyors(s): Joseph Craig and Jason Rein
Survey Date(s): November 2, 2011
Report Completed By: Jason Rein and Joseph Craig
Date: November 3, 2011
Submitted By (Signature and Title): ______________________

Attachment Check List: (#1 through #4 are ***MANDATORY)***

- ■ 1. Relevant Portion of USGS 7.5' Topographic Quadrangle Map(s) showing Project Location and Recorded Sites;
- ■ 2. Project Map(s) depicting Survey Limits and, when Applicable, Approximate Survey Limits, and Concentrations of Cultural Materials;
- ■ 3. Site Form(s); Two Copies of Each Form;
- ■ 4. All Relevant Project Correspondence;
- ☐ 5. Additional Information Sheets As Necessary

Address of Owner/Agent/Agency To Whom SHPO Comment Should Be Mailed

FutureGen Industrial Alliance, Inc. 1101 Pennsylvania Avenue, NW Sixth Floor Washington, D.C. 20004	**Contact Person:** Mr. Ken Humphreys, CEO **Phone Number:** (202) 280-6019 **Fax Number:** n/a
U. S. Department of Energy National Technology Laboratory 3610 Collins Ferry Road P. O. Box 880 Morgantown, WV 26507-0880	**Contact Person:** Mr. Cliff Whyte, NEPA Compliance Officer **Phone Number:** (304) 285-2098 **Fax Number:** n/a

Review Comments:

REFERENCES

Andreas, Lyter & Co.
1872 Atlas Map of Morgan County, Illinois. Davenport.

American Atlas Co.
1894 Plat Book of Morgan County, Illinois. Chicago.

United States Department of Agriculture
2011 http://websoilsurvey.nrcs.usda.gov

United States General Land Office
1823 General Land Survey Plats, T16N, R9W. Plats on file at the Illinois State Library, Springfield, Illinois.

United States Geological Survey
1983 Prentice, IL 7.5 Minute Topographic Map

FIGURES

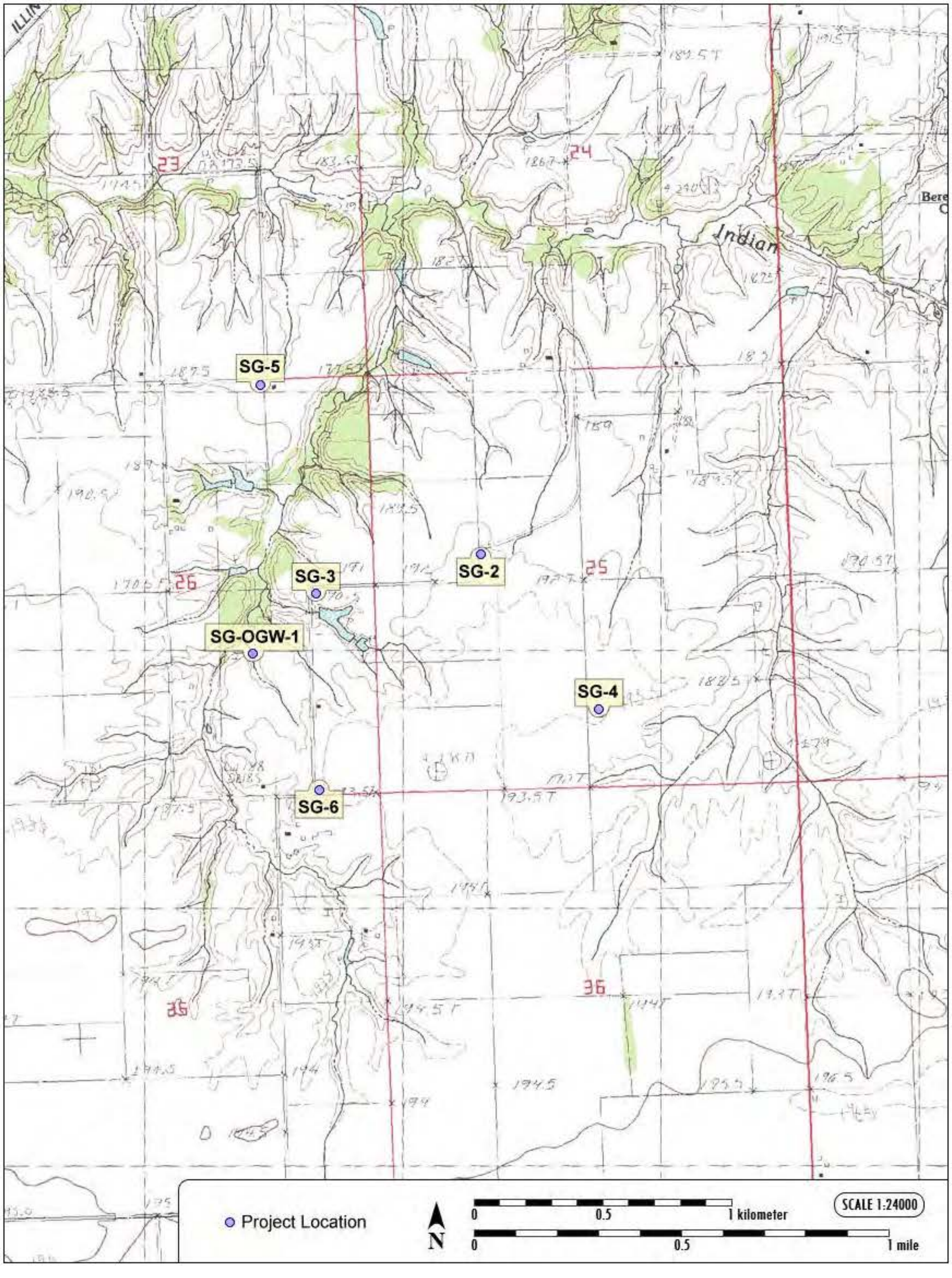

Figure 1. Location of the project area, Morgan County, Illinois (1983 Prentice, IL 7.5' USGS Topographic Map).

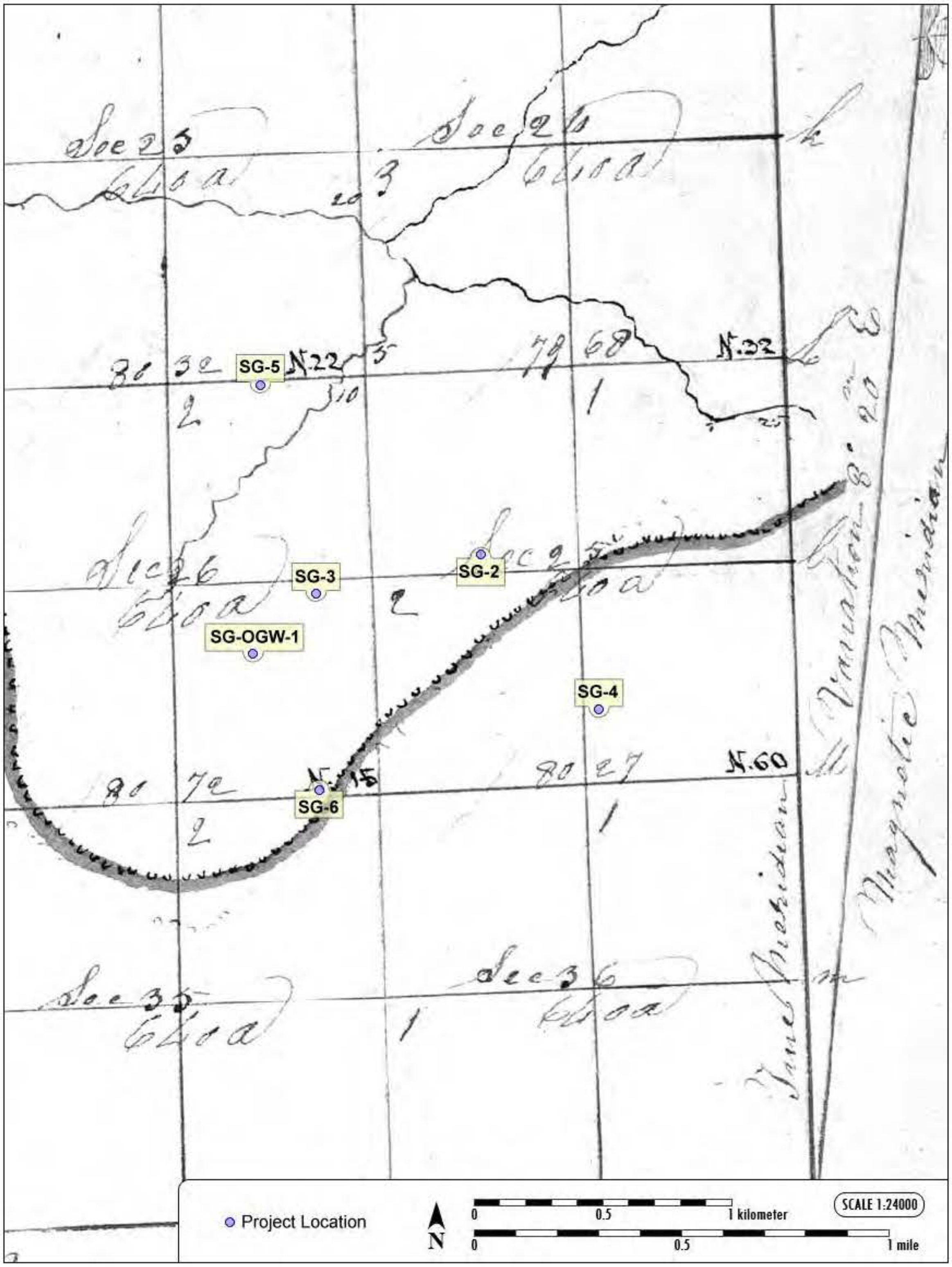

Figure 2. Location of the project area, Township 16 North, Ranges 9 West (1823 United States General Land Office Survey)

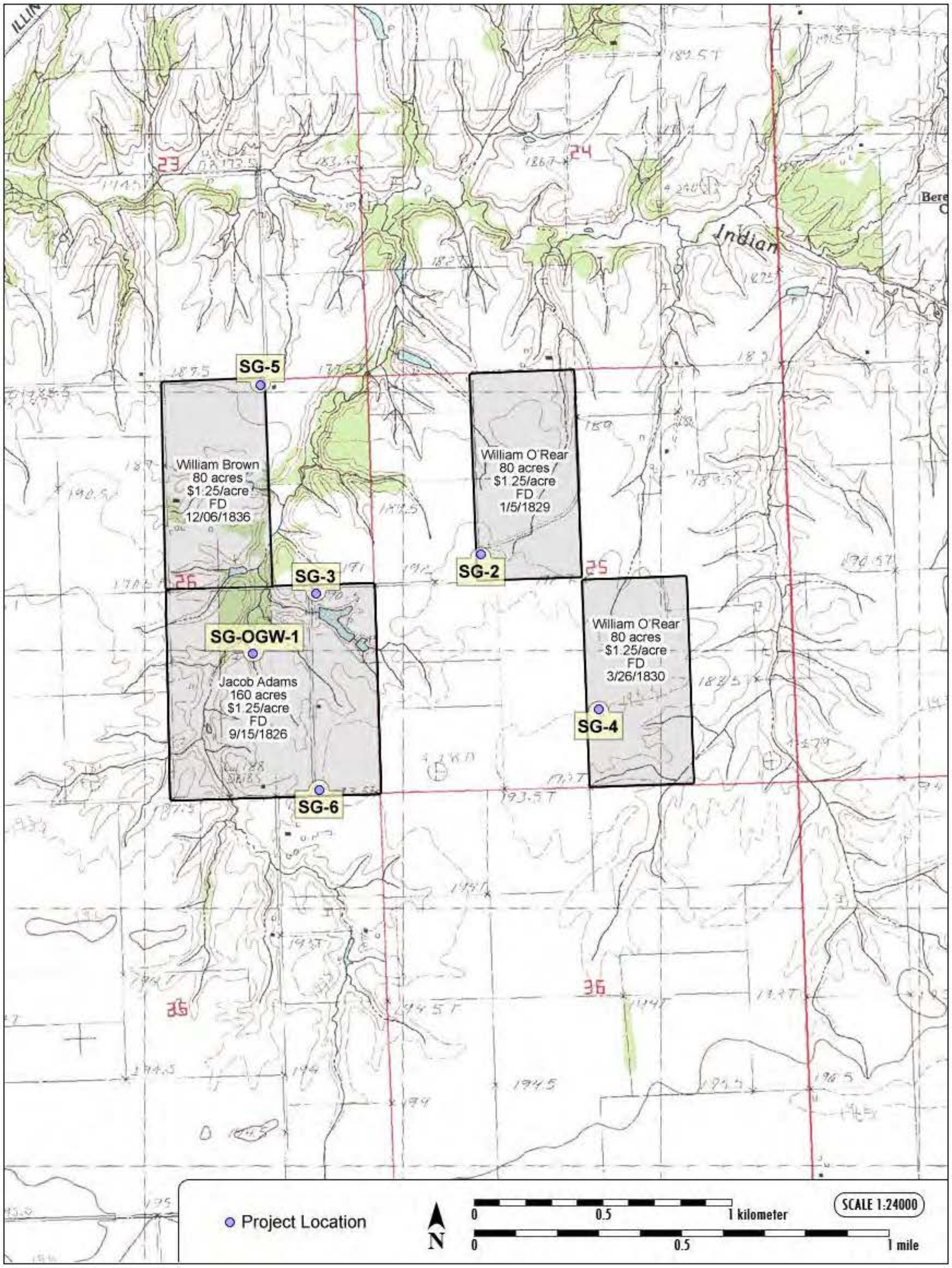

Figure 3. Initial land purchases within the project area.

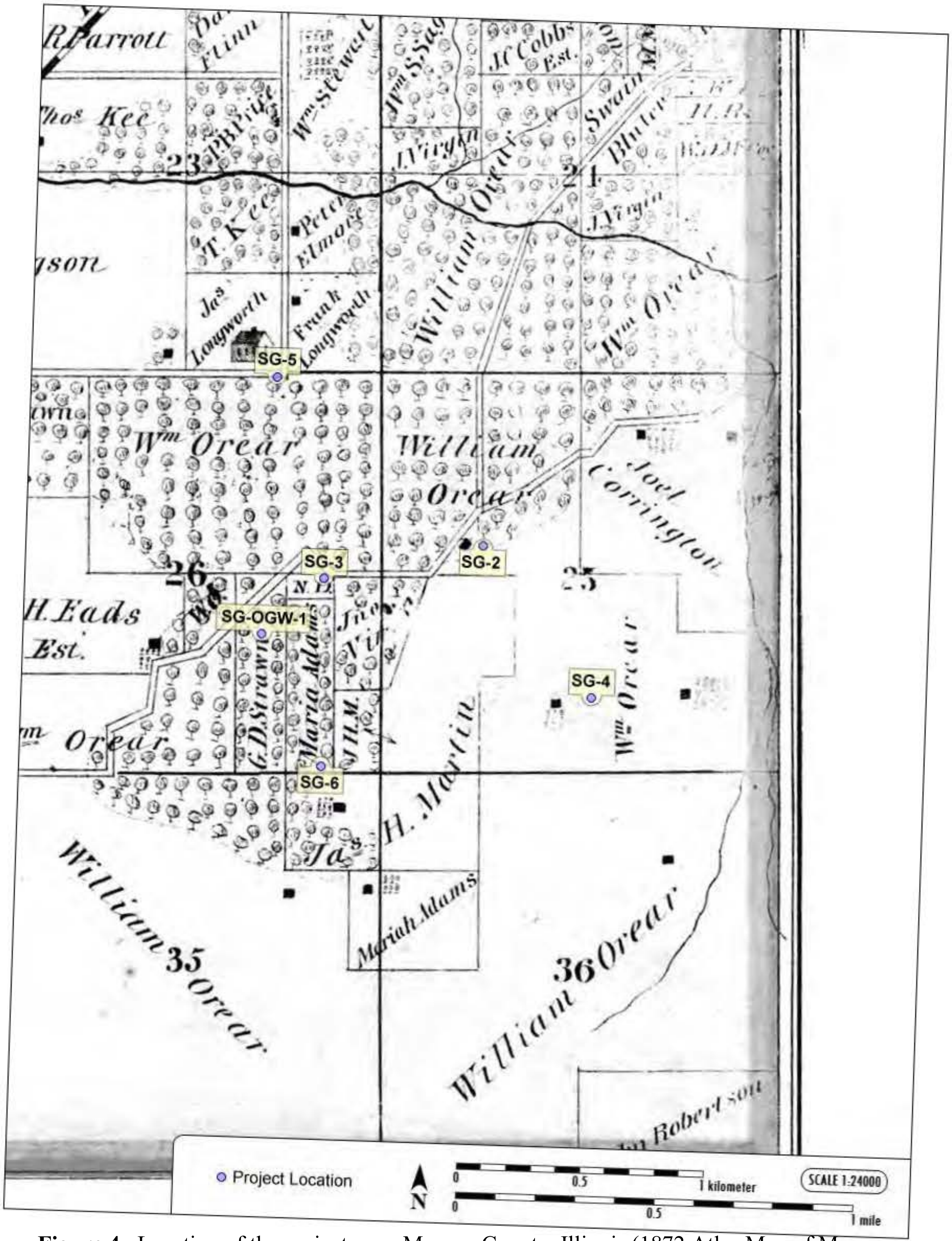

Figure 4. Location of the project area, Morgan County, Illinois (1872 Atlas Map of Morgan County, Illinois).

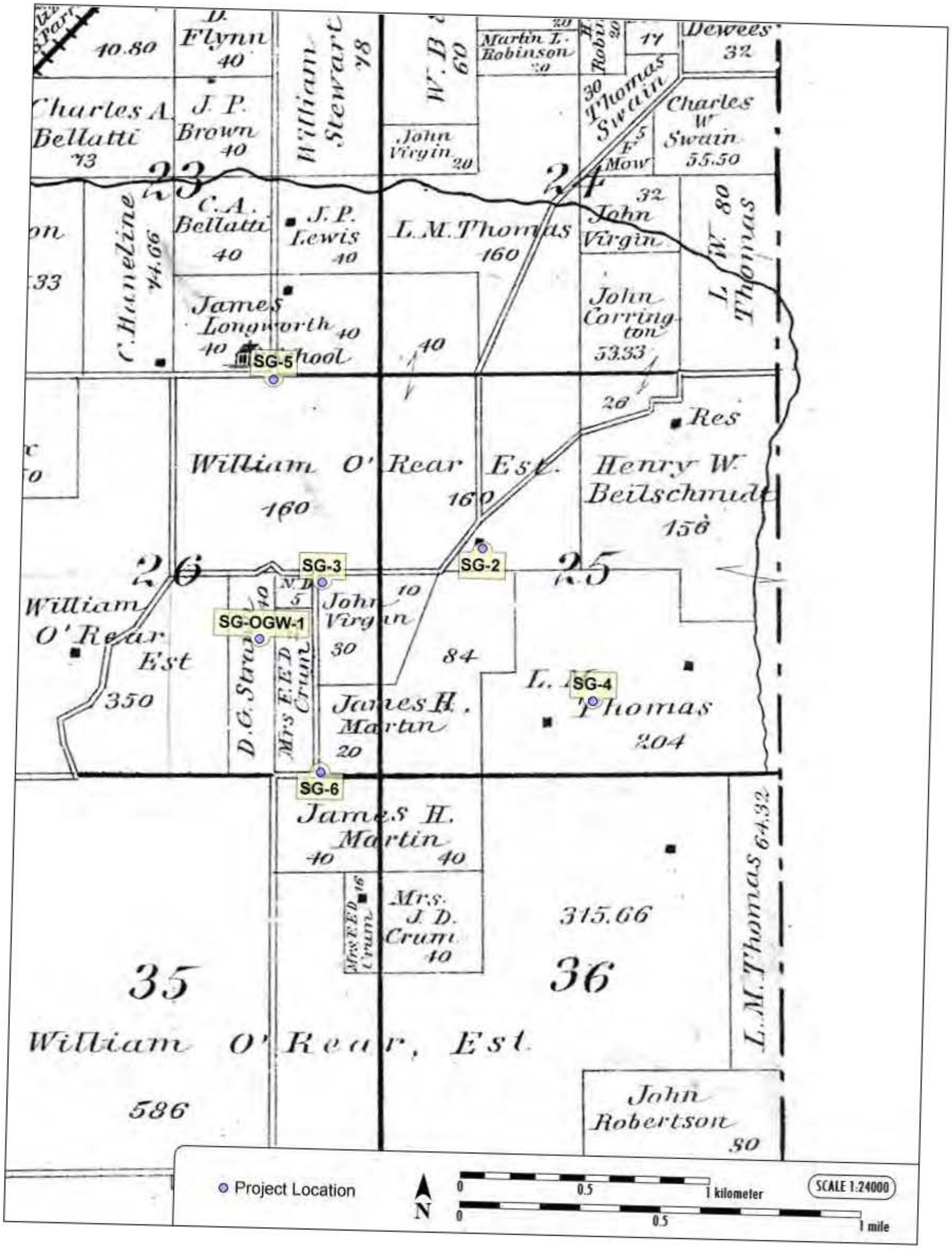

Figure 5. Location of the project area, Morgan County, Illinois (1894 Plat Book of Morgan County, Illinois).

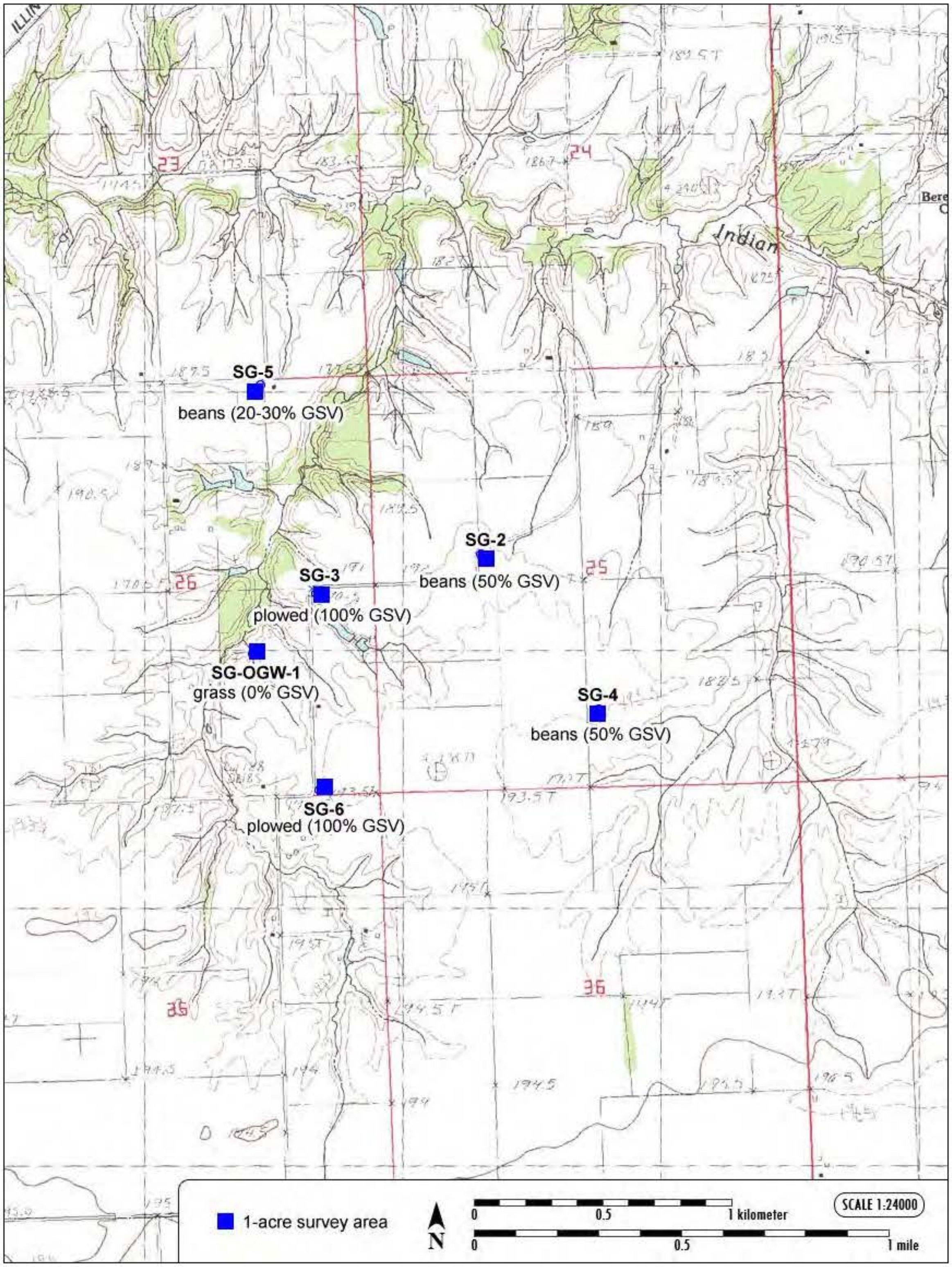

Figure 6. Ground surface visibility at each monitoring location at the time of survey.

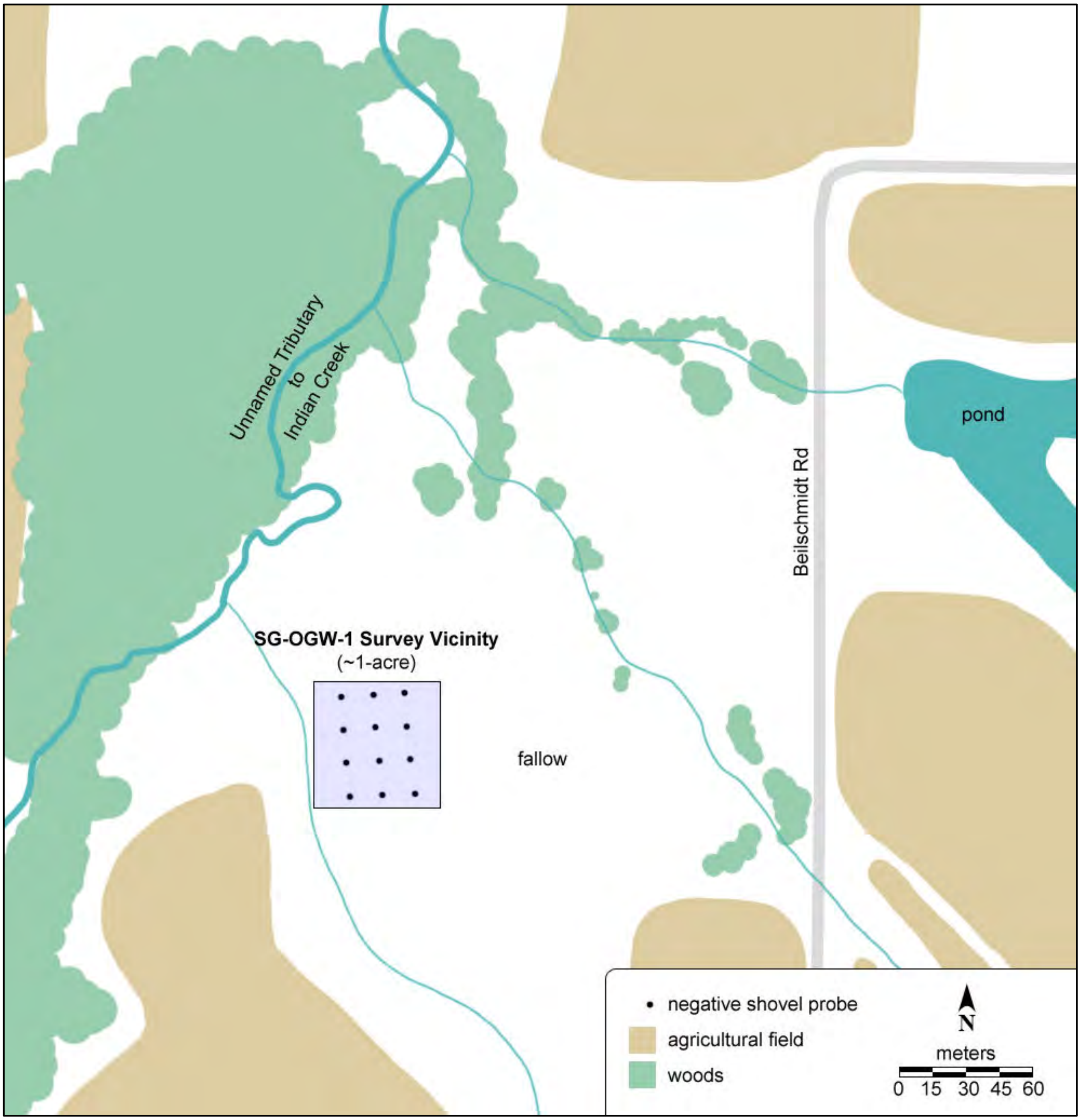

Figure 7. Location of shovel test probes within the vicinity of soil gas monitoring station SG-OGW-1

APPENDIX G

Geological Report

Technical Report: CO_2 Plume Delineation for the Morgan County CO_2 Storage Site

for the

Final Environmental Impact Statement
FutureGen 2.0 Project
Meredosia, Illinois (Morgan County)

Note: This appendix was updated for the Final EIS.

DOE/EIS-0460
October 2013

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Technical Report:
CO_2 Plume Delineation for the Morgan County CO_2 Storage Site
May 2013

1.0 Introduction and Background

After a siting process, the FutureGen Industrial Alliance, Inc. (Alliance) identified a site in Morgan County, Illinois as its preferred location for a permanent, safe, underground carbon dioxide (CO_2) storage site. The Morgan County CO_2 storage site is a component of the FutureGen 2.0 Project, a large-scale oxy-combustion repowering project that will use carbon capture and storage technology. The FutureGen 2.0 Project is a public-private partnership, with costs shared by the U.S. Department of Energy (DOE), the Alliance, and other project partners.

The Alliance plans to acquire a portion of the existing Meredosia Energy Center in Meredosia, Illinois, and repower one of its units with oxy-combustion and carbon capture technology. An oxy-combustion system burns coal with a mixture of oxygen and CO_2, instead of air, to produce a concentrated CO_2 stream that can be captured for geologic storage. The oxy-combustion boiler, air separation unit, and CO_2 purification and compression unit will allow the plant to capture at least 90 percent of its CO_2 emissions and reduce other emissions to near zero.

The captured CO_2 will be transported from the power plant through an underground pipeline to injection wells drilled into the Mount Simon Sandstone—sandstone that underlies central Illinois—so that the CO_2 can be sequestered within that geologic formation. The Alliance plans to inject approximately 1.1 million metric tons (MMT) of CO_2 annually into the Mount Simon Sandstone where it will be permanently stored. Visitor, research, and training facilities located near the CO_2 storage site will provide public education and outreach, as well as training and research opportunities associated with CO_2 capture and storage.

Working with Battelle and its Pacific Northwest Division, the Alliance has identified the approximate area in which the injection wells will be located, and, based on published and site-specific data, has estimated the size of the expected underground area in which the injected CO_2 will be permanently stored. The Alliance has used this information to (1) obtain the necessary property rights from local landowners, (2) provide information for DOE's National Environmental Policy Act (NEPA) process, and (3) prepare Class VI

Underground Injection Control (UIC) permit applications that were submitted to the U.S. Environmental Protection Agency (EPA) pursuant to the Safe Drinking Water Act.[1]

For DOE's NEPA process, the Alliance identified the area within which the CO_2 plume will be located as the "NEPA study area." The NEPA study area is approximately 6,800 acres, as shown in Figure 1.

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[1] The Alliance submitted its Class VI UIC Permit Applications and Supporting Documentation to EPA on March 15, 2013. Responding to EPA's completeness review, the Alliance submitted updated Supporting Documentation to EPA on May 13, 2013. This Technical Report has been updated with the information and graphics from the May 13, 2013 submittal to EPA.

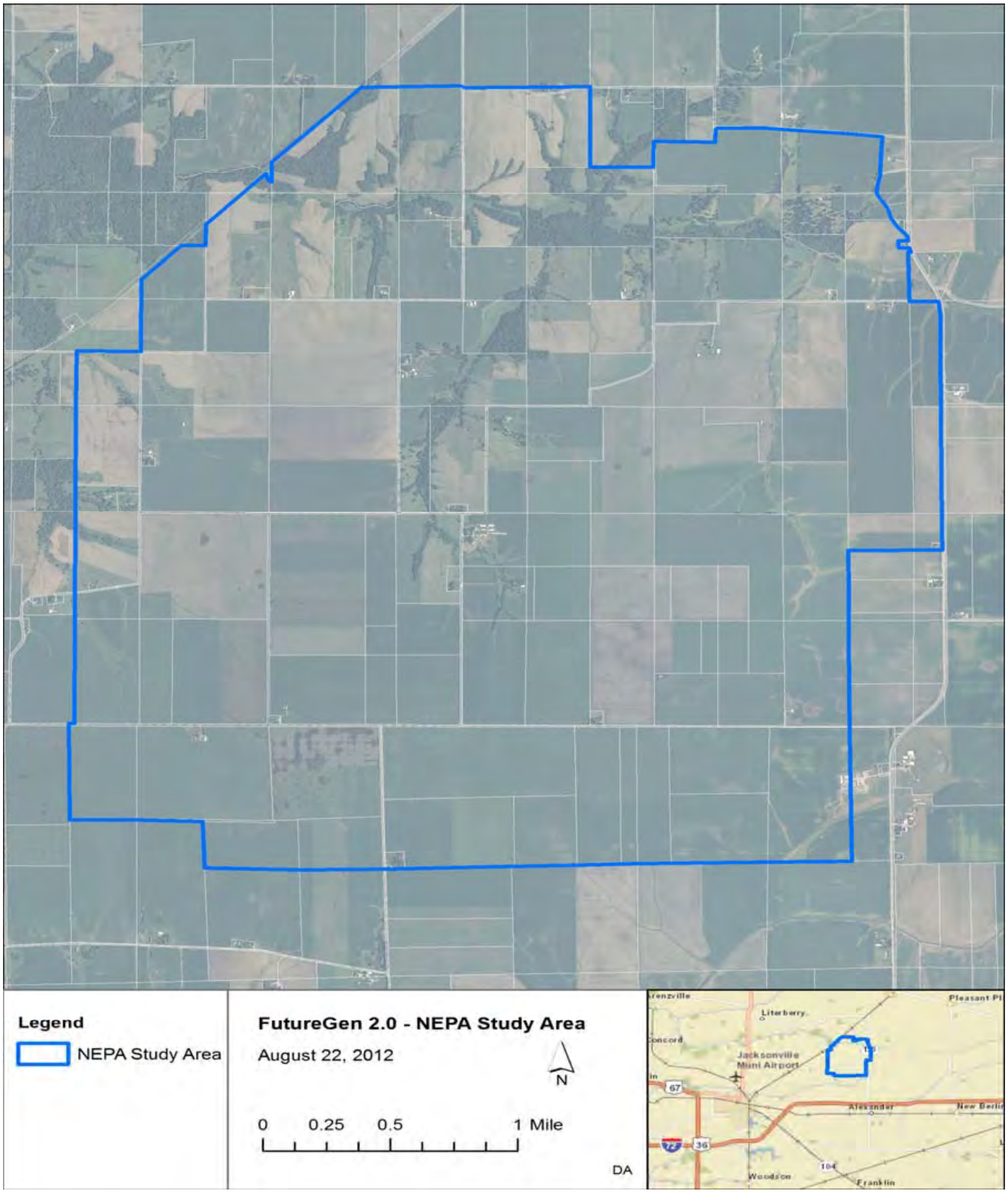

Figure 1. NEPA Study Area for the Morgan County CO_2 Storage Site

Based on computational modeling, the Alliance has determined that the comingled CO_2 plume after 20 years of injection at an annual rate of approximately 1.1 MMT (a total of 22 MMT) will be an area of approximately 4,000 acres. The CO_2 plume will be contained within the 6,800-acre NEPA study area.

A *vertical well* is drilled from the ground surface to a specified completion depth in a straight line.

A *horizontal well* is drilled from the ground surface to a specified depth and then curved to proceed in a horizontal direction.

The Alliance evaluated several injection well configurations using both vertical and horizontal wells at one or two injection sites within the NEPA study area. The Alliance's original configuration was for two vertical injection wells to be located on separate injection well pads located 0.5 to 1 mile apart.

After consideration of site-specific data from the stratigraphic well, the Alliance is now proposing to construct and operate up to four horizontal injection wells for the annual injection of 1.1 MMT of CO_2 over a 20-year period (a total of 22 MMT). The Alliance proposed this configuration in the UIC permit applications it filed with EPA.[2]

All four horizontal wells will originate from a common drilling pad and will operate independently of each other (i.e., separate wellheads). The injection well pad will also accommodate one or two monitoring wells.

The well pad will be a rectangle measuring approximately 640 feet by 500 feet, or approximately 7 acres (by comparison, the well pad for the Alliance stratigraphic well is approximately 350 feet by 350 feet, or approximately 3 acres). Surface facilities in close proximity to the injection well pad will consist of a Site Control Building and a Well Annulus Maintenance and Monitoring System Building. Surface facilities associated with the injection wells will require less than 25 acres for planned structures and access to monitoring points.

Each horizontal well will include a vertical section that extends through the Potosi Formation to an approximate depth of 3,150 feet and a 1,500- to 2,000-foot-long horizontal section in the Upper Mount Simon Formation at an approximate depth of 4,030 feet below

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[2] It is possible, however, that the Alliance could propose a fewer number of horizontal wells at a later time. Any proposed injection well configuration will result in a CO_2 plume that will be located within the NEPA study area.

ground surface (bgs).[3] Each horizontal well will be oriented along a different azimuth to facilitate efficient distribution of the CO_2 and pore space use.

Figure 2 shows an injection well schematic with a cased-hole completion scenario. Figure 3 shows a conceptual arrangement of the four horizontal injection wells. Table 1 shows the length of each lateral leg and the mass rate of CO_2 injection for each well.

Table 1. Length and Mass Rate of CO_2 Injection for Each of the Injection Wells

Well	Length of Lateral Leg (feet)	Mass Rate of CO_2 Injection (MMT/year)
Injection well #1	1,500	0.2063 (19% of total flow)
Injection well #2	2,500	0.3541 (32% of total flow)
Injection well #3	2,500	0.3541 (32% of total flow)
Injection well #4	1,500	0.1856 (17% of total flow)

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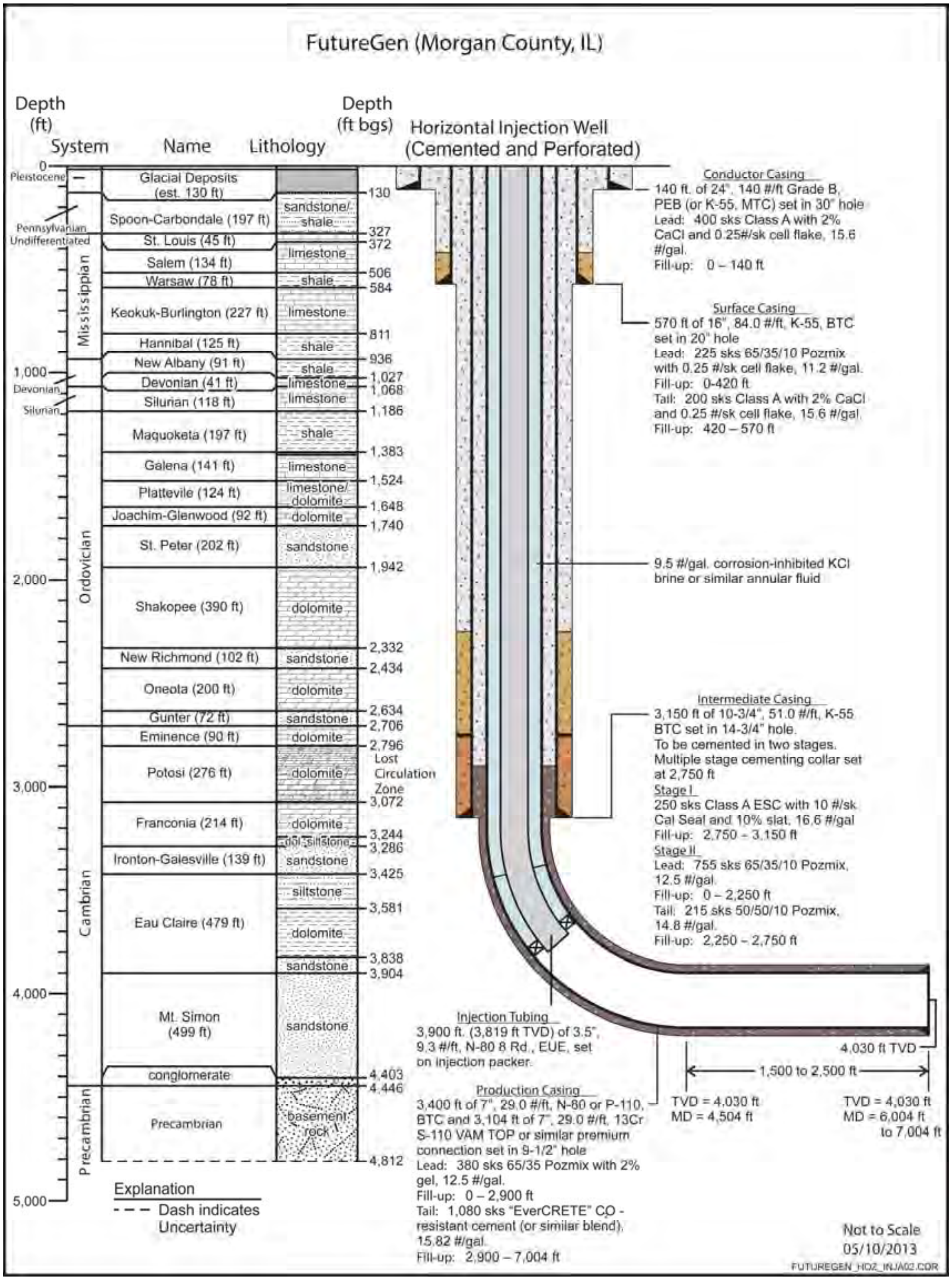
[3] This is the cased-well completion scenario, in which the long-string casing will be perforated across an approximately 1,500- to 2,000-foot long section of the Mount Simon Sandstone. A second possible scenario is an open-hole completion in which the 7-inch production casing will be set (i.e., terminated) on a formation packer shoe in the upper Elmhurst (approximate measured depth 3,950 feet bgs; approximate total vertical depth of 3,850 feet bgs) and the remainder of the penetrated Elmhurst and Mount Simon Formation would remain uncased.



Conductor Casing
140 ft. of 24", 140 #/ft Grade B, PEB (or K-55, MTC) set in 30" hole
Lead: 400 sks Class A with 2% CaCl and 0.25#/sk cell flake, 15.6 #/gal.
Fill-up: 0 – 140 ft

Surface Casing
570 ft of 16", 84.0 #/ft, K-55, BTC set in 20" hole
Lead: 225 sks 65/35/10 Pozmix with 0.25 #/sk cell flake, 11.2 #/gal.
Fill-up: 0-420 ft
Tail: 200 sks Class A with 2% CaCl and 0.25 #/sk cell flake, 15.6 #/gal.
Fill-up: 420 – 570 ft

9.5 #/gal. corrosion-inhibited KCl brine or similar annular fluid

Intermediate Casing
3,150 ft of 10-3/4", 51.0 #/ft, K-55 BTC set in 14-3/4" hole.
To be cemented in two stages.
Multiple stage cementing collar set at 2,750 ft
Stage I
250 sks Class A ESC with 10 #/sk Cal Seal and 10% slat, 16.6 #/gal
Fill-up: 2,750 – 3,150 ft
Stage II
Lead: 755 sks 65/35/10 Pozmix, 12.5 #/gal.
Fill-up: 0 – 2,250 ft
Tail: 215 sks 50/50/10 Pozmix, 14.8 #/gal.
Fill-up: 2,250 – 2,750 ft

Injection Tubing
3,900 ft. (3,819 ft TVD) of 3.5", 9.3 #/ft, N-80 8 Rd., EUE, set on injection packer.

Production Casing
3,400 ft of 7", 29.0 #/ft, N-80 or P-110, BTC and 3,104 ft of 7", 29.0 #/ft, 13Cr S-110 VAM TOP or similar premium connection set in 9-1/2" hole
Lead: 380 sks 65/35 Pozmix with 2% gel, 12.5 #/gal.
Fill-up: 0 – 2,900 ft
Tail: 1,080 sks "EverCRETE" CO_2 - resistant cement (or similar blend), 15.82 #/gal.
Fill-up: 2,900 – 7,004 ft

Figure 2. Injection Well Schematic – Cased-Hole Completion (geology and depths shown in this diagram are based on site-specific characterization data obtained from the FutureGen 2.0 stratigraphic well)

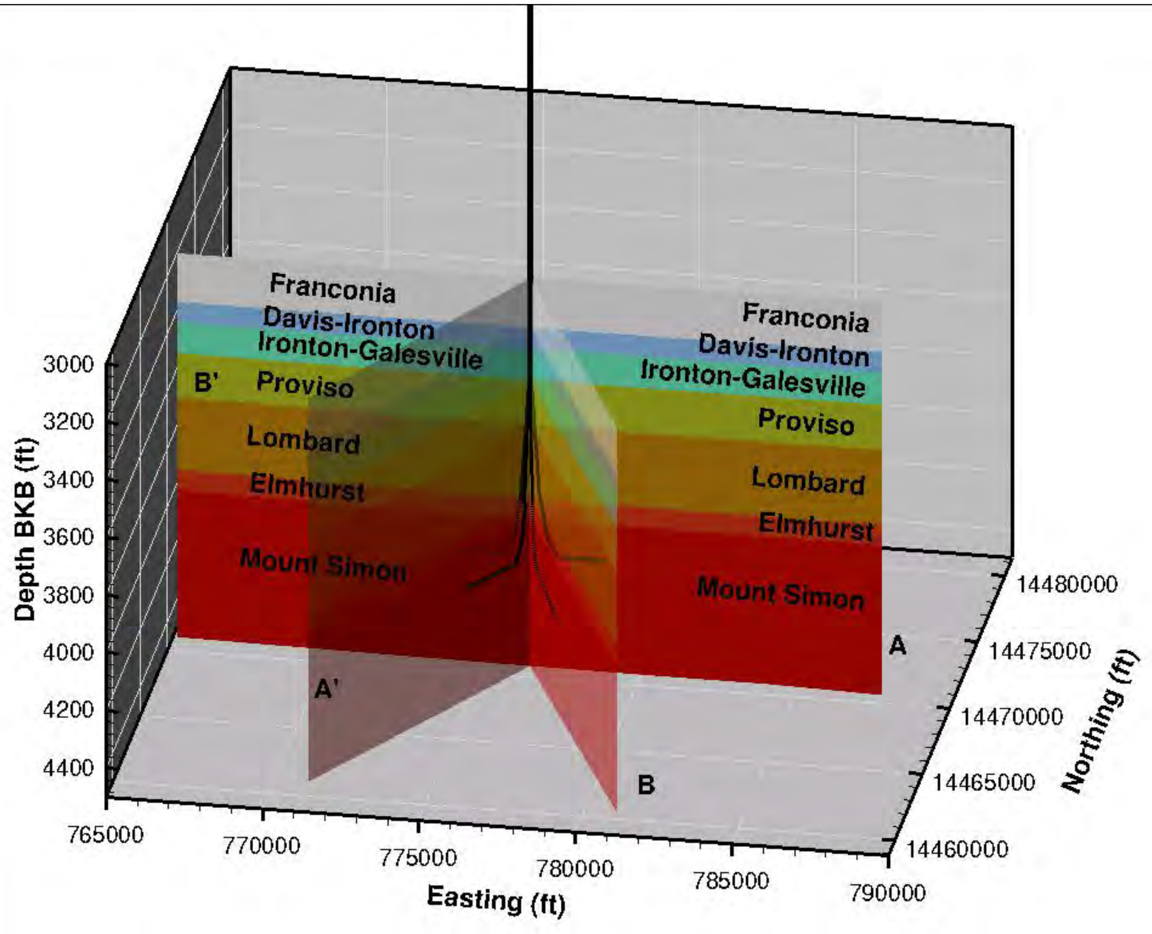


Figure 3. Conceptual Arrangement of Four Horizontal Injection Well Configuration

As currently planned, the injection wells will include the following casing strings: a 24-in.-diameter conductor string set at a depth of approximately 140 feet bgs; a 16-inch-diameter surface string set at a depth of approximately 570 feet bgs; a 10-3/4-inch-diameter intermediate string set at a depth of approximately 3,150 feet bgs; and a 7-inch-diameter long string set at an approximate (measured) depth of 7,004 feet bgs (approximate true vertical depth of 4,030 feet bgs) for a cased-hole completion scenario. The injection tubing will have an outer diameter of 3.5 inches and an inner diameter of 2.992 inches.[4]

Prior to construction of the injection wells and injection of CO_2, the Alliance will obtain a Class VI (CO_2 injection) UIC permit for each injection well as is required by EPA's Geologic Sequestration regulations (40 CFR §§ 146.81 – 146.95). The information in this technical report is consistent with the information that was provided to EPA as part of the Alliance's UIC permit applications. It should be noted that the well configuration proposed in the Alliance's UIC permit applications could change. For example, the Alliance may propose a fewer number of horizontal wells. However, any injection well configuration proposed by the Alliance in its UIC permit applications will result in an underground CO_2 plume of approximately 4.000 acres and it will be located within the NEPA study area.

The remainder of this technical report describes how regional and site-specific geologic and hydrologic information was used in a computational model to delineate the CO_2 plume. It provides an overview of the geologic setting and describes the computational model, including a description of the simulator and the physical processes modeled, along with a description of the conceptual model and numerical implementation.

2.0 Overview of the Geologic Setting

Injection Zone

The *injection zone* is defined in EPA's Class VI UIC regulations as "a geologic formation, group of formations, or part of a formation that is of sufficient areal extent, thickness, porosity, and permeability to receive carbon dioxide through a well or wells associated with a geologic sequestration project." 40 CFR § 146.81(d). For the FutureGen 2.0 Project, the injection zone is the Mount Simon Sandstone Formation and the lower Eau Claire Formation (Elmhurst Sandstone member). However, the injection interval where the Alliance intends to inject CO_2 is the Mount Simon Sandstone Formation.

The Alliance proposes to inject CO_2 into the Mount Simon Sandstone. The Mount Simon Sandstone is the thickest and most widespread potential CO_2 injection formation in Illinois (Leetaru and McBride 2009). The Mount Simon Sandstone has a proven injection-zone capacity, based on a number of natural-gas storage facilities across the Illinois Basin (Buschbach and Bond 1974; Morse and Leetaru 2005) and data from the Archer Daniels Midland (ADM) carbon

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[4] For an open-hole completion, the open borehole will be between 6.5 and 9.5 inches in diameter. The difference depends on whether the borehole is drilled to total depth before installing/cementing the 7-inch production casing (9.5 inches) or if the 7-inch production casing is installed/cemented before drilling the open borehole section (6.5 inches).

storage site in Macon County, Illinois (Leetaru et al. 2009).

The Mount Simon Sandstone in the Illinois Basin represents a regional target for safe injection of anthropogenic CO_2 (Leetaru et al. 2005). The Illinois Basin covers an area of about 110,000 mi^2 over Illinois and parts of Indiana and Kentucky. The Illinois Basin contains approximately 120,000 mi^3 of Cambrian to Pennsylvanian marine and terrestrial sedimentary rocks with a maximum thickness of about 15,000 feet (Buschbach and Kolata 1991; Goetz et al. 1992; McBride and Kolata 1999).

More than 900 wells, mostly pre-1980, have been drilled into the Mount Simon Sandstone in the Illinois Basin (ISGS 2011); about 50 of these wells in Illinois extend to the Precambrian basement underlying the Mount Simon. Most of the wells drilled into the Mount Simon Sandstone prior to 1980 lack well-log suites suitable for quantitative analysis of porosity and permeability. In north-central Illinois where the Mount Simon Sandstone is used for natural-gas storage, some detailed analyses of porosity, permeability, and lithofacies connectivity are available, although most gas-storage wells only penetrate the upper part of the Mount Simon (Morse and Leetaru 2005).

Confining Zone

The *confining zone* is defined in EPA's Class VI UIC regulations as "a geologic formation, group of formations, or part of a formation stratigraphically overlying the injection zone(s) that acts as a barrier to fluid movement." 40 CFR § 146.81(d). For the FutureGen 2.0 Project, the confining zone is the Proviso and Lombard members of the Eau Claire Formation. The Franconia and Davis-Ironton Formations are a secondary confining zones. A confining zone is also referred to as a "caprock" or "seal."

The confining zone for the proposed injection zones consists of the Lombard and Proviso members of the Eau Claire Formation that overlies the Mount Simon and Elmhurst sandstones. The Eau Claire is the most important regional confining zone in Illinois (Leetaru et al. 2005, 2009). The Davis member of the Franconia Formation forms a secondary confining zone above the Eau Claire Formation. Impermeable Precambrian-aged basement rocks underlie the Mount Simon Sandstone and form a no-flow boundary.

The Eau Claire Formation is a widespread, heterolithic carbonate and fine siliciclastic unit present across west-central Illinois and parts of seven adjoining states (Sminchak 2011). The low-permeability Lombard and Proviso members of the Eau Claire form an effective confining layer at 38 natural-gas storage reservoirs in Illinois (Buschbach and Bond 1974; Morse and Leetaru 2005). The confining members of Eau Claire overlie the Elmhurst Sandstone member.

Regionally, the Lombard member of the Eau Claire Formation consists of glauconitic and sandy dolomite interbedded with mudstones and shale; the shale content increases to the south and sand content increases to the west and north (Willman et al. 1975). The Lombard member is overlain by the Proviso member, which is characterized by limestone, dolomite, sandy siltstone, and shale beds. The Lombard and Proviso members are continuous and extend across several buried Precambrian highs in the region. In addition to the Eau Claire Formation, the widespread, low-permeability Franconia Dolomite Formation (Kolata and Nimz 2010), is a secondary confining zone for the containment of CO_2 within the region.

The regional geology of Illinois is well known from wells and borings drilled in conjunction with hydrocarbon exploration, aquifer development and use, and coal and commercial mineral exploration. Related data are largely publicly available through the Illinois State Geological Survey (ISGS)[5] and the U.S. Geological Survey (USGS).[6] In addition, DOE has sponsored a number of studies by the Midwest Geologic Sequestration Consortium[7] to evaluate subsurface strata in Illinois and adjacent states as possible targets for the containment of anthropogenic CO_2.

In addition, to support the evaluation of the Morgan County site as a potential carbon storage site, the Alliance drilled and extensively characterized a deep stratigraphic well approximately 1 mile east of the planned injection site. The stratigraphic well reached a total depth of 4,826 feet bgs within the Precambrian basement. The well penetrated 479 feet of the Eau Claire Formation and 512 feet of the Mount Simon Sandstone.

Depth Measurements

Well depths, or points along a well, are provided in depths “below ground surface” (abbreviated bgs) or in depths “below kelly bushing” (abbreviated bkb or KB). A kelly bushing is a component of a drilling rig that is located above the ground surface on the drill rig used to drill the well. For the Alliance’s stratigraphic well, the kelly bushing was 14 feet above the ground surface. Thus, for the stratigraphic well, the difference between a depth measured in bkb and a depth measured in bgs is 14 feet. If no specific designation is provided, the measurement is assumed to be bkb.

The stratigraphic well was extensively characterized, sampled, and geophysically logged during drilling. These resulting data, together with the regional data, form the basis for understanding the geologic setting at the proposed site. A total of 177 feet of whole core were collected from the lower Eau Claire-upper Mount Simon Sandstone and 34 feet were collected from lower Mount Simon Sandstone-Precambrian basement interval. In addition to whole drill core, a total of 130 side-wall core plugs were obtained from the combined interval of the Eau Claire Formation, Mount Simon Sandstone, and the Precambrian basement. Figure 4 shows the stratigraphic column at the Alliance’s stratigraphic well on the Morgan County CO_2 storage site.

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[5] http://www.isgs.uiuc.edu/

[6] http://www.usgs.gov/

[7] http://sequestration.org/

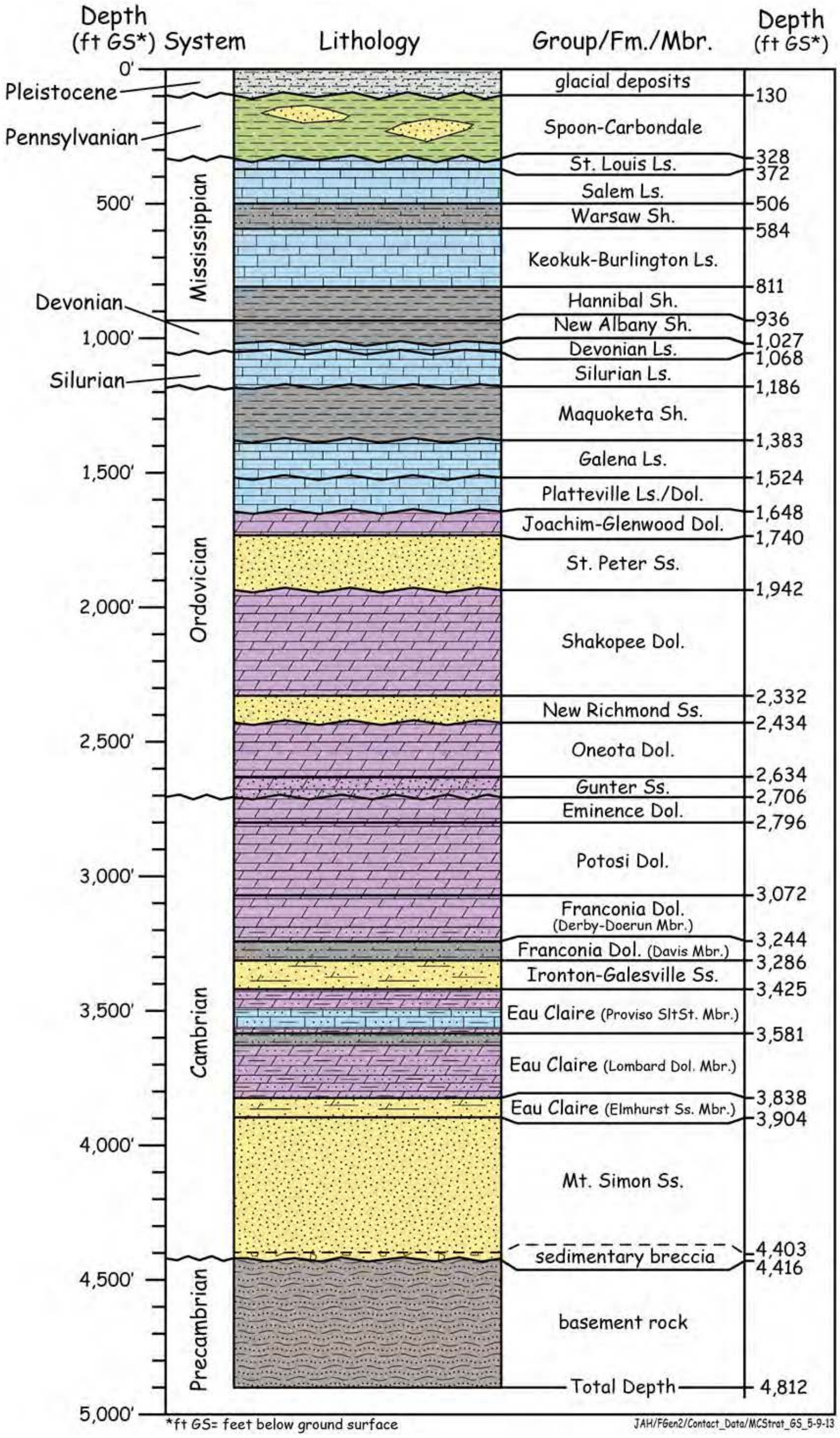


Figure 4. Stratigraphic Column at the Morgan County CO_2 Storage Site

Based on publicly available regional data and site-specific data obtained by the Alliance from its stratigraphic well drilled near the proposed injection site, the Mount Simon Sandstone at the site is sufficiently deep and has sufficient thickness, porosity, and permeability to store up to 22 MMT of CO_2. In addition, the Eau Claire Formation caprock at the site is of sufficient thickness, lateral continuity, and has low enough permeabilities to serve as the primary confining zone or caprock.

The site affords additional containment with several secondary confining zones, including the Franconian Formation. The basement rock was encountered at 4,430 feet and is a rhyolite, which will act as an impermeable lower boundary for the injection zones within the Mount Simon Sandstone.

3.0 Computational Modeling

Computational modeling comprises two elements: a computer code, or simulator, that implements the mathematics of scientific understanding, and implementation of the simulator as an analytical tool. These elements result in the ability to predict the quantity and distribution of CO_2 injected into saline reservoirs for permanent storage. This requires solving the mathematical equations that describe the migration and partition behavior of CO_2 as it is injected into geologic media for which the pore space is initially filled with an aqueous saline solution (brine). The equations that describe these flow and transport processes are too complex to solve directly. Therefore, the governing flow and transport equations are solved indirectly where space and time are divided into discrete elements. Space discretization involves dividing the storage reservoir into grid blocks and time discretization involves moving through time using finite steps. The discretization process transforms the governing flow and transport equations into forms that are solvable on high-speed computers. Both of the elements of the computational model that were used to determine the CO_2 plume for the Morgan County CO_2 storage site are described in the sections that follow.

4.0 Description of Simulator

Numerical simulation of CO_2 injection into deep geologic reservoirs requires the modeling of complex, coupled hydrologic, chemical, and thermal processes, including multi-fluid flow and transport, partitioning of CO_2 into the aqueous phase, and chemical interactions with aqueous fluids and rock minerals. The simulations conducted for this investigation were executed using the STOMP-CO2 simulator (White et al. 2012; White and Oostrom 2006; White and Oostrom 2000). STOMP-CO2 was verified against other codes used for simulation of geologic disposal of CO_2 as part of the GeoSeq code intercomparison study (Pruess et al. 2002).

Partial differential conservation equations for fluid mass, energy, and salt mass compose the fundamental equations for STOMP-CO2. Coefficients within the fundamental equations are related to the primary variables through a set of constitutive relationships. The salt transport equations are solved simultaneously with the component mass and energy conservation equations. The solute and reactive species transport equations are solved sequentially after the coupled flow and transport equations. The fundamental coupled flow equations are solved using an integral volume finite-difference approach with the nonlinearities in the discretized equations resolved through Newton-Raphson iteration. The dominant nonlinear functions within the STOMP-CO2 simulator are the relative permeability-saturation-capillary pressure (k-s-p) relationships.

The STOMP-CO2 simulator allows the user to specify these relationships through a large variety of popular and classic functions. Two-phase (gas-aqueous) k-s-p relationships can be specified with hysteretic or nonhysteretic functions or nonhysteretic tabular data. Entrapment of CO_2 with imbibing water conditions can be modeled with the hysteretic two-phase k-s-p functions. Two-phase k-s-p relationships span both saturated and unsaturated conditions. The aqueous phase is assumed to never completely disappear through extensions to the s-p function below the residual saturation and a vapor-pressure lowering scheme. CO_2 has the function of a gas in these two-phase k-s-p relationships.

For the range of temperature and pressure conditions present in deep saline reservoirs, four phases are possible: 1) water-rich liquid (aqueous), 2) CO_2-rich vapor (gas), 3) CO_2-rich liquid (liquid-CO_2) and 4) crystalline salt (precipitated salt). The equations of state express 1) the existence of phases given the temperature, pressure, and water, CO_2, and salt concentration; 2) the partitioning of components among existing phases; and 3) the density of the existing phases. Thermodynamic properties for CO_2 are computed via interpolation from a property data table stored in an external file. The property table was developed from the equation of state for CO_2 published by Span and Wagner (1996). Phase equilibria calculations in STOMP-CO2 use the formulations of Spycher et al. (2003) for temperatures below 100°C and Spycher and Pruess (2010) for temperatures above 100°C, with corrections for dissolved salt provided in Spycher and Pruess (2010). The Spycher formulations are based on the Redlich-Kwong equation of state with parameters fitted from published experimental data for CO_2-H_2O systems. Additional details regarding the equations of state used in STOMP-CO2 can be found in the guide by White et al. (2012).

A well model is defined as a type of source term that extends over multiple grid cells, where the well diameter is smaller than the grid cell. A fully coupled well model in STOMP-CO2 was used to simulate the injection of CO_2 under a specified mass injection rate, subject to a pressure limit. When the mass injection rate can be met without exceeding the specified pressure limit, then the well is considered to be flow controlled. Conversely, when the mass injection rate cannot be met without exceeding the specified pressure limit, then the well is considered to be pressure controlled and the mass injection rate is determined based on the injection pressure. The well model assumes a constant pressure gradient within the well and calculates the injection pressure at each cell in the well. The CO_2 injection rate is proportional to the pressure gradient between the well and surrounding formation in each grid cell. By fully integrating the well equations into the reservoir field equations, the numerical convergence of the nonlinear conservation and constitutive equations is greatly enhanced.

5.0 Physical Processes Modeled

Physical processes modeled in the reservoir simulations included non-isothermal multi-fluid flow and transport for a number of components (e.g., water, salt, and CO_2) and phases (e.g., aqueous and gas). The preliminary reservoir model assumes isothermal conditions, which are appropriate if the temperature of the injected CO_2 is similar to the formation temperature. Reservoir salinity is considered in the simulations because salt precipitation can occur near the injection well in higher permeability layers as the rock dries out during CO_2 injection. This can completely plug pore throats, making the layer impermeable, thereby reducing reservoir injectivity and affecting the distribution of CO_2 in the reservoir.

Injected CO_2 partitions in the reservoir between the free (or mobile) gas, entrapped gas, and aqueous phases. Sequestering CO_2 in deep saline reservoirs occurs through four mechanisms: 1) structural trapping, 2) aqueous dissolution, 3) hydraulic trapping, and 4) mineralization. Structural trapping is the long-term retention of the buoyant CO_2 phase in the pore space of the reservoir rock held beneath one or more impermeable caprocks. Aqueous dissolution occurs when CO_2 dissolves in the brine resulting in an aqueous-phase density greater than the ambient conditions. Hydraulic trapping is the pinch-off trapping of the CO_2 phase in pores as the brine re-enters pore spaces previously occupied by the CO_2 phase. Generally, hydraulic trapping only occurs upon the cessation of CO_2 injection. Mineralization is the chemical reaction that transforms formation minerals to carbonate minerals. In the Mount Simon Sandstone, the most likely precipitation reaction is the formation of iron carbonate precipitates. A likely reaction between CO_2 and shale is the dewatering of clays. Laboratory investigations are currently quantifying the importance of these reactions at the Morgan County CO_2 storage site. Therefore, the simulations described here did not include mineralization reactions. However, the STOMP-CO2 simulator does account for precipitation of salt during CO_2 injection.

The CO_2 stream provided by the plant to the storage site is 97 percent dry basis CO_2. Because the amount of impurities is small, for the purposes of modeling the CO_2 injection and redistribution for this project, it was assumed that the injectate was pure CO_2.

6.0 Geologic Model

A stratigraphic conceptual model of the geologic layers from the Precambrian basement to ground surface was constructed using the EarthVision® software package (Figure 5). The geologic setting and site-specific characterization data were the basis for the Morgan County CO_2 storage site model. Borehole data from the Alliance's stratigraphic well and data from regional boreholes and published regional contour maps were used as input data. However, units below the Shakopee Dolomite and above the Eau Claire Formation were assumed to have a constant thickness based on the stratigraphy observed at the stratigraphic well.

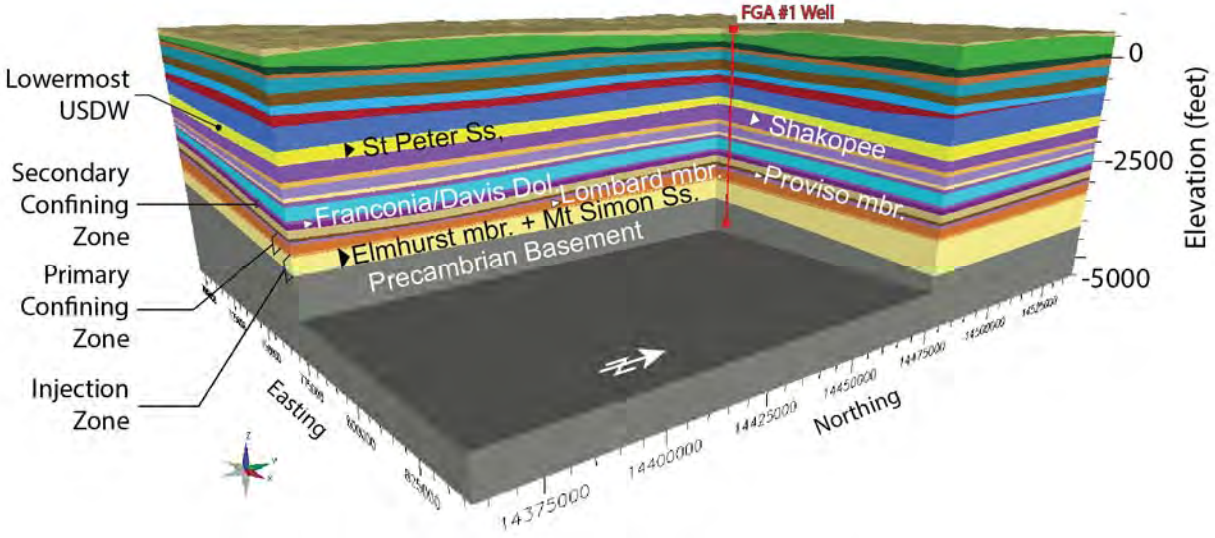
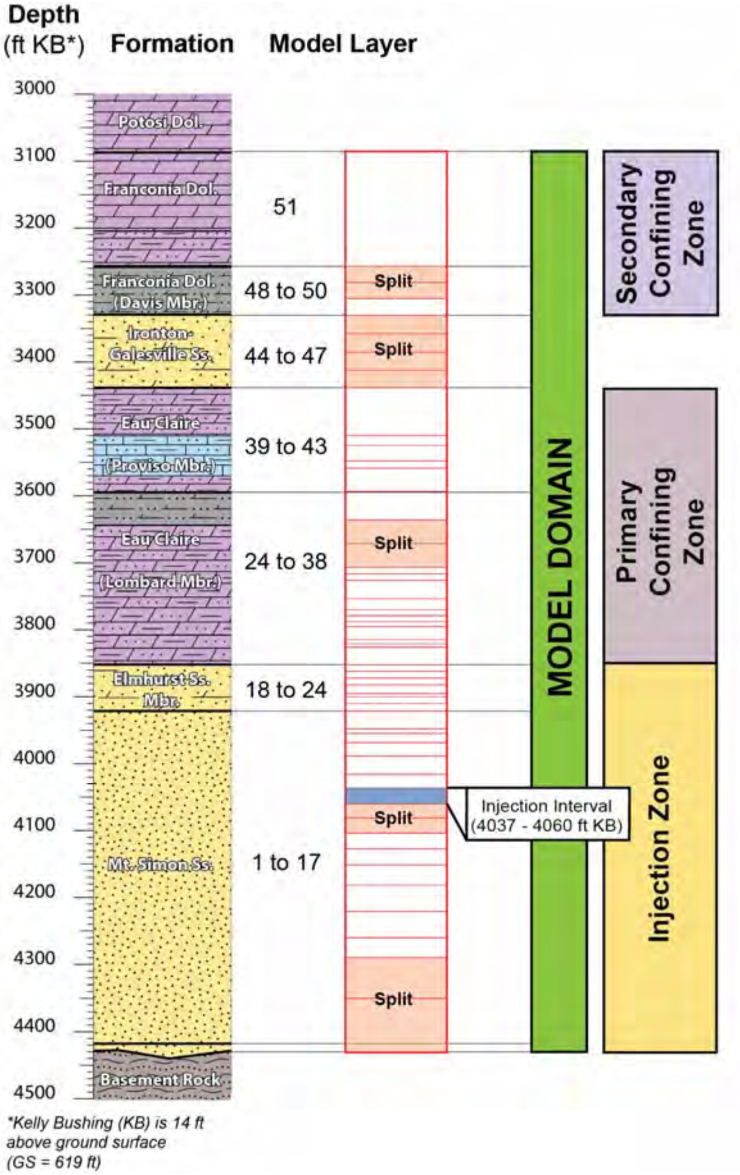


Figure 5. EarthVision® Solid Earth Model for the Proposed Morgan County CO_2 Storage Site. View to the southwest. For clarity, only the main formations have been labeled.

An expanded 100-mile x 100-mile geologic model was constructed to represent units below the Potosi including the Franconia, Ironton, Eau Claire (Proviso, Lombard and Elmhurst), Mount Simon, and Precambrian formations. These surfaces were gridded in EarthVision® based on borehole data and regional contour maps and make up the stratigraphic layers of the computational model.

6.1 Hydrogeologic Layers

The geologic model hydrogeologic layers were defined for each stratigraphic layer based on zones of similar hydrologic properties. The hydrologic properties (permeability, porosity) were deduced from geophysical well logs and side-wall cores. The lithology, deduced from wireline logs and core data, was also used to subdivide each stratigraphic layer of the model. Based on these data, the Mount Simon Sandstone was subdivided into 17 layers, and the Elmhurst Sandstone (member of the Eau Claire Formation) was subdivided into 7 layers as shown in Figure 6. These units form the injection zone. The Lombard and Proviso members of the Eau Claire Formation were subdivided respectively into 14 and 5 layers. The Ironton Sandstone was divided into four layers, the Davis Dolomite into three layers, and the Franconia Formation into one layer. One can also note that some layers ("split" label in Figure 6) have similar properties but have been subdivided to maintain a reasonable thickness of layers within the injection zone as represented in the computational model.



*Kelly Bushing (KB) is 14 ft above ground surface (GS = 619 ft)

Figure 6. Division of Stratigraphic Layers to Create Computational Model Layers

The thickness of the layers varies from 4 to 172 feet, with an average of 26 feet. The assignment of hydrologic properties to these layers is described in the next sections.

6.2 Hydrologic and Porous Media Properties

Continuous wireline log results are commonly calibrated using discrete laboratory core measurements to provide a more continuous record for the particular characterization parameter (e.g., permeability, porosity). From these calibrated wireline-survey measurements, statistical or average values for the hydrologic parameter can be assigned to layers used in numerical models for the purpose of predicting fluid movement within targeted reservoirs.

A number of characterization data sources and methods were used to assign hydrologic properties to the various model layers. Available data sources for the Morgan County site include results from continuous wireline surveys (compensated magnetic resonance [CMR], ELAN), standard and side-wall cores (SWCs), and hydrologic tests (Modular Formation Dynamics Tester [MDT] and packer tests).

Because of differences in lithology and in the borehole construction, the method used to assign properties varied for different vertical zones of the conceptual model.

Horizontal Permeability

Intrinsic permeability is the property of the rock/formation that relates to its ability to transmit fluid, and is independent of the in situ fluid properties. For modeling of sedimentary rock formations, two permeabilities are commonly used: permeability in the horizontal direction, k_h (permeability parallel to sedimentary layering [also Kh]) and permeability in the vertical direction, k_v (permeability perpendicular to layering [also Kv]). The subsequent discussion pertains to assigned horizontal permeability values for the various borehole sections.

Intrinsic permeability data sources for the FutureGen 2.0 stratigraphic well include computed geophysical wireline surveys (CMR and ELAN logs), and where available, laboratory measurements of rotary SWCs, core plugs from the whole core intervals and hydrologic tests (including wireline [MDT]), and packer tests.

Intrinsic Permeability in the Injection Zone (Mount Simon and Elmhurst Sandstone)

For model layers within the injection zone (i.e., Elmhurst Sandstone and Mount Simon Sandstone; 3,852 to 4,432 feet) a correlation/calibration approach was applied. Wireline log CMR- and ELAN-computed permeability model responses were first correlated with and then calibrated to rotary side-wall and core plug permeability results. The correlation process was facilitated using natural gamma ray responses and clay or shale abundance to establish correlation data sets. This calibration provided a continuous permeability estimate over the entire injection reservoir section (curve permKCal).

Intrinsic Permeability in the Confining Zones (Franconia to Lombard Formations)

The sources of data are similar to those for the injection zone reservoir. For each model layer the core data were reviewed, and a simple average of the available horizontal Klinkenburg permeabilities was then calculated for each layer. Core samples that were noted by Core Lab as having potential cracks and/or were very small were eliminated if the results appeared to be unreasonable based on the sampled lithology. If no core samples were available and the arithmetic mean of the PermKCal was below 0.01 mD, a default value of 0.01 mD was applied (Lombard9 is the only layer with a 0.01-mD default value).

Because the sandstone intervals of the Ironton-Galesville Sandstone have higher permeabilities that are similar in magnitude to the modeled reservoir layers, the Ironton-Galesville Sandstone model layer permeabilities were derived from the arithmetic mean of the PermKCal permeability curve.

Figure 7 shows the depth profile of the horizontal permeability assigned to each layer of the model (actual values assigned are listed in Table 7).

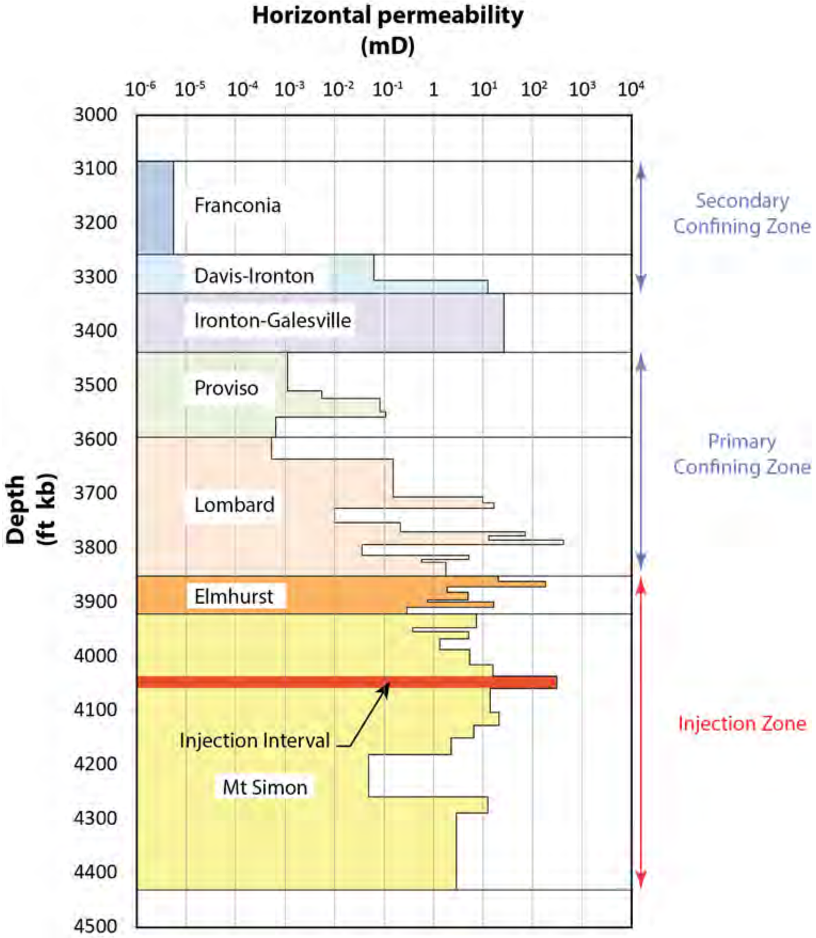


Figure 7. Horizontal Permeability Versus Depth in Each Model Layer

Vertical Permeability

Sedimentation can create an intrinsic permeability anisotropy, caused by sediment layering and preferential directions of connected-pore channels. Kv/Kh ratios were successfully determined for 20 vertical/horizontal siliciclastic core plug pairs cut from intervals of whole core from the stratigraphic well. Horizontal permeability data in the stratigraphic well far outnumber vertical permeability data, because vertical permeability could not be determined from rotary SWCs.

Effective vertical permeability in siliciclastic rocks is primarily a function of the presence of mudstone or shale (Ringrose et al. 2005). The siliciclastic lithologies (sandstones, siltstones, mudstones and shales) are heterolithic in the cored interval of the lower Lombard, and in rotary SWCs from the upper Lombard and non-carbonate Proviso. Core plug samples of heterolithic siliciclastics are poorly representative of larger vertical intervals (Meyer and Krause 2006).

Because the vertical permeability anisotropy of the model layers is not likely to be represented by the sparse data from the stratigraphic well, the following lithology-specific permeability anisotropy averages from literature studies representing larger sample sizes are used for the model layers (Table 2).

The literature-based permeability anisotropy values listed in Table 3 were used to assign Kv/Kh to each layer of the model. Figure 8 shows the depth profile of the anisotropy assigned to each layer of the model. Actual values assigned for each layer are listed in Table 7.

Table 2. Lithology-Specific Permeability Anisotropy Averages from Literature

Facies or Lithology	Kv/Kh	Reference
1. Heterolithic, laminated shale/mudstone/siltstone/sandstone	0.1	Meyer and Krause (2006)
2. Herringbone cross-stratified sandstone. Strat dips to 18 degrees	0.4	Meyer and Krause (2006)
3. Paleo weathered sandstone (coastal flat)	0.4	Meyer and Krause (2006)
4. Accretionary channel bar sandstones with minor shale laminations	0.5	Ringrose et al. (2005); Meyer and Krause (2006)
6. Alluvial fan, alluvial braided stream plain to shallow marine sandstones, low clay content	.3	Kerr et al. (1999)
7. Alluvial fan, alluvial plain sandstones, sheet floods, paleosols, higher clay content	0.1	Hornung and Aigner (1999)
8. Dolomite mudstone	0.007	Saller et al. (2004)

Table 3. Summary of the Scaling Factors Applied for the Modeling

Model Layer	Kv/Kh
Franconia Carbonate	0.007
Davis-Ironton	0.1
Ironton-Galesville	0.4
Proviso (layers 4 and 5)	0.1
Proviso (layers 1 to 3)	0.007
Lombard	0.1
Elmhurst	0.4
Mount Simon (layers 12, 13, 14, 15, 17)	0.4
Mount Simon (layer 16)	0.1
Mount Simon (layer 11, injection interval)	0.5
Mount Simon (layers 6, 7, 8, 9, 10)	0.3
Mount Simon (layers 1, 2, 3, 4, 5)	0.1

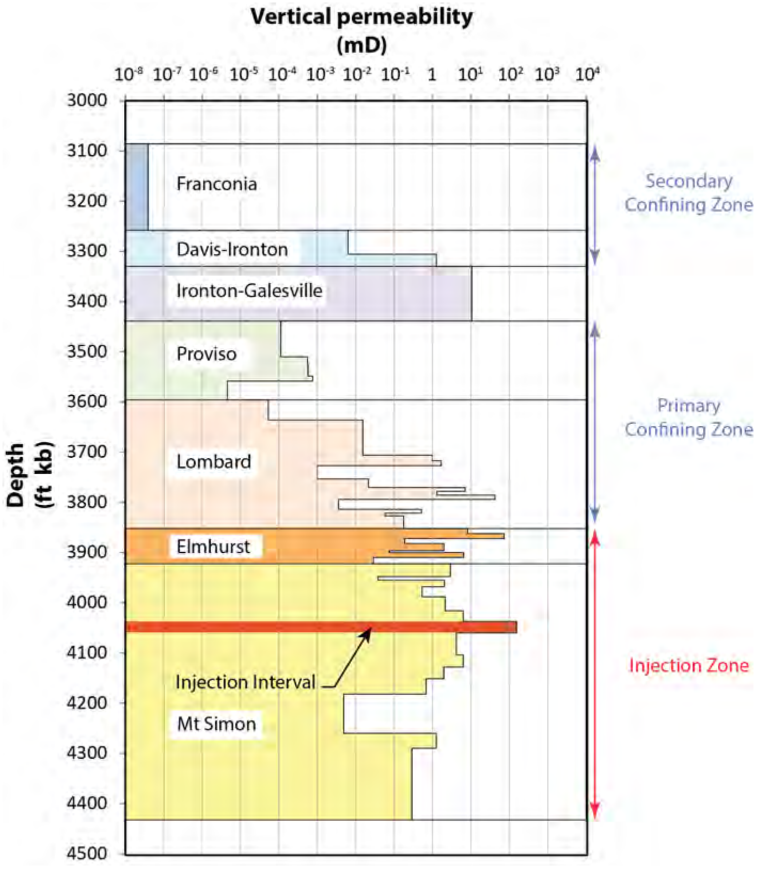


Figure 8. Vertical Permeability Versus Depth in Each Model Layer

Porosity

Total (or absolute) porosity is the ratio of void space to the volume of whole rock. Effective porosity is the ratio of interconnected void space to the volume of the whole rock.

As a first step in assigning porosity values for the FutureGen 2.0 numerical model layers, Schlumberger ELAN porosity log results were compared with laboratory measurements of porosity as determined from SWC and core plugs for specific sampling depth within the Mount Simon.

Figure9 shows the depth profile of the assigned model layer porosities based on the average of the calibrated ELAN values. The actual values assigned for each layer are listed in Table 7.

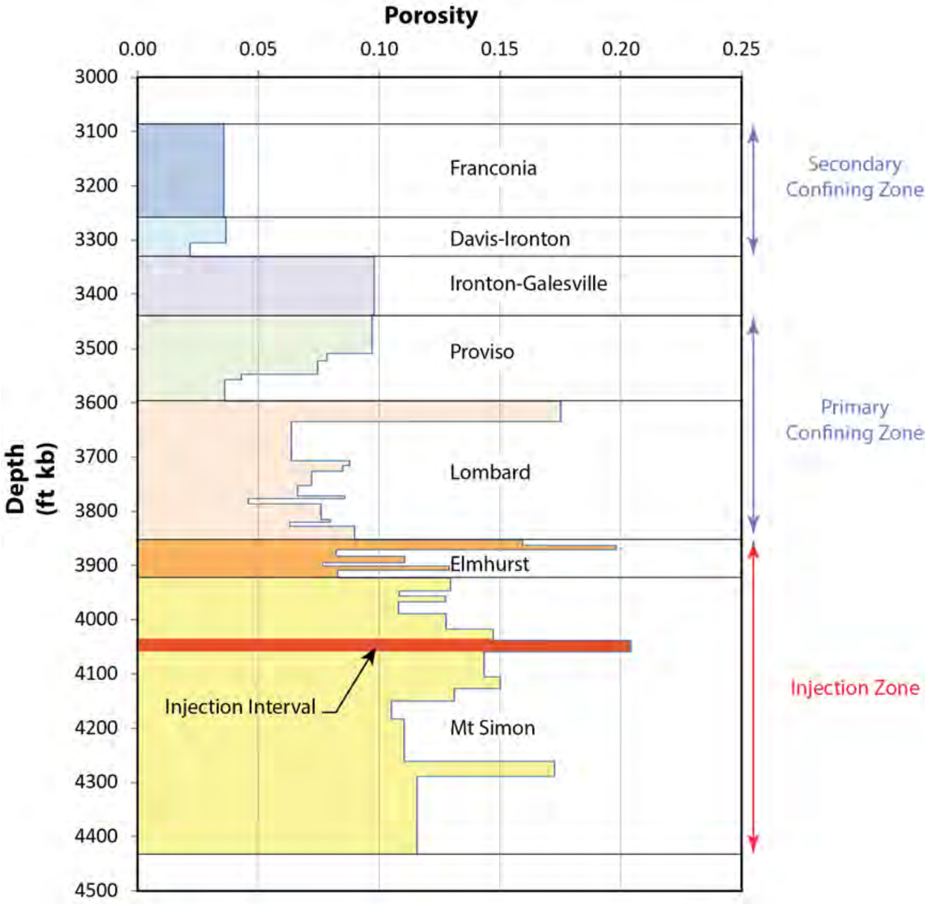


Figure 9. Porosity Versus Depth in Each Model Layer

Rock (Bulk) Density and Grain Density

Grain density data were calculated from laboratory measurements of SWCs. The data were then averaged (arithmetic mean) for each main stratigraphic layer in the model. Only the Proviso member (Eau Claire Formation) has been divided in two sublayers to be consistent with the lithology changes. Figure10 shows the calculated grain density with depth. The actual values assigned to each layer of the model are listed in Table 7. Grain density is the input parameter specified in the simulation input file, and STOMP-CO2 calculates the bulk density from the grain density and porosity for each model layer.

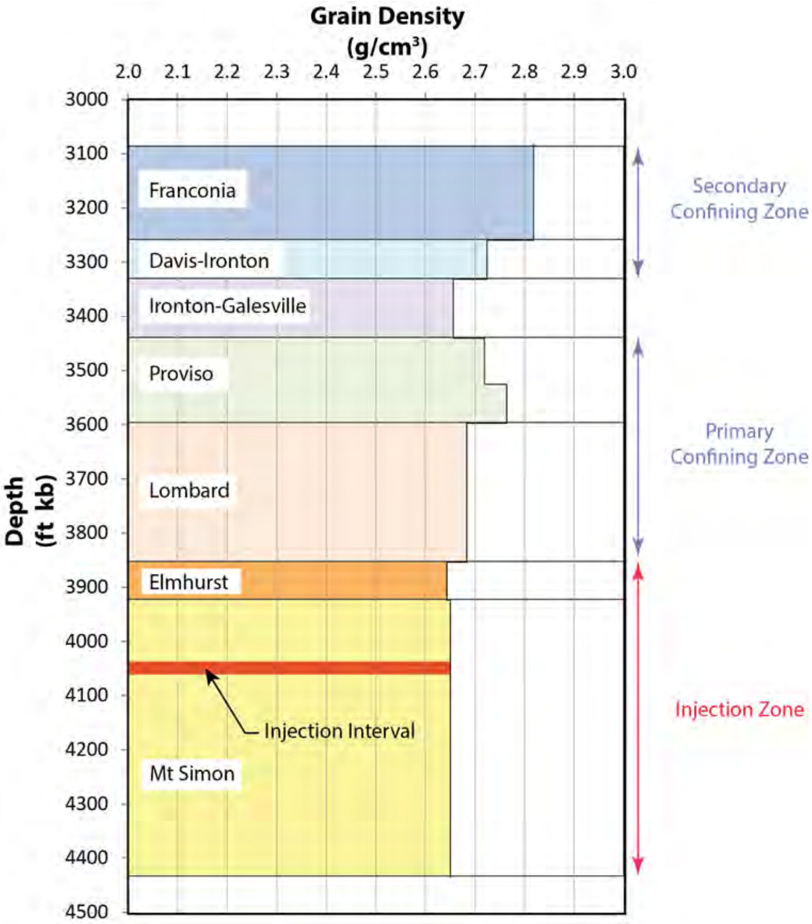


Figure 10. Grain Density Versus Depth in Each Model Layer

Capillary Pressure and Saturation Functions

Capillary pressure is the pressure difference across the interface of two immiscible fluids (e.g., CO_2 and water). The entry capillary pressure is the minimum pressure required for an immiscible non-wetting fluid (i.e., CO_2) to overcome capillary and interfacial forces and enter pore space containing the wetting fluid (i.e., saline formation water).

Capillary pressure data determined from site-specific cores were not available at the time the model was constructed. However, tabulated capillary pressure data were available for several Mount Simon gas storage fields in the Illinois Basin. The data for the Manlove Hazen well were the most complete. Therefore, these aqueous saturation and capillary pressure values were plotted and a user-defined curve fitting was performed to generate Brooks-Corey parameters for four different permeabilities (Figure 11). These parameters were then assigned to layers based on a permeability range as shown in

Table 4.

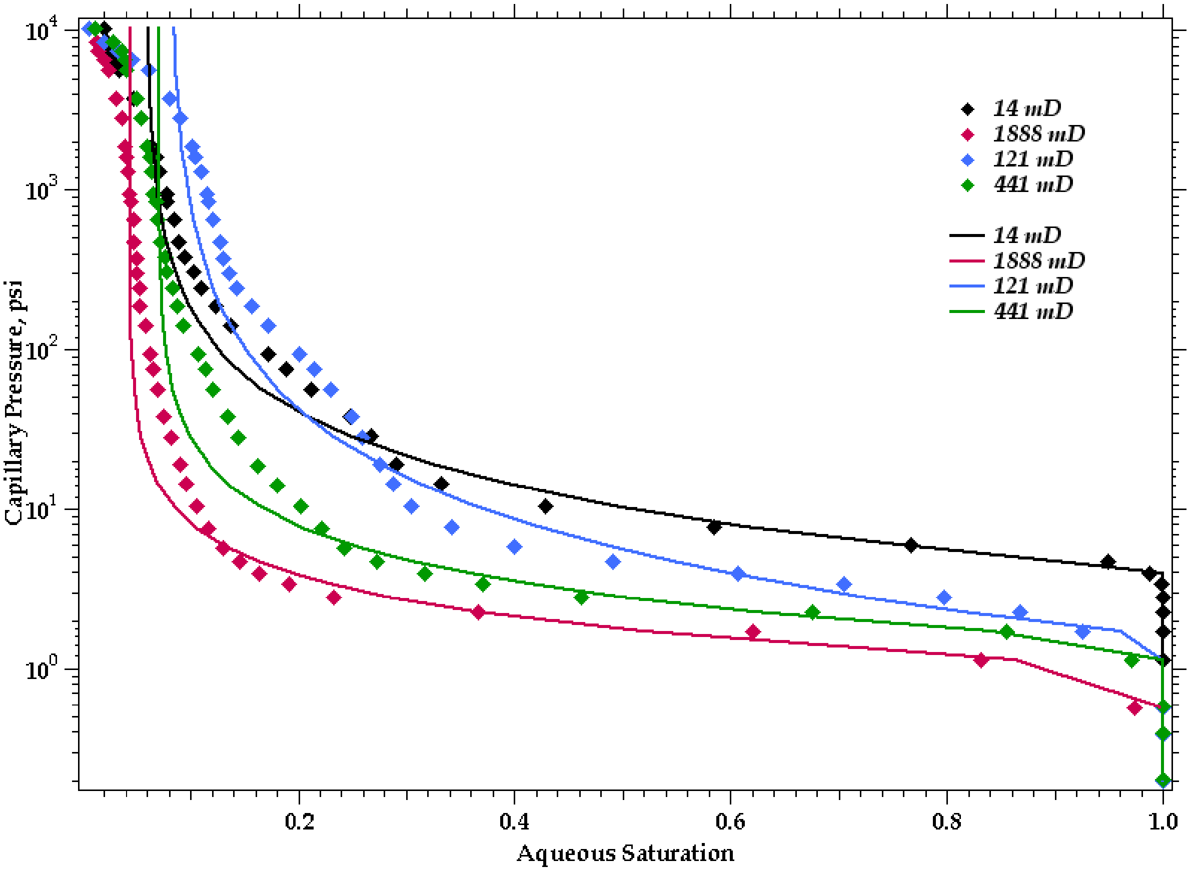


Figure 11. Aqueous Saturation Versus Capillary Pressure Based on Mercury Injection Data from the Hazen No. 5 Well at the Manlove Gas Field in Champagne County, Illinois

Table 4. Permeability Ranges Used to Assign Brooks-Corey Parameters to Model Layers

Permeability (mD)	Psi (ψ)	Lambda (λ)	Residual Aqueous Saturation
< 41.16	4.116	0.83113	0.059705
41.16 to 231	1.573	0.62146	0.081005
231 to 912.47	1.450	1.1663	0.070762
> 912.47	1.008	1.3532	0.044002

Gas Entry Pressure

No site-specific data were available for gas entry pressure; therefore, this parameter was estimated using the Davies- (1991) developed empirical relationships between air entry pressure, P_e, and intrinsic permeability, k, for different types of rock:

$$P_e = a\, k^b,$$

where P_e takes the units of MPa and k the units of m^2, a and b are constants and are summarized below for shale, sandstone, and carbonate (Davies 1991; Table 5).

Table 5. Values for Constants a and b for Different Lithologies

	Shale	Sandstone	Carbonate
a	7.60E-07	2.50E-07	8.70E-07
b	-0.344	-0.369	-0.336

The dolomite found at the Morgan County site is categorized as a carbonate. The P_e for the air-water system is further converted to that for the CO_2-brine system by multiplying the interfacial tension ratio of a CO_2-brine system β_{cb} to an air-water system β_{aw}. An approximate value of 30 mN/m was used for β_{cb} and 72 mN/m for β_{aw}.

Formation Compressibility

Limited information about formation (pore) compressibility estimates is available. The best estimate for the Mount Simon Sandstone (Table 6) is that back-calculated by Birkholzer et al. (2008) from a pumping test at the Hudson Field natural-gas storage site, found 80 miles northeast of the Morgan County CO_2 storage site. The back-calculated pore-compressibility estimate for the Mount Simon of $3.71E{-}10\ Pa^{-1}$ was used as a spatially constant value for their basin-scale simulations. In other simulations, Birkholzer et al. (2008) assumed a pore compressibility value of $4.5E{-}10\ Pa^{-1}$ for aquifers and $9.0E{-}10\ Pa^{-1}$ for aquitards. Zhou et al. (2010) in a later publication used a pore compressibility value of $7.42E{-}10\ Pa^{-1}$ for both the Eau Claire Formation and Precambrian granite, which were also used for these initial simulations (Table 6).

Because the site-specific data are limited to a single reservoir sample, only these two published values have been used for the model. The first value (3.71E-10 Pa^{-1}) has been used for sands that are compressible because of the presence of porosity. The second value (7.42E-10 Pa^{-1}) is assigned for all other rocks that are less compressible (dolomite, limestone, shale, and rhyolite). Table 7 lists the hydrologic parameters assigned to each model layer.

Table 6. Formation Compressibility Values Selected from Available Sources

Hydrogeologic Unit	Formation (Pore) Compressibility, Pa^{-1}
Franconia	7.42E-10 Pa-^{1}
Davis-Ironton	3.71E-10 Pa^{-1}
Ironton-Galesville	3.71E-10 Pa^{-1}
Eau Claire Formation (Lombard and Proviso)	7.42E-10 Pa^{-1}
Eau Claire Formation (Elmhurst)	3.71E-10 Pa^{-1}
Mount Simon Sandstone	3.71E-10 Pa^{-1}

Table 7. Summary of the Hydrologic Properties Assigned to Each Model Layer

	Model Layer	Top Depth (ft bkb)	Top Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Porosity	Horizontal Permeability (mD)	Vertical Permeability (mD)	Grain Density (g/cm3)	Compressibility (1/Pa)
Primary Conf. Zone	Franconia	3086.00	-2453	-2625	172	0.0358	5.50E-06	3.85E-08	2.82	7.42E-10
	Davis-Ironton3	3258.00	-2625	-2649	24	0.0367	6.26E-02	6.26E-03	2.73	3.71E-10
	Davis-Ironton2	3282.00	-2649	-2673	24	0.0367	6.26E-02	6.26E-03	2.73	3.71E-10
	Davis-Ironton1	3306.00	-2673	-2697	24	0.0218	1.25E+01	1.25E+00	2.73	3.71E-10
	Ironton-Galesville4	3330.00	-2697	-2725	28	0.0981	2.63E+01	1.05E+01	2.66	3.71E-10
	Ironton-Galesville3	3358.00	-2725	-2752	27	0.0981	2.63E+01	1.05E+01	2.66	3.71E-10
	Ironton-Galesville2	3385.00	-2752	-2779	27	0.0981	2.63E+01	1.05E+01	2.66	3.71E-10
	Ironton-Galesville1	3412.00	-2779	-2806	27	0.0981	2.63E+01	1.05E+01	2.66	3.71E-10
Primary Confining Zone	Proviso5	3439.00	-2806	-2877	71	0.0972	1.12E-03	1.12E-04	2.72	7.42E-10
	Proviso4	3510.00	-2877	-2891	14	0.0786	5.50E-03	5.50E-04	2.72	7.42E-10
	Proviso3	3524.00	-2891	-2916	25	0.0745	8.18E-02	5.73E-04	2.77	7.42E-10
	Proviso2	3548.50	-2916	-2926	10	0.0431	1.08E-01	7.56E-04	2.77	7.42E-10
	Proviso1	3558.50	-2926	-2963	38	0.0361	6.46E-04	4.52E-06	2.77	7.42E-10
	Lombard14	3596.00	-2963	-3003	40	0.1754	5.26E-04	5.26E-05	2.68	7.42E-10
	Lombard13	3636.00	-3003	-3038	35	0.0638	1.53E-01	1.53E-02	2.68	7.42E-10
	Lombard12	3671.00	-3038	-3073	35	0.0638	1.53E-01	1.53E-02	2.68	7.42E-10
	Lombard11	3706.00	-3073	-3084	11	0.0878	9.91E+00	9.91E-01	2.68	7.42E-10
	Lombard10	3717.00	-3084	-3094	10	0.0851	1.66E+01	1.66E+00	2.68	7.42E-10
	Lombard9	3727.00	-3094	-3121	27	0.0721	1.00E-02	1.00E-03	2.68	7.42E-10
	Lombard8	3753.50	-3121	-3138	17	0.0663	2.13E-01	2.13E-02	2.68	7.42E-10
	Lombard7	3770.50	-3138	-3145	8	0.0859	7.05E+01	7.05E+00	2.68	7.42E-10
	Lombard6	3778.00	-3145	-3153	8	0.0459	1.31E+01	1.31E+00	2.68	7.42E-10
	Lombard5	3785.50	-3153	-3161	9	0.0760	4.24E+02	4.24E+01	2.68	7.42E-10
	Lombard4	3794.00	-3161	-3181	20	0.0604	3.56E-02	3.56E-03	2.68	7.42E-10
	Lombard3	3814.00	-3181	-3189	8	0.0799	5.19E+00	5.19E-01	2.68	7.42E-10
	Lombard2	3821.50	-3189	-3194	5	0.0631	5.71E-01	5.71E-02	2.68	7.42E-10
	Lombard1	3826.50	-3194	-3219	26	0.0900	1.77E+00	1.77E-01	2.68	7.42E-10

Table 7. (contd)

	Model Layer	Top Depth (ft bkb)	Top Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Porosity	Horizontal Permeability (mD)	Vertical Permeability (mD)	Grain Density (g/cm3)	Compressibility (1/Pa)
Injection Zone	Elmhurst7	3852.00	-3219	-3229	10	0.1595	2.04E+01	8.17E+00	2.64	3.71E-10
	Elmhurst6	3862.00	-3229	-3239	10	0.1981	1.84E+02	7.38E+01	2.64	3.71E-10
	Elmhurst5	3872.00	-3239	-3249	10	0.0822	1.87E+00	1.87E-01	2.64	3.71E-10
	Elmhurst4	3882.00	-3249	-3263	14	0.1105	4.97E+00	1.99E+00	2.64	3.71E-10
	Elmhurst3	3896.00	-3263	-3267	4	0.0768	7.52E-01	7.52E-02	2.64	3.71E-10
	Elmhurst2	3900.00	-3267	-3277	10	0.1291	1.63E+01	6.53E+00	2.64	3.71E-10
	Elmhurst1	3910.00	-3277	-3289	12	0.0830	2.90E-01	2.90E-02	2.64	3.71E-10
	MtSimon17	3922.00	-3289	-3315	26	0.1297	7.26E+00	2.91E+00	2.65	3.71E-10
	MtSimon16	3948.00	-3315	-3322	7	0.1084	3.78E-01	3.78E-02	2.65	3.71E-10
	MtSimon15	3955.00	-3322	-3335	13	0.1276	5.08E+00	2.03E+00	2.65	3.71E-10
	MtSimon14	3968.00	-3335	-3355	20	0.1082	1.33E+00	5.33E-01	2.65	3.71E-10
	MtSimon13	3988.00	-3355	-3383	28	0.1278	5.33E+00	2.13E+00	2.65	3.71E-10
	MtSimon12	4016.00	-3383	-3404	21	0.1473	1.59E+01	6.34E+00	2.65	3.71E-10
	MtSimon11 *(injection Interval)*	4037.00	-3404	-3427	23	0.2042	3.10E+02	1.55E+02	2.65	3.71E-10
	MtSimon10	4060.00	-3427	-3449	22	0.1434	1.39E+01	4.18E+00	2.65	3.71E-10
	MtSimon9	4082.00	-3449	-3471	22	0.1434	1.39E+01	4.18E+00	2.65	3.71E-10
	MtSimon8	4104.00	-3471	-3495	24	0.1503	2.10E+01	6.29E+00	2.65	3.71E-10
	MtSimon7	4128.00	-3495	-3518	23	0.1311	6.51E+00	1.95E+00	2.65	3.71E-10
	MtSimon6	4151.00	-3518	-3549	31	0.1052	2.26E+00	6.78E-01	2.65	3.71E-10
	MtSimon5	4182.00	-3549	-3588	39	0.1105	4.83E-02	4.83E-03	2.65	3.71E-10
	MtSimon4	4221.00	-3588	-3627	39	0.1105	4.83E-02	4.83E-03	2.65	3.71E-10
	MtSimon3	4260.00	-3627	-3657	30	0.1727	1.25E+01	1.25E+00	2.65	3.71E-10
	MtSimon2	4290.00	-3657	-3717	60	0.1157	2.87E+00	2.87E-01	2.65	3.71E-10
	MtSimon1	4350.00	-3717	-3799	82	0.1157	2.87E+00	2.87E-01	2.65	3.71E-10

6.3 Reservoir Properties

Fluid Pressure

An initial fluid sampling event from the Mount Simon Formation was conducted December 14, 2011, in the stratigraphic well during the course of conducting open-hole logging. Sampling was attempted at 22 discrete depths using the MDT tool in the Quicksilver Probe configuration and from one location using the conventional (dual-packer) configuration. Pressure data were obtained at 7 of the 23 attempted sampling points, including one duplicated measurement at a depth of 4,048 feet bkb (Table 8).

Table 8. Pressure Data Obtained from the Mount Simon Formation Using the MDT Tool. (Red line delimits the samples within the injection zone.)

Sample Number	Sample Depth (ft bkb)	Absolute Pressure (psia)
7	4130	1828
8	4131	1827.7
9	4110.5	1818.3
11	**4048**	**1790.2**
17	**4048 (duplicated)**	**1790.3**
21	4248.5	1889.2
22	4246	1908.8
23	4263	1896.5(a)

(a) Sample affected by drilling fluids (not representative)

Temperature

The best fluid temperature depth profile was performed on February 9, 2012, as part of the static borehole flow meter/fluid temperature survey that was conducted prior to the constant-rate injection flow meter surveys. Two confirmatory discrete probe depth measurements that were taken prior to the active injection phase (using colder brine) corroborate the survey results. The two discrete pressure probe temperature measurements have been plotted on the temperature/depth profile plot (Figure 12).

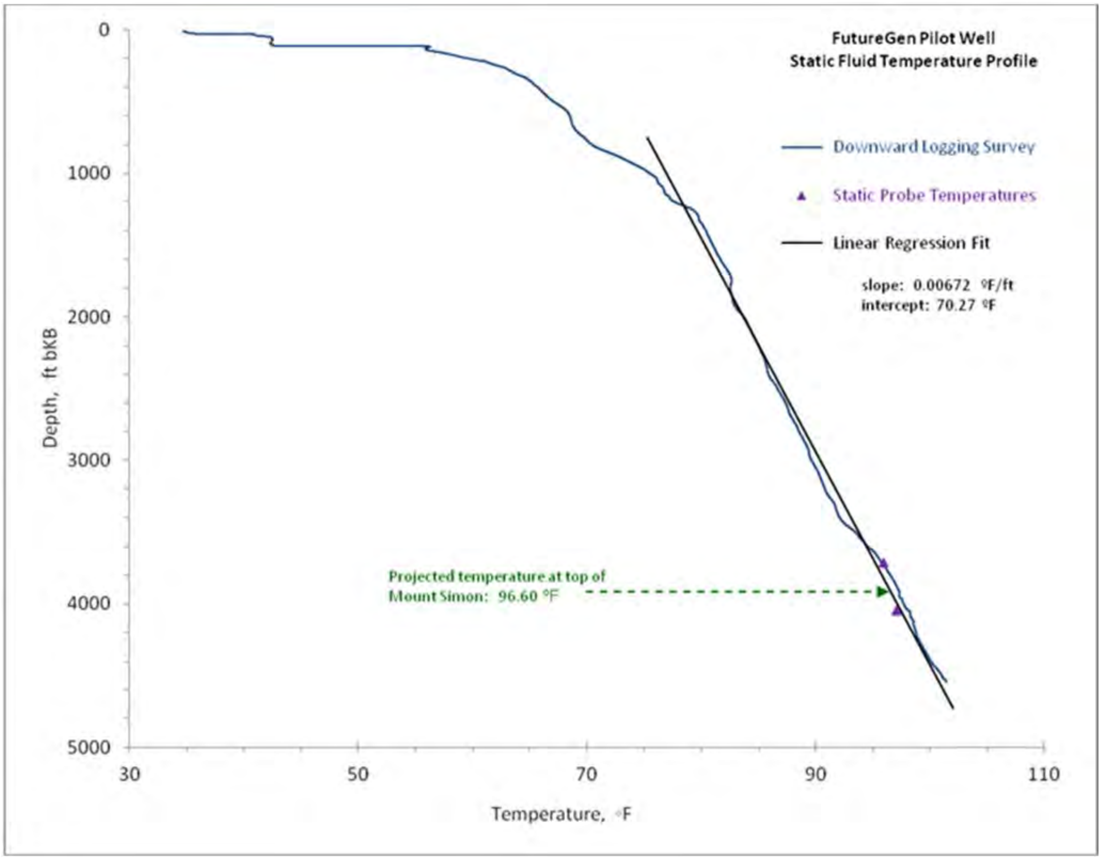


Figure 12. Static Fluid Temperature Profile Performed on February 9, 2012 in the Stratigraphic Well

The discrete static measurement for the depth of 3,712 feet is a pressure probe temperature gauge that has been installed below the tubing packer used to facilitate running of the dynamic flow meter survey. It is in the well casing so there is very little to no vertical movement of fluid and we have static measurements at this depth for more than 12 hours before starting any testing within the borehole. The value for this depth (3,712 feet) was 95.9°F. This value plots exactly on the static, continuous fluid temperature survey results for this depth.

The second discrete static probe temperature measurement is from the MDT probe for the successful sampling interval of 4,048 feet. This sample is perhaps less "static" in that fluid was produced through the tool for a period of time as part of the sampling process; however, it does provide a consistent value with the continuous fluid temperature survey. So the bottom line is that the static fluid temperature of February 9, 2012, looks to be a valid representation of well fluid column conditions.

Based on that conclusion, a linear-regression temperature/depth relationship was developed for use by modeling. The regression data set analyzed was for temperature data over the depth interval of 1,300 to 4,547 feet. Based on this regression a projected temperature for the reference datum at the top of the Mount Simon (3,918 feet bkb) of 96.60°F is indicated. A slope (gradient) of 6.72^{-3}°F/foot and intercept of 70.27°F is also calculated from the regression analysis.

Brine Density

Although this parameter is determined by the simulator using pressure, temperature, and salinity, based on the upper and lower Mount Simon reservoirs tests, the calculated in situ reservoir fluid density is 1.0315 g/cm^3.

Salinity

During the process of drilling the well, fluid samples were obtained from discrete-depth intervals in the St. Peter Formation and the Mount Simon Formation using wireline-deployed sampling tools (MDTs) on December 14, 2011. After the well had been drilled, additional fluid samples were obtained from the open borehole section of the Mount Simon Formation by extensive pumping using a submersible pump.

The assigned salinity value for the Mount Simon (upper zone) 47,500 ppm is as indicated by both the MDT sample (depth 4,048 feet) and the multiple samples collected during extensive composite pumping of the open borehole section.

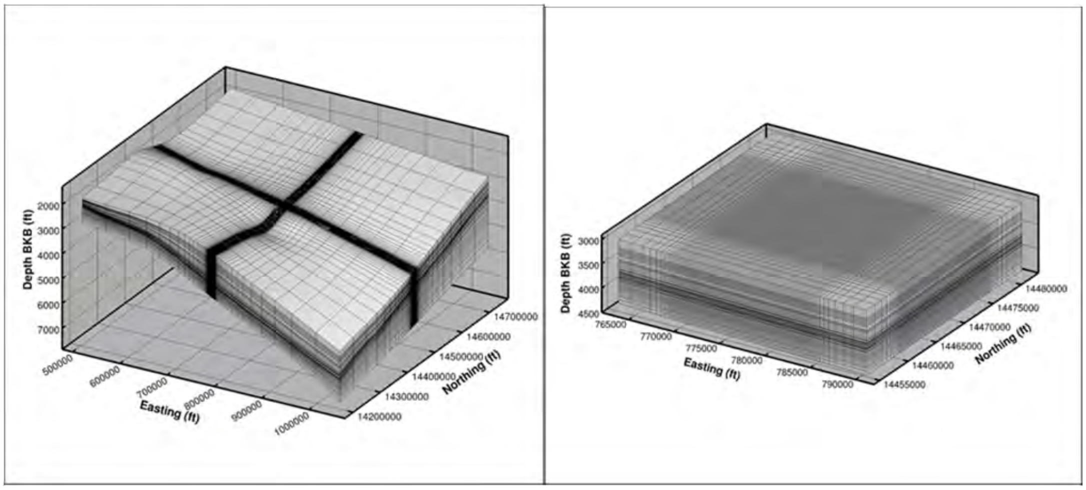
6.4 Chemical Properties

EPA (2011a) identified a number of chemical properties as relevant parameters for multiphase flow modeling. These include the aqueous diffusion coefficient, aqueous solubility, and solubility in CO_2. The properties change significantly relative to temperature, pressure, salinity, and other variables, and are predicted by equations of state used by the model to calculate properties at conditions encountered in the simulation as they change with location and time.

7.0 Numerical Model Implementation

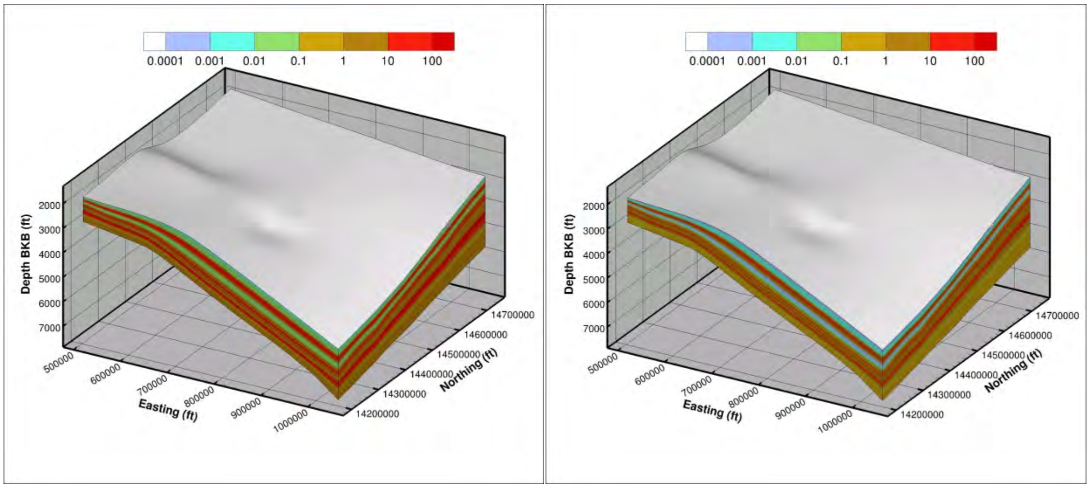
As described above, the model domain for the Morgan County CO_2 storage site consists of the injection zone (Mount Simon and Elmhurst), the primary confining zone (Lombard and Proviso), the Ironton-Galesville, and the secondary confining zone (Davis-Ironton and the Franconia). Preliminary simulations were conducted to determine the extent of the model domain so that lateral boundaries were distant enough from the injection location so as not to influence the model results. The three-dimensional, boundary-fitted numerical model grid was designed to have constant grid spacing with higher resolution in the area influenced by the CO_2 injection (3-mile by 3-mile area), with increasingly larger grid spacing moving out in all lateral directions toward the domain boundary.

Figure13 shows the numerical model grid for the entire 100-mile by 100-mile domain and also for the 3-mile by 3-mile area with higher grid resolution and uniform grid spacing of 200 feet by 200 feet. The model grid contains 125 nodes in the x-direction, 125 nodes in the y-direction, and 51 nodes in the z-direction for a total number of nodes equal to 796,875. The expanded geologic model was queried at the node locations of the numerical model to determine the elevation of each surface for the stratigraphic units at the numerical model grid cell centers (nodes) and cell edges. Then each of those layers was subdivided into the model layers by scaling the thickness to preserve the total thickness of each stratigraphic unit. Once the vertical layering was defined, material properties were mapped to each node in the model. Figure 14 shows the distribution of horizontal and vertical permeability as it was assigned to the numerical model grid.



(a) (b)

Figure 13. Numerical Model Grid for a) Full Domain, and b) Finer Resolution Area Containing the Injection Wells



(a) (b)

Figure 14. Permeability Assigned to Numerical Model a) Horizontal Permeability; b) Vertical Permeability

7.1 Initial Conditions

The reservoir is assumed to be under hydrostatic conditions with no regional or local flow conditions. Therefore the hydrologic flow system is assumed to be at steady state until the start of injection. To achieve this with the STOMP-CO2 simulator one can either run an initial simulation (executed for a very long time period until steady-state conditions are achieved) to generate the initial distribution of pressure, temperature, and salinity conditions in the model from an initial guess, or one can specify the initial conditions at a reference depth using the hydrostatic option, allowing the simulator to calculate and assign the initial conditions to all the model nodes. Site-specific data were available for pressure, temperature, and salinity, and therefore the hydrostatic option was used to assign initial conditions. A temperature gradient was specified based on the geothermal gradient, but the initial salinity was considered to be constant for the entire domain. A summary of the initial conditions is presented in Table 9.

Table 9. Summary of Initial Conditions

Parameter	Reference Depth (bkb)	Value
Reservoir Pressure	4,048 ft	1,790.2 psi
Aqueous Saturation		1.0
Reservoir Temperature	3,918 ft	96.6 °F
Temperature Gradient		0.0672 °F/ft
Salinity		47,500 ppm

7.2 Boundary Conditions

Boundary conditions were established with the assumption that the reservoir is continuous throughout the region and that the underlying Precambrian unit is impermeable. Therefore, the bottom boundary was set as a no-flow boundary for aqueous fluids and for CO_2 gas. The lateral and top boundary conditions were set to hydrostatic pressure using the initial condition with the assumption that each of these boundaries is distant enough from the injection zone to have minimal to no effect on the CO_2 plume migration and pressure distribution.

7.3 Simulation Time Period

The EPA Geologic Sequestration regulations require that owners or operators must "Predict, using existing site characterization, monitoring and operational data, and computational modeling, the projected lateral and vertical migration of the CO_2 plume and formation fluids in the subsurface from the commencement of injection activities until the plume movement ceases, until pressure differentials sufficient to cause the movement of injected fluids or formation fluids into an underground source of drinking water are no longer present, or until the end of a fixed time period as determined by the Director." 40 CFR § 146.84(c)(1). Preliminary simulations were conducted to determine the total simulation time needed to satisfy the required conditions, and those results are presented in this section.

Figure15 shows the plume area over time relative to the plume extent at 30 years, with the plume area being defined as the areal extent containing 99 percent of the separate-phase (gas-phase) CO_2 mass. While the CO_2 is still redistributing long after injection ceases, it can be seen that the change in the areal extent of the plume becomes insignificant after the end of the injection period. The pressure differential, however, dissipates much more slowly. As indicated in Figure 16, the pressure dissipates more than 90 percent within the first 100 years. Hence, the final representative case simulations were executed for a period of 100 years.

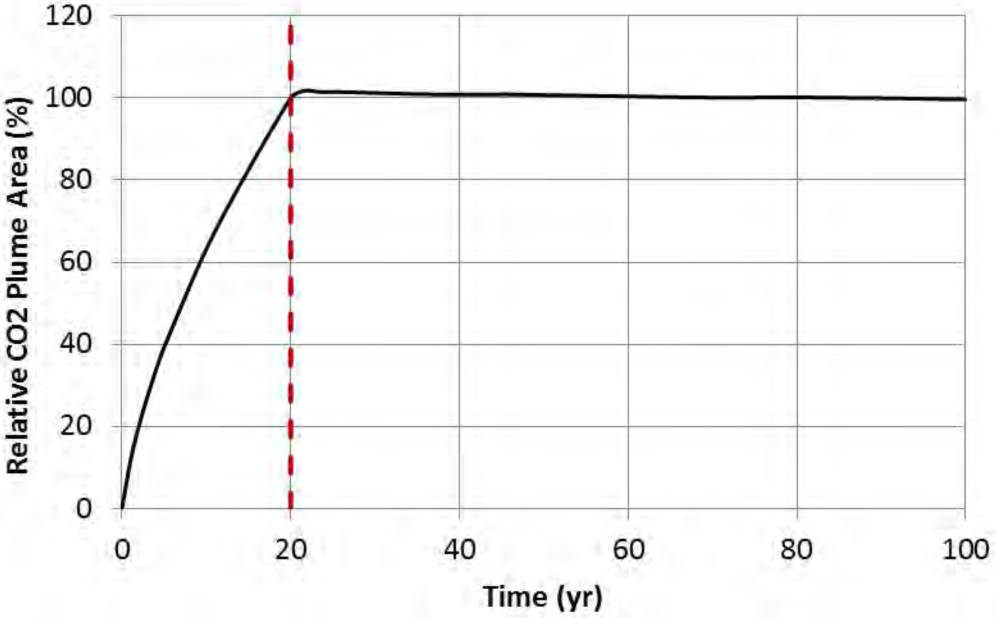


Figure 15. CO$_2$ Plume Area Versus Time Relative to Plume Extent at End of Injection Period (20 Years). Areal plume extent is defined by 99.0 percent of separate-phase CO$_2$ mass.

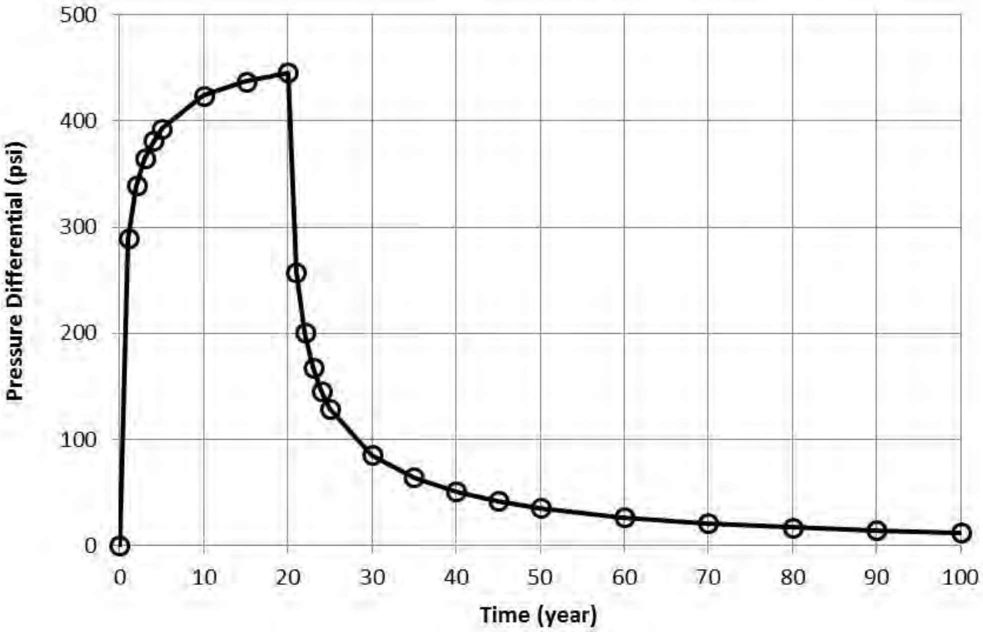


Figure 16. Pressure Differential (relative to initial formation pressure) Versus Time at the Injection Well

CO$_2$ Plume Delineation (5-31-2013)

The modeling described above results in an underground CO_2 plume with four "lobes." The simulated shape and size of the CO_2 plumes after 20 years of injection and 50 years after injection ceases are shown in Figure 17. The predicted area of the 20-year CO_2 plume that will result from injecting a total of 22 MMT of CO_2 into four horizontal injection wells is estimated to be approximately 3,970 acres. The area of the CO_2 plume 50 years after injection ceases (i.e., 70 years) is predicted to be slightly larger at approximately 3,980 acres.

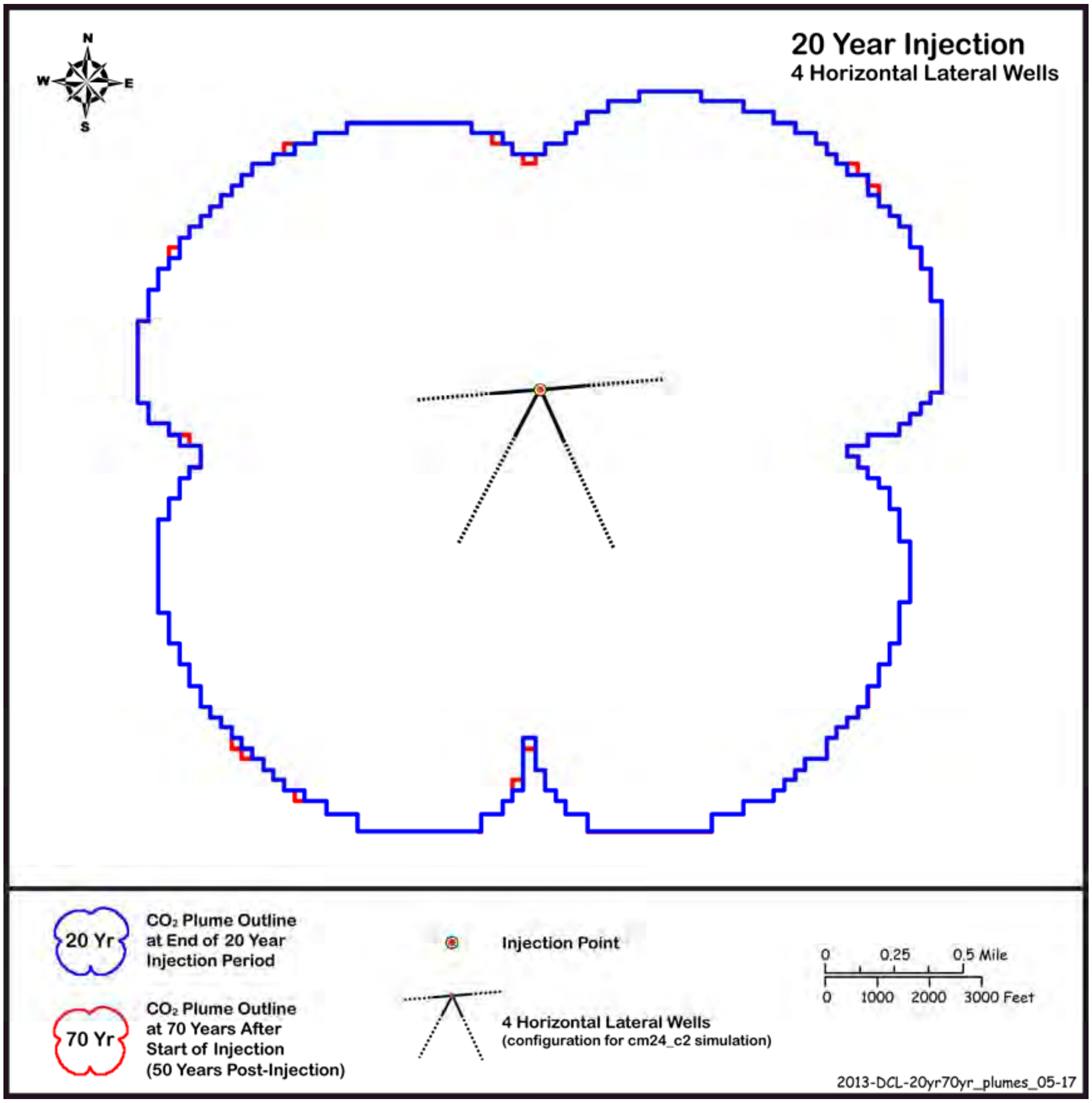


Figure 17. CO_2 Plume Outline after 20 Years of Injection and 50 Years after Injection Ceases

8.0 Sensitivity Analysis

Modeling underground CO_2 storage involves many conceptual and quantitative uncertainties. The major problem is the uncertainty in parameters such as permeability and porosity, and the geologic description of the injection zone and confining zone. To fully address these uncertainties, Monte Carlo simulation was conducted. Because the model results serve as a basis for calculating the plume delineation, the sensitivity analysis focuses on a set of parameters that strongly influence the plume calculation.

The effects of scaling factors associated with porosity, permeability, and fracture gradient were evaluated. The three scaling factors are independent variables, while the rock type and other mechanical/hydrological properties for the geological layers are dependent variables, which vary according to scaling.

The sensitivity of selected output variables including the percent of CO_2 mass injected, the acreage of the plume, the acreage of the projected plume, and the percent variation of plume area relative to the representative case (4 horizontal injection wells, 20 years of injection) was analyzed. The projected acreage of the plume is calculated for cases where less than 100 percent of the CO_2 mass was injected, providing a normalization of the plume area for direct comparison across cases. Both marginal (individual) and joint (combined) effects were evaluated.

Whether a response curve (2D) or response surface (3D or higher dimension) is representative or reliable depends on the efficiency of the sampling approach. A good sampling approach should be able to explore the parameter space without clumping or gapping. As can be seen Figure 18, the quasi Monte Carlo (QMC) approach (right), with controlled locations of the samples, has better scatters than regular Monte Carlo (left) and Latin-hypercube samples (right).

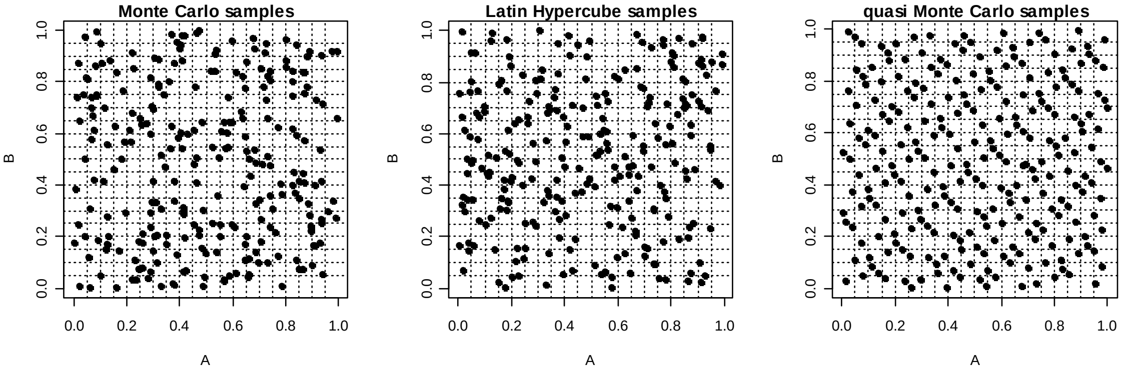


Figure 18. Scatter Plots of Monte Carlo, Latin-Hypercube, and Quasi Monte Carlo Samples. QMC samples are well dispersed in the parameter space and therefore are exploratory and efficient without clumping points and gapping.

The scaling factors used for generating these samples were based on an evaluation of the site characterization data to determine reasonable bounding values. These scaling factors are shown in Table 10.

Table 10. Scaling Factors Evaluated for Parameter Sensitivity Analysis

Parameter	Minimum	Representative Case	Maximum
Porosity	.75	1.0	1.25
Permeability	.75	1.0	1.25
Fracture Gradient	.88	1.0	1.10

Thirty-two cases were defined from the representative case model using the QMC sampling technique to represent a statistical distribution of possible cases based on the parameters varied. All other inputs were the same as in the representative case.

Simulation results show that increasing the porosity results in a smaller predicted plume area, while decreasing the fracture gradient results in an increase in the predicted plume area. Varying the permeability has very little effect on the plume area. The reason for this is that injectivity is mainly controlled by the injection rate, and as long as the average permeability is large enough and the injection pressure permitted is large enough, the injection rate is the limiting factor in predicted plume size.

A generalized linear model analysis was performed for the simulated CO_2 plume area and the final model was obtained through AIC (Akaike information criterion) -based step-wise backward removal approach and the statistical t-values and P-values were obtained. When a P-value is larger than the significance level (e.g., 0.05), the corresponding variable (input parameter) is relatively insignificant. Considering only the marginal linear effects, the fracture gradient and porosity are the most significant parameters for determining plume size. However, when the interactions are included, the combination of permeability and fracture gradient becomes significant.

The injectivity varied from the representative base case by about 50 percent for cases either with low permeability, low fracture gradient, or a combination of both. Because the injection rate was specified as a maximum rate, it was not possible to determine if, in some cases, more than 100 percent of the mass could be injected and if so, how much more. The predicted plume area varied from the representative case by about 80 to 120 percent, which is approximately the same as the variation in permeability and porosity.

9.0 References

Birkholzer JT, J Apps, L Zhenge, Y Zhang, T Xu and C Tzang. 2008. *Research Project on CO_2 Geological Storage and Groundwater Resources: Large-Scale Hydrological Evaluation and Modeling of the Impact on Groundwater Systems Annual Report: October 1, 2007, to September 30, 200*8. Lawrence Berkeley National Laboratory, Berkeley, California.

Buschbach TC and DC Bond. 1974. *Underground Storage of Natural Gas in Illinois – 1973*. Illinois Petroleum 101, Illinois State Geological Survey, Champaign, Illinois.

Davies PB. 1991. *Evaluation of the Role of Threshold Pressure in Controlling Flow of Waste-Generated Gas into Bedded Salt at the Waste Isolation Pilot Plant (WIPP)*.SAND 90-3246, Sandia National Laboratory, Albuquerque, New Mexico.

EPA (U.S. Environmental Protection Agency). 2011a. Draft Underground Injection Control (UIC) Program Class VI Well Area of Review Evaluation and Corrective Action Guidance for Owners and Operators. EPA 816-D-10-007, EPA Office of Water, Washington, D.C.

Hornung J and T Aigner. 1999. "Reservoir and aquifer characterization of fluvial architectural elements: Stubensandstein, Upper Triassic, southwest Germany." *Sedimentary Geology* 129(3–4): 215-280.

ISGS (Illinois State Geological Survey). 2011. Illinois Oil and Gas Resources (ILOIL) Internet Map Service. Last accessed on October 8, 2011 at http://moulin.isgs.uiuc.edu/ILOIL/webapp/ILOIL.html

Kerr DR, L Ye, A Bahar, BM Kelkar, and S Montgomery. 1999. "Glenn Pool Field, Oklahoma: A Case of Improved Production from a Mature Reservoir." *American Association of Petroleum Geologists Bulletin*, 83(1):1-18.

Kolata DR and CK Nimz. 2010. *Geology of Illinois*. Illinois State Geologic Survey, Urbana, Illinois.

Leetaru HE and JH McBride. 2009. "Reservoir uncertainty, Precambrian topography, and carbon sequestration in the Mt. Simon Sandstone, Illinois Basin." *Environmental Geosciences* 16(4):235-243.

Leetaru HE, DG Morse, R Bauer, SM Frailey, D Keefer, DR Kolata, C Korose, E Mehnert, S Rittenhouse, J Drahovzal, S Fisher, JH McBride. 2005. "Saline reservoirs as a sequestration target." In *An Assessment of Geological Carbon Sequestration Options in the Illinois Basin*, Final Report for U.S. DOE Contract: DE-FC26-03NT41994, Principal Investigator: Robert Finley. Midwest Geological Sequestration Consortium, Champaign, Illinois.

Leetaru HE, SM Frailey, D Morse, RJ Finley, JA Rupp, JA Drahozval, and JH McBride. 2009. "Carbon sequestration in the Mount Simon Sandstone saline reservoir." *In* Grobe M, JC Pashin, and RL Dodge (eds.), Carbon dioxide sequestration in geological media—State of the science, *AAPG Studies in Geology* 59:261-277.

McBride JH and DR Kolata. 1999. "Upper Crust Beneath Central Illinois Basin, United States". *GSA Bulletin* 111(3)375-394.

Meyer R and FF Krause. 2006. "Permeability Anisotropy and Heterogeneity of a Sandstone Reservoir Analogue: An Estuarine to Shoreface Depositional System in the Virgelle Member, Milk River Formation, Writing-On-Stone Provincial Park, Southern Alberta." *Bulletin of Canadian Petroleum Geology*, 54(4):301-318.

Morse DG and HE Leetaru. 2005. *Reservoir characterization and three-dimensional models of Mt. Simon Gas Storage Fields in the Illinois Basin*. Circular 567, Illinois State Geological Survey, Urbana, Illinois (CD-ROM).

Pruess K, J Garcia, T Kovscek, C Oldenburg, J Rutqvist, C Steefel, and T Xu. 2002. *Intercomparison of Numerical Simulation Codes for Geologic Disposal of CO_2*. LBNL-51813, Lawrence Berkeley National Laboratory, Berkeley, California.

Ringrose P, K Nordahl, and RJ We. 2005. "Vertical permeability estimation in heterolithic tidal deltaic sandstones." *Petroleum Geoscience* 11(1):29-36.

Saller AH, J Schwab, S Walden, S Robertson, R Nims, H Hagiwara, and S Mizohata. 2004. "Three-dimensional seismic imaging and reservoir modeling of an upper Paleozoic "reefal" buildup, Reinecke Field, west Texas, United States." Pp. 107-125 *in* GP Eberli, JL Masaferro, and JF Sarg (eds.), *Seismic Imaging of Carbonate Reservoirs and Systems*, Volume 81, American Association of Petroleum Geologists, Tulsa, Oklahoma.

Sminchak J. 2011. *Conceptual Model Summary Report Simulation Framework for Regional Geologic CO_2 Storage Along Arches Province of Midwestern United States*, Topical Report. Battelle Memorial Institute, Columbus, Ohio.

Span R and W Wagner. 1996. "A New Equation of State for Carbon Dioxide Covering the Fluid Region from the Triple-Point Temperature to 1100 K at Pressures Up to 800 MPa." *J Phys Chem Ref Data* 25:1509-1596.

Spycher N and K Pruess. 2010. "A Phase-Partitioning Model for CO2-Brine Mixtures at Elevated Temperatures and Pressures: Application to CO_2-Enhanced Geothermal Systems." *Transport in Porous Media*, 82:173-196, doi:10.1007/s11242-009-9425-y.

Spycher N, K Pruess, and J Ennis-King. 2003. "CO_2-H_2O mixtures in geological sequestration of CO_2. I. Assessment and calculation of mutual solubilities from 12 to 100°C and up to 600 bar." *Geochimica et Cosmoschimica Acta*, 67(16):3015-3031, doi:10.1016/s0016-7037(03)00273-4.

White MD, DH Bacon, BP McGrail, DJ Watson, SK White, and ZF Zhang. 2012. *STOMP Subsurface Transport Over Multiple Phases: STOMP-CO2 and STOMP-CO2e Guide, Version 1.0*. PNNL-21268, Pacific Northwest National Laboratory, Richland, Washington.

White MD and M Oostrom. 2006. *STOMP Subsurface Transport Over Multiple Phases, Version 4: User's Guide.* PNNL-15782, Pacific Northwest National Laboratory, Richland, Washington.

White MD and M Oostrom. 2000. *STOMP Subsurface Transport Over Multiple Phases: Theory Guide*. PNNL-12030, Pacific Northwest National Laboratory, Richland, Washington.

Willman HB, E Atherton, TC Buschbach, C Collinson, JC Frey, ME Hopkins, JA Lineback, and JA Simon. 1975. *Handbook of Illinois Stratigraphy*. Bulletin 95, Illinois State Geological Survey, Urbana, Illinois.

Zhou Q, JT Birkholzer, E Mehnert, Y-F Lin, and K Zhang. 2010. "Modeling basin- and plume-scale processes of CO_2 storage for full-scale deployment." *Ground Water* 48(4):494–514.

APPENDIX H

Agricultural Mitigation

Agricultural Impact Mitigation Agreement between the FutureGen Industrial Alliance and the Illinois Department of Agriculture

for the

Final Environmental Impact Statement
FutureGen 2.0 Project
Meredosia, Illinois (Morgan County)

Note: This appendix was added for the Final EIS.

DOE/EIS-0460
October 2013

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AGRICULTURAL IMPACT MITIGATION AGREEMENT
between the
FUTUREGEN INDUSTRIAL ALLIANCE
and the
ILLINOIS DEPARTMENT OF AGRICULTURE
in
ILLINOIS
Pertaining to the Construction of up to a
12-inch CARBON DIOXIDE PIPELINE and RELATED APPURTENANCES

The Illinois Department of Agriculture (IDOA) and the FutureGen Industrial Alliance (hereinafter the Alliance) agree to the following measures which the Alliance will implement as it constructs a carbon dioxide pipeline under agricultural land in Illinois. The construction standards and policies contained herein will serve to minimize the agricultural impacts that may occur due to pipeline construction. The Alliance will also construct the pipeline in accordance with applicable laws, rules and regulations such as, but not limited to, those contained in the Illinois Commerce Commission and the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) as set out in 49 CFR 195.

The following pipeline construction standards and policies are recommended to help preserve the integrity of any agricultural land that is impacted by pipeline construction. They were developed with the cooperation of agricultural agencies, organizations, landowners, tenants, drainage contractors, and pipeline companies.

Unless an agreement between the Alliance and the Landowner specifically provides to the contrary, the below prescribed construction standards and policies are applicable to construction activities occurring on agricultural land. With the exception of Item No. 3, they are not intended to apply to construction, maintenance and repair activities occurring entirely on public right-of-way, railroad right-of-way, publicly owned land, or privately owned land that is not agricultural land. The Alliance will adhere to the construction specifications in this agreement relating to the repair of outlets for drain tile and/or surface drainage when they are encountered on lands owned or leased by others.

INTRODUCTION

The Alliance will retain qualified Agricultural Inspectors on each work phase of the project. This shall include the initial construction plan development, the construction, the initial restoration, and the post-construction monitoring and follow-up restoration. The Agricultural Inspector shall act to assure that the provisions set forth in this document or in any separate agreement, will be adhered to in good faith by the Alliance and by the pipeline installation contractor(s), and that all agreements protect the resources of both the Landowner and the Alliance.

The Agricultural Inspector shall assist with the collection and analyzing of site-specific agricultural information gathered for the construction plan development by the Alliance. This information will be obtained through field review as well as direct contact with affected Landowners and farm operators, local County Soil and Water Conservation Districts (SWCDs), Agricultural Extension Agents, and others. The Agricultural Inspector will maintain contact with the appropriate onsite Company Project Inspectors throughout the construction phase. The Agricultural Inspector will also maintain contact with the affected Landowners and farm operators in conjunction with Company rights-of-way agents, as well as local county Soil and Water Conservation District personnel concerning farm resources and management matters pertinent to the agricultural operations and the site-specific implementation of the construction plan. The Alliance shall provide a courtesy copy of information to the appropriate local County Soil and Water Conservation Districts any time a construction plan modification is submitted.

The Alliance will employ Agricultural Inspectors that are at a minimum thoroughly familiar with the following:

FutureGen 2.0 Plans and Procedures;
Pipeline Construction Sequences and Process;
All aspects of soil and water conservation; and
Farm operations.

The Agricultural Inspector will possess:

Good oral and written communication skills, and the
Ability to work closely with the Landowners and project sponsor.

The Alliance will employ a minimum of one Agricultural Inspector per construction (installation) spread.

When permitted by law and contract, Alliance shall encourage its pipeline contractor(s) to use, where and if available, local drain tile contractors to redesign, reconstruct, and/or repair any drain tile lines that are affected by the pipeline installation. Often the local contractors may have installed the Landowner's drain tile system and can have valuable knowledge as to the location, depth of cover, appurtenances, and any other factors affecting the tile operation. The drain tile contractor(s) shall follow the attached construction specifications. (Refer to 3.D)

The Alliance shall provide the Landowner a copy of that portion of the final plans that affect his property and any plans or maps that contain the information described below concerning agricultural areas and or uses.

Unless the easement or other agreement between the Landowner and the Alliance provides to the contrary, the actions specified in the pipeline standards and construction specifications contained in this Agricultural Impact Mitigation Agreement (Agreement) will be implemented in accordance with the conditions listed below:

A. The Alliance shall provide a copy of this Agreement to the Landowner or Landowner's Designate and Tenant prior to obtaining an easement from said Landowner. Additionally, the Alliance will provide a copy of this Agreement to each of the Soil and Water Conservation Districts and Farm Bureau offices in counties through which the pipeline traverses.

B. All provisions herein are subject to any agreement which may be made between Landowner and the Alliance.

C. The Alliance may negotiate with Landowners or Landowner's Designates to carry out the actions that Landowners wish to perform themselves, along with possible compensation.

D. All mitigative actions employed by Company, unless otherwise specified in these construction standards and policies or in an easement negotiated with a Landowner, will be implemented within 45 days of completion of the pipeline facilities on any affected property, weather and landowner permitting. Temporary repairs will be made by Company during the construction process as needed to minimize the risk of additional property damage that may result from an extended construction time period. If weather delays the completion of any mitigative action beyond the 45 day period, the Alliance will provide the affected Landowner(s) with an estimate of the time needed for completion of the mitigative action. Any such notice of delay, if oral, shall be followed by a written notice as soon as practicable.

E. The Alliance will provide the IDOA with a set of mailing labels of all Landowners and known Tenants in such area, most likely on a county-by-county basis, who will be affected by the proposed pipeline. As the list of affected Landowners and Tenants is updated, the Alliance will notify the IDOA of any additions or deletions. The IDOA will use the labels for notification of area-wide meetings with Landowners and the mailing of this Agreement to the Landowners and Tenants.

F. All actions pursuant to this Agreement shall extend to associated future construction, maintenance and repairs by the Alliance.

G. After construction, the Alliance will provide the Landowners and IDOA with drawings showing the location by survey station of tile lines encountered in the construction of the pipeline. The drawings will include a tile line depth measurement from the surface and will be provided on a county-by-county basis to the local SWCDs.

H. The Alliance shall implement the actions contained in this Agreement to the extent that they do not conflict with the requirements of any applicable federal, state and local rules and regulations and other permits and approvals that are obtained by the Alliance for the project.

I. Prior to the construction of the pipeline, the Alliance shall provide each Landowner or Landowner's Designate and Tenant with a telephone number and address which can be used to contact the Alliance, both during and following the completion of construction, regarding the work that was performed on their property or any other construction-related matter. The Alliance shall respond promptly to Landowner's or Landowner's Designate and Tenant's telephone calls and correspondence.

J. If any provision of this Agreement is held to be unenforceable, no other provision shall be affected by that holding, and the remainder of the Agreement shall be interpreted as if it did not contain the unenforceable provision.

K. A forester with local expertise shall be hired by the Alliance to appraise the merchantable value of any timber to be cut for construction of the pipeline. The Landowner shall be compensated 100 percent of the value.

Definitions

Agricultural Land	Land used for cropland, hayland, pasture land, truck gardens, farmsteads, commercial ag-related facilities, feedlots, livestock confinement systems, land on which farm buildings are located within 100 feet of the pipeline, and land in government set-aside programs.
Best Management Practice (BMP)	Any structural, vegetative or managerial practice used to treat, prevent or reduce soil erosion. Such practices may include temporary seeding of exposed soils, construction of retention basins for storm water control and scheduling the implementation of all BMPs to maximize their effectiveness.
Cropland	Land used for growing row crops, small grains, or hay; includes land which was formerly used as cropland, but is currently in a government set-aside program and pastureland that was formerly utilized as cropland or is comprised of Prime farmland.
Drain Tile	Any artificial subsurface drainage system including, but not limited to, clay and concrete tile, vitrified sewer tile, corrugated plastic tubing, and stone drains.
Landowner	Person(s) holding legal title to property on the pipeline route from whom the Alliance is seeking, or has obtained, a temporary or permanent easement.
Landowner's Designate	Any person(s) legally authorized by a Landowner to make decisions regarding the mitigation or restoration of agricultural impacts to such Landowner's property.
Non-Agricultural Land	Any land that is not "Agricultural Land" as defined above.
Pipeline	The carbon dioxide (CO_2) pipeline including its related equipment, controls and appurtenances necessary to operate and transport CO_2 in accordance with its design specifications and all applicable laws, rules and regulations.
Prime farmland	Agricultural land comprised of soils that are defined by the USDA Natural Resources Conservation Service as being "prime" soils (generally considered the most productive soils with the least input of nutrients and management).
Right-of-way	Includes the permanent and temporary easements that the Alliance acquires for the purpose of constructing, operating and maintaining the pipeline.

Spread	Each major segment of project right-of-way where pipeline construction will occur. Spread length for a particular project may vary from a few miles up to 60+ miles.
Surface Drains	Any surface drainage system such as shallow surface field drains, grassed waterways, open ditches, or any other conveyance of surface water.
Tenant	Any person lawfully residing on or leasing/renting of the land.
Topsoil	The upper most part of the soil commonly referred to as the plow layer, the A layer, or the A horizon, or its equivalent in uncultivated soils. It is the surface layer of the soil that has the darkest color or the highest content of organic matter (as identified in the USDA County Soil Survey and verified with right-of-way samples as stipulated under 2A below).

Construction Standards and Policies

1. Pipeline depth

A. Except for aboveground piping facilities, such as mainline block valves, tap valves, meter stations, etc., the pipeline will be buried with:

1. a minimum of 5 feet of top cover where it crosses cropland.
2. a minimum of 5 feet of top cover where it crosses pasture land or other agricultural land comprised of soils that are classified by the USDA as being prime soils.
3. a minimum of 3 feet of top cover where it crosses pasture land and other agricultural land not comprised of prime soils.
4. a minimum of 3 feet of top cover where it crosses wooded/brushy land.
5. substantially the same top cover as an existing parallel pipeline, but not less than 5 feet, where the route parallels an existing pipeline within a 100 foot perpendicular offset and is comprised of soils that are classified by the USDA as being prime soils.
6. a minimum of 60 inches of cover shall be maintained over the top of the pipeline where it crosses drains, diversions, grassed waterways, open ditches and streams.

B. Notwithstanding the foregoing, in those areas where (i) rock in its natural formation and/or (ii) a continuous strata of gravel exceeding 200 feet in length are encountered, the minimum depth of cover will be 30 inches.

C. On agricultural land subject to erosion, the Alliance will patrol the pipeline right-of-way with reasonable frequency to detect areas of erosion of the top cover. In no instance will the Alliance knowingly allow the depth of top cover to be less than 3 feet, except as stated in 1.B. above.

2. Soil Removal and Replacement

A. The topsoil shall be determined by a properly qualified Agricultural Inspector, soil scientist or soil technician who will set stakes or flags every 200 feet along the right-of-way identifying the depth of topsoil to be removed.

B. At a minimum, the actual depth of the topsoil, not to exceed 16 inches, will first be stripped from the area to be excavated above the pipeline and the subsoil storage area. The topsoil will be stored in a windrow parallel to the pipeline trench in such a manner that it will not become intermixed with subsoil materials. The Alliance may conduct full right-of-way topsoiling, if acceptable to the Landowner. Topsoil may be stored at either edge of the right-of-way, or in some cases spread over the working side of the right-of-way, but not intermixed with subsoil materials.

C. During the clearing/grading phase, the Agricultural Inspector shall monitor site-specific depths of topsoil stripping. Where right-of-way construction requires cut-and-fill of the soil profile across grades, to the extent practicable, topsoil stockpiling will be located on the up slope edge of the right-of-way. Where topsoil cannot be separately stored on the up slope side, suitable right-of-way space will be provided on the down slope side to ensure the complete segregation of the topsoil from all cut-and-fill material.

D. All subsoil material that is removed from the trench will be placed in a second windrow parallel to the pipeline trench that is separate from the topsoil windrow.

E. In backfilling the trench, the stockpiled subsoil material will be placed back into the trench before replacing the topsoil.

F. Refer to Items Nos. 5.A and 5.B for procedures pertaining to rock removal from the subsoil and topsoil.

G. Refer to Items Nos. 7.A through 7.C for procedures pertaining to the alleviation of compaction of the topsoil.

H. The topsoil must be replaced so that after settling occurs, the topsoil's original depth and contour will be restored. The same shall apply where excavations are made for road, stream, drainage ditch, or other crossings. In no instance will the topsoil materials be used for any other purpose.

3. Repair of Damaged Drain Tile Lines

All drain tile repair and/or replacement shall be completed prior to topsoil replacement.

If underground drain tile is damaged by the pipeline installation, it shall be repaired in a manner that assures the drain tile proper operating condition at the point of repair. If underground drain tile lines in the pipeline construction area are adversely affected by the pipeline construction, the Alliance will take such actions as are necessary to insure the proper functioning of the drain tile lines, including the relocation, reconfiguration, and replacement of the existing drain tile lines. The following standards and policies shall apply to the drain tile line repair:

A. The Alliance shall make a conscientious effort to locate all drain tile lines within the right-of-way prior to the pipeline installation. The Alliance will contact affected Landowners and/or Tenants for their knowledge of drain tile line locations prior to the pipeline installation. All identified drain tile lines will be marked with a highly visible lathe to alert construction crews to the need for drain tile line repairs.

B. During construction, all drain tile lines that are damaged, cut, or removed shall be distinctly marked by placing a highly visible lathe in the trench spoil bank directly opposite each drain tile line. This marker shall not be removed until the drain tile line has been permanently repaired and such repairs have been approved and accepted by the Landowner and the Agricultural Inspector. Also, the location of damaged tile lines will be recorded using Global Positioning System technology as a method of permanently charting tiles for ease in locating in the future.

C. If water is flowing through any damaged tile line, the tile line will be immediately and temporarily repaired, as necessary, to ensure continuous flow until such time that permanent repairs can be made. If the tile lines are dry and water is not flowing, temporary repairs are not required if the permanent repairs can be made within 14 days of the time damage occurred; however, the exposed tile lines will be screened or otherwise protected to prevent the entry of foreign materials, small mammals, etc. into the tile lines. This shall include the use of filter material to prevent the movement of soil into the drain tile line or the temporary plugging of the drain tile line until permanent repairs can be made.

D. Where tile lines are severed by the pipeline trench, repairs shall be made using Figures 1 and 2 or as agreed upon by the Landowner and the Alliance.

E. There will be a minimum of one foot of separation between the tile line and the pipeline whether the pipeline passes over or under the tile line.

F. The original tile line alignment and gradient shall be maintained. A laser transit shall be used to ensure the proper gradient is maintained.

G. Before completing permanent drain tile repairs, all drain tile lines shall be probed or examined by suitable means on both sides of the trench for their entire length within the right-of-way to check for drain tile that might have been damaged by construction equipment. If any drain tile line is found to be damaged, it shall be repaired so it will operate as well after construction as before construction began.

H. All permanent drain tile line repairs shall be made within 14 days following completion of the pipeline installation on any affected Landowner's property unless otherwise authorized by the Landowner, weather and soil conditions permitting. Landowners and/or Tenants will be contacted prior to final backfill and restoration and offered opportunity to witness final tile line repair.

I. Following completion of the pipeline, the Alliance will be responsible for correcting all tile line repairs that fail due to pipeline construction, provided those repairs were made by the Alliance. The Alliance will not be responsible for drain tile line repairs that the Alliance pays the Landowner to perform. The plans for the repairs shall be approved by the Landowner prior beginning work on the repair.

4. Correction of Future Drainage Problems

The Alliance shall be responsible for installing such additional drainage measures, including additional tiles lines, as are necessary to properly drain wet areas on the permanent and temporary easements caused by the construction and/or existence of the pipeline.

5. Rock Removal

The following rock removal procedures only pertain to rocks found in the uppermost 42 inches of soil.

A. Before replacing any topsoil, all rocks greater than 3 inches in any dimension will be removed from the surface of all exposed subsoil (i.e. working side and subsoil storage areas). Rock greater than 3 inches in any dimension occurring in the top

42 inches or the actual depth of top cover, whichever is less, within the pipeline trench shall be removed. The pipeline trench, bore pits, or other excavations shall not contain rocks of any greater concentration or size than what existed prior to the pipeline construction.

B. All rocks greater than 3 inches in any dimension will be removed from the topsoil following final restoration unless undisturbed areas adjacent to the ROW can be shown to contain similar concentration and size.

C. If trenching, blasting, or boring operations are required through rocky terrain, suitable precautions will be taken to minimize the potential for oversized rocks to become interspersed with adjacent soil material.

D. Rocks and soil containing rocks removed from the subsoil areas, topsoil, or from any excavations, will be hauled off the Landowner's premises or disposed of on the Landowner's premises at a location that is mutually acceptable to the Landowner and the Alliance and in accordance with any applicable laws or regulations.

6. Removal of Construction Debris

All construction-related debris and material that are not an integral part of the pipeline will be removed from the Landowner's property. Such material to be removed would include litter generated by the construction crews which will be removed on a daily basis.

7. Compaction, Rutting, Fertilization, Liming

A. In all agricultural sections of the right-of-way that were traversed by vehicles and construction equipment, where topsoil is stripped and prior to topsoil replacement, the subsoil shall be fractured by deep ripping to a depth of not less than 16 inches below the surface of the subsoil with the appropriate industrial ripper. Subsurface features (i.e. drain tiles, other utilities) may warrant less depth. Deep ripping shall be conducted using a ripper or subsoiling tool with a shank length of no less than 18 inches and a shank spacing of approximately the same measurement as the shank length. Ripper shanks mounted on the back of a dozer are not an acceptable method of decompaction. The footprint of the tractor used to pull the ripper must be equal to or less wide than the width of the decompacted soil created by the ripper. Should multiple passes of the ripper be needed to achieve decompaction between the knives/shanks of the ripping tool, the subsequent passes should be positioned so the knife tracks from the previous pass are split by the second pass.

Decompaction shall be conducted according to the guidelines provided in Appendices A and B.

Following the ripping operation, all stone and rock material three (3) inches and larger in size which has been lifted to the surface shall be collected and removed from the site for disposal.

Upon approval by the Agricultural Inspector of the subsoil decompaction and the stone removal, the topsoil that has been temporarily removed for the period of construction shall then be replaced. The topsoil profile in the full width of the right-of-way shall be shattered to a depth of approximately 2 inches greater than the depth of topsoil with a heavy-duty subsoiling tool having angled legs. Stone removal shall be completed, as necessary, to eliminate any additional rocks and stones brought to the surface as a result of the final subsoil shattering process.

The existence of stumps, tile lines or underground utilities may necessitate less depth.

B. Traffic on the decompacted ROW should be kept to a minimum. If the ripping pass has left the soil surface too rough and uneven for the Landowner to efficiently farm the field, the field can be smoothed with a shallow pass using a chisel, field cultivator, or similar agricultural finishing tool.

C. Ripping and light tillage passes will be done at a time when the soil is dry enough for normal tillage operations to occur on undisturbed farmland adjacent to the areas to be ripped.

D. Should conditions persist that do not allow for effective decompaction prior to topsoil replacement the following alternate decompaction plan will be implemented. Utilizing the alternate decompaction plan, topsoil can be replaced prior to decompacting the subsoil. This alternate decompaction plan will be implemented only when the Landowner has requested the alternate plan or when soil conditions, such as high moisture levels, do not allow for proper and effective decompaction of the subsoil prior to topsoil replacement in a timely manner. Decompaction of the subsoil through the topsoil will be conducted when the soil moisture levels are such that decompaction efforts will reduce compaction levels. The depth of decompaction will be no less than the depth of topsoil (up to 16 inches) plus 16 inches into the subsoil. Decompaction under the alternate decompaction plan shall be conducted according to the guidelines provided in Appendices A and B.

E. The Alliance will restore all compacted or rutted land as near as practicable to its original condition.

F. The cost of applying fertilizer, manure, and/or lime will be included in the damages paid to the Landowner, thereby allowing the Landowner to apply the appropriate type and amounts of fertilizer, manure, and/or lime as needed depending on the crops contemplated and the construction schedule. These included costs are designed to cover the expense to maintain or restore soil fertility and pH levels on the ROW to similar levels as the immediately adjacent off-ROW portions of the field.

G. If there is a dispute between the Landowner and the Alliance as to what areas need to be ripped, the depth at which compacted areas should be ripped, or the necessity or rates of lime and fertilizer application, the appropriate county Soil and Water Conservation District's opinion in conjunction with the opinions of other experts will be considered by the Alliance and the Landowner.

8. Land Leveling

A. Following the completion of the pipeline, the Alliance will restore any right-of-way to its original pre-construction elevation and contour should uneven settling occur or surface drainage problems develop as a result of pipeline construction.

B. The Alliance will provide the Landowners with a telephone number and address that may be used to alert the Alliance of the need to perform additional land leveling services.

C. If, in the future, uneven settling occurs or surface drainage problems develop as a result of the pipeline construction, the Alliance will provide land leveling services within 45 days of a Landowner's written notice, weather and soil conditions permitting.

D. If there is any dispute between the Landowner and the Alliance as to what areas need additional land leveling beyond that which is done at the time of construction, it will be the Alliance's responsibility to disprove the Landowner's claim that additional land leveling is warranted.

9. Backfill Profile and Trench Crowning

In all agricultural land areas, trench crowning shall occur during the trench backfilling operation using subsoil materials over the trench to allow for trench settling, to be followed by topsoil replacement. Due to the increased elevation of the crown compared to the rest of the ROW, surface drainage across the trench may be hindered until the crown has settled completely.

Surface drainage should not be permanently blocked or hindered in any way. If excess spoil is encountered, it will be removed offsite to prevent ridging. Adding additional spoil to the crown over the trench in excess of that required for settlement will not be permitted. In areas where minor trench settling occurs after topsoil spreading, land leveling or imported topsoil shall be used to fill each depression. In areas where major trench settling occurs after topsoil spreading, and land leveling cannot be utilized; imported topsoil shall be used to fill each depression of significant depth. Topsoil from the adjacent agricultural land outside of the right-of-way shall not be used to fill the depressions.

In agricultural areas where the materials excavated during trenching are insufficient in quantity to meet backfill requirements, the soil of any agricultural land adjacent to the trench and construction zone shall not be used as either backfill or surface cover material. Under no circumstances shall any topsoil materials be used for pipe padding material or trench backfill. In situations where imported soil materials are employed for backfill on agricultural lands, such material shall be of similar texture and quality to the existing soils on site. Imported soils should be free from noxious weeds and other pests to the extent possible.

10. Prevention of Soil Erosion

A. The Alliance will work with Landowners to prevent excessive erosion on right-of- way that has been disturbed by construction. Reasonable methods will be implemented to control erosion. This is not a requirement, however, if the land across which the pipeline is constructed is bare cropland that the Landowner intends to leave bare until the next crop is planted.

B. If the Landowner and the Alliance cannot agree upon a reasonable method to control erosion on the Landowner's right-of-way, the recommendations of the appropriate county Soil and Water Conservation District will be considered by the Alliance and the Landowner.

C. The following conditions will determine whether construction will be allowed to continue due to wet weather conditions. The Alliance Chief Environmental Inspector and the Chief Inspector, in consultation with the Agricultural Inspector, will determine when construction should not proceed in a given area due to wet weather conditions.

   1. Wet weather restrictions will only apply to those areas necessary and may not require cessation of work in areas not affected by wet weather.

   2. Work will not be allowed in areas where rutting is mixing subsoil with topsoil, or potentially could result in mixing subsoil with topsoil, given existing soil conditions. The depth of the allowable rutting is dependent upon the depth of topsoil in a location.

   3. In areas where rutting is or potentially could result in topsoil/subsoil mixing, alternatives such as working equipment on board mats and/or timbers will be acceptable. Low ground weight equipment may also be acceptable to perform tasks otherwise performed by wheeled equipment, such as stringing trucks. Other alternatives to minimize rutting include use of flat bottom sleds pulled by low ground weight equipment, disking the right-of-way to increase evaporation and dewatering the area with portable pumps.

11. Repair of Damaged Soil Conservation Practices

All soil conservation practices (such as terraces, grassed waterways, critical area seedings, etc.) which are damaged by the pipeline's construction, will be restored to their pre-construction condition.

12. Control of Trench Washouts, Water Piping and Blowouts

Trench breakers shall be installed for the dual purpose of preventing trench washouts during construction and abating water piping and blowouts subsequent to trench backfill. The distance between permanent trench breakers will be determined through agreement between Landowners and the Alliance. The Alliance will record each installed trench breaker location by map-referenced station-number.

13. Damages to Private Property

A. The Alliance will reasonably compensate Landowners for any construction-related damages caused by the Alliance that occur on or off of the established pipeline right-of-way.

B. Compensation for damages to private property caused by the Alliance shall extend beyond the initial construction of the pipeline, to include those damages caused by the Alliance during future construction, operation, maintenance, and repairs relating to the pipeline.

14. Clearing of Trees and Brush from the Easement

A. If trees are to be removed from the right-of-way, the Alliance will consult with the Landowner to determine if there are trees of commercial or other value to the Landowner.

B. If there are trees of commercial or other value to the Landowner, the Alliance will compensate the Landowner at a fair market value for the trees as well as allow the Landowner the right to retain ownership of the trees with the disposition of the trees to be negotiated prior to the commencement of land clearing.

C. The Alliance will identify black cherry trees located on the right-of-way near active livestock use areas during the construction plan development. Black cherry tree vegetation is toxic to livestock when wilted and shall not be stockpiled in areas accessible to livestock. During the clearing phase, such vegetation will be disposed of in a manner that prevents contact with livestock.

D. Unless otherwise restricted by federal, state or local regulations, the Alliance will remove and dispose of trees, brush, and stumps of no value to the Landowner to an approved off-site disposal location.

15. Interference with Irrigation Systems

A. If the pipeline and/or temporary work areas intersect an operational (or soon to be operational) spray irrigation system, the Alliance will establish with the Landowner an acceptable amount of time the irrigation system may be out of service.

B. If, as a result of pipeline construction activities, an irrigation system interruption results in crop damages, either on the pipeline right-of-way or off the right-of-way, the Landowner will be reasonably compensated for all such crop damages.

C. If it is feasible and mutually acceptable to the Alliance and the Landowner, temporary measures will be implemented to allow an irrigation system to continue to operate across land on which the pipeline is also being constructed.

16. Ingress and Egress Routes

Prior to the pipeline's installation, the Alliance and the Landowner will reach a mutually acceptable agreement on the route that will be utilized for entering and leaving the pipeline right-of-way should access to the right-of-way not be practical or feasible from adjacent segments of the pipeline right-of-way; from public highway or railroad right-of-way or from other suitable public access.

Where access ramps/pads are required from the highway to the pipeline construction area, the topsoil shall be removed and stockpiled for replacement, an underlayment of durable geotextile matting, or equivalent shall be placed over the exposed subsoil surface prior to the placement of temporary rock access fill material. All such material will be removed upon completion of the project. Complete removal of the ramp upon completion of the project and restoration of the impacted site is required prior to topsoil replacement.

17. Temporary Roads

A. The location of temporary roads to be used for construction purposes will be negotiated with the Landowner.

B. The temporary roads will be designed to not impede surface drainage and will be built to minimize soil erosion on or near the temporary roads.

C. Upon abandonment, temporary roads may be left intact through mutual agreement of the Landowner and the Alliance unless otherwise restricted by federal, state, or local regulations.

D. If the temporary roads are to be removed, the rights-of-way upon which the temporary roads are constructed will be returned to their previous use(s) and restored to equivalent condition(s) as existed prior to their construction. All temporary access roads that are removed shall be ripped to a depth not less than 16 inches. All ripping will be done consistent with Items 7.A. through 7.C.

18. Weed Control

A. On any right-of-way over which the Alliance has jurisdiction as to its surface use, (i.e., valve sites, metering stations, compression stations, etc.), the Alliance will provide for weed control in a manner that prevents the spread of weeds onto adjacent lands used for agricultural purposes. Spraying will be done by a pesticide applicator that is appropriately licensed for doing such work in the State of Illinois.

B. The Alliance will be responsible for reimbursing all reasonable costs incurred by owners of land adjacent to surface facilities when the Landowners must control weeds on their land which can be determined to have spread from land accommodating pipeline surface facilities, should the Alliance fail to do so after being given written notice and a 45-day opportunity to respond.

19. Pumping of Water from Open Trenches

A. In the event it becomes necessary to pump water from open trenches, the Alliance will pump the water in a manner that will avoid damaging adjacent agricultural land, crops, and/or pasture. Such damages include, but are not limited to, the inundation of crops for more than 24 hours, the deposition of excessive sediment in ditches and other water courses, and the deposition of subsoil sediment and gravel in fields and pastures. No back filling shall be done in water filled trench. All freestanding water shall be removed prior to any back filling.

B. If it is impossible to avoid water-related damages as described in Item 19.A. above, the Alliance will reasonably compensate the Landowners for the damages or will correct the damages so as to restore the land, crops, pasture, water courses, etc. to their pre-construction condition.

C. All pumping of water shall comply with existing drainage laws, local ordinances relating to such activities, and provisions of the Clean Water Act.

20. Aboveground Facilities

Subject to regulation and reasonable design limitations, locations for aboveground facilities shall be selected in a manner so as to be as unobtrusive as reasonably possible to ongoing agricultural activities occurring on the land adjacent to the facilities. Aboveground facilities on the right-of-way will be located in a manner that attempts to minimize the loss of agricultural land and the impacts to other environmental features. If this is not feasible, such facilities shall be located so as to incur the least hindrance to the adjacent cropping operations (i.e., located in field corners or areas where at least one side is not used for cropping purposes).

21. Advance Notice of Access to Private Property

A. The Alliance will provide the Landowner or Tenant with a minimum of 24 hours prior notice before accessing his/her property for the purpose of constructing the pipeline.

B. Prior notice shall first consist of a personal contact, e-mail or a telephone contact, whereby the Landowner or Tenant is informed of the Alliance's intent to access the land. If the Landowner or Tenant cannot be reached in person, by e-mail or by telephone, the Alliance will mail or hand deliver to the Landowner at his home or the address designated on the easement, or the Tenant's home, a dated, written notice of the Alliance's intent. If by mail, notice shall be considered given when mailed. The Landowner or Tenant need not acknowledge receipt of the written notice before the Alliance can enter the Landowner's property.

22. Reporting of Inferior Agricultural Impact Mitigation Work

No later than 3 days prior to the commencement of the pipeline construction across a Landowner's property, the Alliance will provide the Landowner with a toll-free number the Landowner can call to alert the Alliance should the Landowners observe inferior agricultural impact mitigation work which is being done or has been carried out on his/her property.

23. Indemnification

The Alliance will indemnify all owners and farm tenants of agricultural land upon which such pipeline is installed, their heirs, successors, legal representatives, assigns (collectively "Indemnitees"), from and against all claims by third parties losses incurred thereby, and reasonable expenses, resulting from or arising out of personal injury, death, injury to property, or other damages or liabilities of any sort related to the design, laying, maintenance, removal, repair, use or existence of such pipeline, whether heretofore or hereafter laid, including damages caused by such pipeline or any of its appurtenances and the leaking of its contents, except where claims, injuries, suits, damages, costs, losses, and expenses are caused by the negligence or intentional acts, or willful omissions of such Indemnitees provided further that such Indemnitees shall tender any such claim as soon as possible upon receipt of notice thereof to the Alliance.

24. General Monitoring and Remediation

The Alliance will provide a monitoring and remediation period of no less than two-years immediately following the full-length activation of the pipeline or the completion of initial right-of-way restoration, whichever occurs last. The Alliance shall be responsible for the cost of the monitoring and remediation. The two-year period allows for the effects of climatic cycles such as frost action, precipitation and growing seasons to occur, from which various monitoring determinations can be made. The Alliance shall maintain an Agricultural Inspector on at least a part-time basis through this period. The monitoring and remediation phase shall be used to identify any remaining impacts associated with the pipeline construction that are in need of correction and to implement the follow-up restoration.

General right-of-way conditions to be monitored during this period include topsoil thickness, relative content of rock and large stones, trench settling, crop growth, drainage, erosion and repair of severed fences, etc. Areas exhibiting significant crop growth differences on the ROW compared to that immediately off-ROW will be logged. The problems or concerns shall be identified through on-site monitoring of all areas along the right-of-way and through contact with each respective Landowner and local county Soil and Water Conservation Districts.

Topsoil deficiency and trench settling shall be restored with land leveling or imported topsoil that is consistent with the quality of topsoil on the affected site. Excessive amounts of rock and oversized stone material shall be determined by a visual inspection of the right-of-way. Results shall be compared to portions of the same field located outside of the right-of-way. Included in the determination of relative rock and large stone content is the right-of-way's condition subsequent to tillage and the relative concentration of such materials within the right-of-way as compared to off the right-of-way. All excess rocks and large stones shall be removed and disposed of by the Alliance.

On site monitoring on agricultural lands shall be conducted at least two times during the growing season and shall include a comparison of growth for crops on and off the right-of-way. It should be noted that other permits will require additional site visits to monitor for erosion and other environmental compliance requirements. Should a crop issue be visible during one of these visits, the observations will be recorded at that time. In the fourth quarter of the second year after construction, prior to the completion of the two year post-construction crop monitoring period, Landowners with cropped agricultural lands will be sent an enrollment form for a crop yield monitoring program. At their discretion, Landowners may enroll in the crop yield monitoring program, which will begin the third growing season after construction. Crop yield monitoring will be conducted at the expense of the Alliance. In order to plan for yield monitor staffing and equipment needs, enrollment forms must be received by the Alliance no later than July 1 of the year monitoring is to take place. Yield monitoring methods will be used to collect replicated and quantitative crop yield data both on and off the ROW for the purpose of determining the percent crop loss of the ROW area relative to the adjacent off ROW area. The crop loss data can be utilized to determine both the level of crop loss and the potential need for additional restoration efforts. Cropped lands where significant yield losses are observed shall be automatically reenrolled in the crop yield monitoring program for the following year. When the subsequent crop productivity within the affected right-of-way is significantly less than that of the adjacent unaffected agricultural land, the Agricultural Inspector, in conjunction with the Alliance as well as other appropriate organizations, shall help to determine the appropriate rehabilitation measures for the Alliance to implement. During the various stages of the project, all affected farm operators shall be periodically apprised of the duration of remediation by their respective Agricultural Inspector. Properties enrolled in the crop yield monitoring program will be released from yield monitoring when the yield difference between the ROW and adjacent off ROW areas are of similar yield and no longer significantly different.

After completion of the specific remediation period, the Alliance shall continue to respond to the reasonable requests of the Landowner to correct project related adverse affects on the agricultural resources.

On lands subject to erosion, the Alliance shall patrol the pipeline right-of-way with reasonable frequency to detect erosion of the top cover. Whenever the loss of cover due to erosion creates a safety issue or whenever the amount of topcover is less than 36 inches (as defined in Section 1.C of this Agreement), the Alliance shall take corrective action.

Concurrence of the Parties to this Agreement

The Illinois Department of Agriculture and the Alliance concur that this Agreement is the complete Agreement between them governing the construction standards and polices that will aid in minimizing agricultural impacts within the State of Illinois that may result from the construction of the pipeline.

The effective date of this Agreement commences on the date of execution.

STATE OF ILLINOIS
DEPARTMENT OF AGRICULTURE

(signature)
H.W. Devlin, Acting Director

(signature)
by Shari L. West, Legal Counsel

State Fairgrounds
801 Sangamon Avenue
Springfield, IL 62702

Date 1/20/2012 , 2012

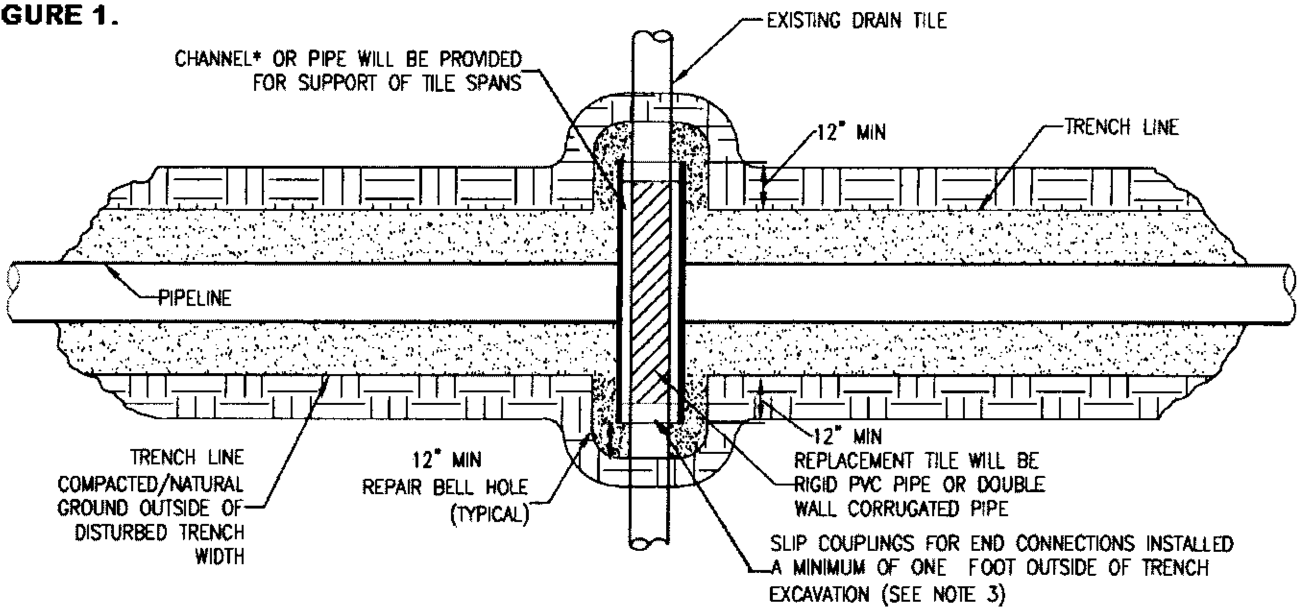
FutureGen Industrial Alliance

Kenneth K. Humphreys
(signature)
Ken Humphreys, CEO

Morgan County Office
73 Central Park Plaza East
Jacksonville, IL 62650

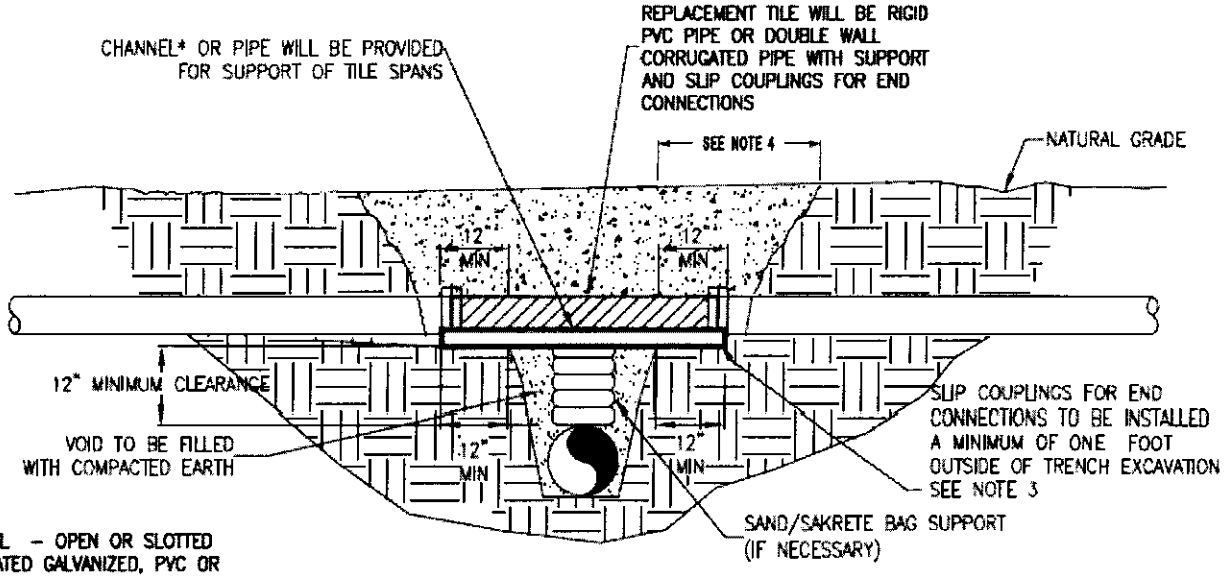
Date JANUARY 20TH , 2012

FIGURE 1.



PLAN

N.T.S.



*CHANNEL – OPEN OR SLOTTED CORRUGATED GALVANIZED, PVC OR ALUMINUM CRADLE TO SUPPORT DRAIN TILE.

CROSS SECTION

N.T.S.

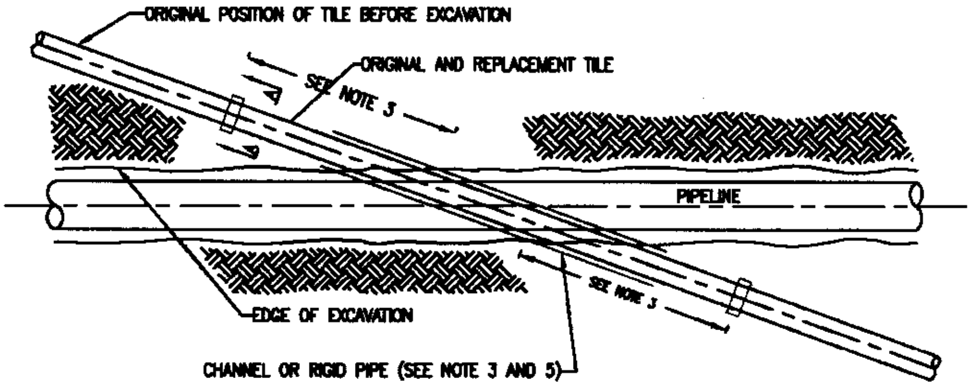
NOTE:

1. IMMEDIATELY REPAIR TILE IF WATER IS FLOWING THROUGH TILE AT TIME OF TRENCHING. IF NO WATER IS FLOWING AND TEMPORARY REPAIR IS DELAYED, OR NOT MADE BY THE END OF THE WORK DAY, A SCREEN OR APPROPRIATE 'NIGHT CAP' SHALL BE PLACED ON OPEN ENDS OF TILE TO PREVENT ENTRAPMENT OF ANIMALS ETC.
2. CHANNEL OR PIPE (OPEN OR SLOTTED) MADE OF CORRUGATED GALVANIZED PIPE, PVC OR ALUMINUM WILL BE USED FOR SUPPORT OF DRAIN TILE SPANS.
3. INDUSTRY STANDARDS SHALL BE FOLLOWED TO ENSURE PROPER SEAL OF REPAIRED DRAIN TILES.
4. THE TRENCH SIDEWALL CUTBACK DISTANCE NEEDED ABOVE THE TILE REPAIR SHOULD BE A MINIMUM DISTANCE OF 12 INCHES. THE DISTANCE MAY NEED TO BE INCREASED BASED ON SITE-SPECIFIC, SOIL STABILITY.

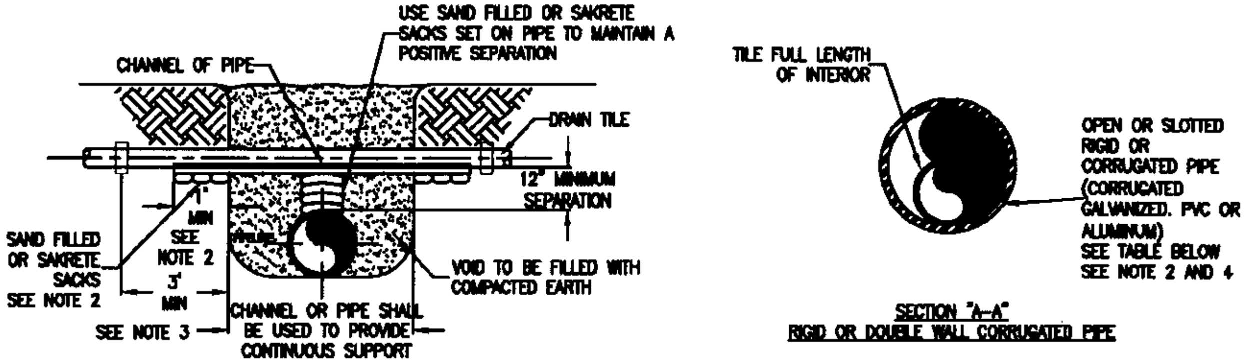
TEMPORARY DRAIN TILE REPAIR

PAGE 1 of 2

FIGURE 2.



PLAN VIEW



SECTION "A-A"
RIGID OR DOUBLE WALL CORRUGATED PIPE

END VIEWS

MINIMUM SUPPORT TABLE

TILE SIZE	CHANNEL SIZE		PIPE SIZE	
3"	4" @ 5.4	#/ft	4"	STD. WT.
4"-5"	5" @ 6.7	#/ft	6"	STD. WT.
8"-9"	7" @ 9.8	#/ft	9"-10"	STD. WT.
10"	10" @ 15.3	#/ft	12"	STD. WT.

NOTE:

1. TILE REPAIR AND REPLACEMENT SHALL MAINTAIN ORIGINAL ALIGNMENT GRADIENT AND WATER FLOW TO THE GREATEST EXTENT POSSIBLE. IF THE TILE NEEDS TO BE RELOCATED, THE INSTALLATION ANGLE MAY VARY DUE TO SITE SPECIFIC CONDITIONS AND LANDOWNER RECOMMENDATIONS.

2. 1'-0" MINIMUM LENGTH OF CHANNEL OR RIGID PIPE (OPEN OR SLOTTED CORRUGATED GALVANIZED. PVC OR ALUMINUM CRADLE) SHALL BE SUPPORTED BY UNDISTURBED SOIL, OR IF CROSSING IS NOT AT RIGHT ANGLES TO PIPELINE, EQUIVALENT LENGTH PERPENDICULAR TO TRENCH. SHIM WITH SAKRETE, OR SAND BAGS TO UNDISTURBED SOIL FOR SUPPORT AND DRAINAGE GRADIENT MAINTENANCE (TYPICAL BOTH SIDES).

3. DRAIN TILES WILL BE PERMANENTLY CONNECTED TO EXISTING DRAIN TILES A MINIMUM OF THREE FEET OUTSIDE OF EXCAVATED TRENCH LINE USING INDUSTRY STANDARDS TO ENSURE PROPER SEAL OF REPAIRED DRAIN TILES INCLUDING SLIP COUPLINGS.

4. DIAMETER OF RIGID PIPE SHALL BE OF ADEQUATE SIZE TO ALLOW FOR THE INSTALLATION OF THE TILE FOR THE FULL LENGTH OF THE RIGID PIPE.

5. OTHER METHODS OF SUPPORTING DRAIN TILE MAY BE USED IF ALTERNATE PROPOSED IS EQUIVALENT IN STRENGTH TO THE CHANNEL/PIPE SECTIONS SHOWN AND IF APPROVED BY COMPANY REPRESENTATIVES AND LANDOWNER IN ADVANCE. SITE SPECIFIC ALTERNATE SUPPORT SYSTEM TO BE DEVELOPED BY COMPANY REPRESENTATIVES AND FURNISHED TO CONTRACTOR FOR SPANS IN EXCESS OF 20', TILE GREATER THEN 10" DIAMETER, AND FOR "HEADER" SYSTEMS.

6. ALL MATERIAL TO BE FURNISHED BY CONTRACTOR.

7. PRIOR TO REPAIRING TILE, CONTRACTOR SHALL PROBE LATERALLY INTO THE EXISTING TILE TO FULL WIDTH OF THE RIGHTS OF WAY TO DETERMINE IF ADDITIONAL DAMAGE HAS OCCURRED. ALL DAMAGED/DISTURBED TILE SHALL BE REPAIRED AS NEAR AS PRACTICABLE TO ITS ORIGINAL OR BETTER CONDITION.

PERMANENT DRAIN TILE REPAIR

PAGE 2 of 2

Appendix A.

Guidelines for Conducting Proper and Successful Decompaction

1. Decompaction is required when:
    - A. the area has been trafficked or traversed by vehicles or construction equipment, and
    - B. the soil penetrometer readings are 300 pounds per square inch (psi) or greater, and
    - C. the soil strength (psi) in the right-of-way area is greater than that of the non-trafficked area.

2. An Environmental and/or Agricultural Inspector with experience and training in the proper identification of compacted soil and operation methods of deep decompaction tools is required to observe the daily operation of the ripper/subsoiler to ensure the conditions are appropriate for decompaction efforts and that the proper equipment is utilized and that equipment is set-up and operated correctly.

3. To achieve the most effective shatter of the compacted soil the following guidelines have been established:
    - A. Conduct ripping when the soil is dry. Follow the "Soil Plasticity Test Procedures" detailed in Appendix B to determine if soil conditions are adequately dry to conduct decompaction efforts.
    - B. Deep ripping shall be conducted using a ripper or subsoiling tool with a shank length of no less than 18 inches and a shank spacing of approximately the same measurement as the shank length.
    - C. Use a ripper with a knife length of no less than 2 inches more than the desired depth of decompaction.
    - D. To best promote revegetation and restore crop production, a total depth of 30 or more inches of non-compacted soil (topsoil plus subsoil) is recommended. At a minimum, rip the subsoil to a total depth of no less than 16 inches and rip the replaced topsoil to a depth of no less than 2 inches more than the depth of the replaced topsoil. If decompacting the entire 30 or more inches through the topsoil, a larger ripping tool will be required to achieve the full depth of decompaction.

      The knife length required when decompacting the entire 30 or more inches through the replaced topsoil is the depth of the topsoil plus 18 inches or a minimum depth of 32 inches, whichever is greatest. This will allow for decompaction to approximately the same total depth achieved when decompacting the subsoil prior to topsoil replacement or a minimum depth of 30 inches.
    - E. The minimum depths of decompaction stated above in 3.D. are required where possible. A safe distance from sub-surface structures (tile drains, pipelines, buried utilities, bedrock, etc.) must be maintained at all times. Where such structures exist, a lesser depth of decompaction will be required to prevent damage to equipment and the structures as well as to maintain a safe work environment. The allowable decompaction depth in these instances will be determined on a site by site basis.
    - F. When the knives are in the soil to the desired depth the tongue of the ripper should be parallel to the surface of the ground.

G. Select a tractor that has enough horsepower to pull the ripper at a speed of 1.5 to 2 mph and whose footprint is of equal or lesser width than the ripper. Tracked equipment is preferred and typically required to achieve this criteria.

H. The ripper shanks should not create ruts, channels, or mixing of the sub-soil with topsoil. A speed of 1.5 to 2 mph is recommended to minimize the risk of rutting and soil mixing. The ideal operating speed can vary with soil characteristics and ripping tool used. An excessive travel speed will often increase mixing of soil horizons.

I. When the equipment is set up and operated correctly, the ripper should create a wave across the surface of the ground as it lifts and drops the soil.

J. Make one ripping pass through the compacted area. Using a penetrometer, the AI will measure the PSI between the ripped knife tracks to determine if the single ripping pass was successful. Additional passes should only be used where needed as they may reduce the effectiveness of the ripping by re-compacting the soil shattered in the previous pass.

K. If the first pass does not successfully decompact the soil, additional passes will be needed. Should multiple passes of the ripper be needed to achieve decompaction between the knives tracks of the ripping tool, the subsequent passes should be positioned so the knife tracks from the previous pass are split by the second pass. If three or more passes have been made and sufficient decompaction has not yet been achieved the AI may choose to halt further decompaction efforts in that area until conditions improve or better methods are determined.

L. Following ripping, all stone and rock three or more inches in size which has been lifted to the surface shall be collected and removed from agricultural areas.

M. After ripping has been conducted, do not allow unnecessary traffic on the ripped area.

N. In agricultural lands and croplands that will not be replanted to vegetation by Alliance, recommend to landowners to plant a deep rooted crop following decompaction. Reduced compaction created by the ripper pass will not remain over time without subsequent root penetration. Root penetration into the shattered soil is necessary to establish permanent stabilized channels to conduct air and water into the soil profile.

Appendix B.

Soil Plasticity Test Procedures

The Agricultural Inspector will test the consistency of the surface soil to a depth of approximately 4 to 8 inches using the Field Plasticity Test procedure developed from the *Annual Book of ASTM Standards, Plastic Limit of Soils* (ASTM D-424).

1. Pull a soil plug from the area to be tilled, moved, or trafficked to a depth of 4-8 inches.

2. Roll a portion of the sample between the palms of the hands to form a wire with a diameter of one-eighth inch.

3. The soil consistency is:

   A. Tillable (able to be worked) if the soil wire breaks into segments not exceeding 3/8 of an inch in length.

   B. Plastic (not tillable) if the segments are longer than 3/8 of an inch before breaking.

4. This Procedure is to be used to aid in determining when soil conditions are dry enough for construction activities to precede.

5. Once the soil consistency has been determined to be of adequate dryness, the plasticity test is not required again until the next precipitation event.

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APPENDIX I

Public Comments on the Draft EIS

I1 – Summary of Public Hearing and Comment Period
I2 – Comments on the Draft EIS and DOE Responses
I3 – DOE's Notice of Availability

for the

Final Environmental Impact Statement
FutureGen 2.0 Project
Meredosia, Illinois (Morgan County)

Note: This appendix was added for the Final EIS.

DOE/EIS-0460
October 2013

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APPENDIX I1

SUMMARY OF PUBLIC HEARING AND COMMENT PERIOD

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SUMMARY OF PUBLIC HEARING AND COMMENT PERIOD

PUBLICATION OF THE DRAFT EIS

DOE produced the Draft EIS for the FutureGen 2.0 Project in April 2013 and distributed copies to officials, agencies, Native American tribes, organizations, libraries, and members of the public identified in the distribution list (Draft EIS Volume 1, Chapter 8). DOE published the NOA for the Draft EIS in the *Federal Register* on May 3, 2013 (78 FR 26004), which provided the website to access the Draft EIS online, the location and timing of the public hearing, and the various methods for submitting comments (see Appendix I3 for a copy of the NOA). On the same date, the USEPA published its NOA for the Draft EIS (78 FR 26027), which initiated the 45-day public comment period (from May 3 to June 17, 2013).

PUBLIC HEARING AND COMMENT PERIOD

On May 21, 2013, DOE held a public hearing in Jacksonville, Illinois, to offer the public an opportunity to comment on the Draft EIS for the FutureGen 2.0 Project. The hearing was held at Jacksonville High School, 1211 N. Diamond Street. An informational session was held from 5:00 p.m. to 6:00 p.m., followed by the formal presentations and comment period from 6:00 p.m. to approximately 8:00 p.m.

DOE posted notices in three area newspapers announcing the public hearing date, time, location, and purpose, which were published during the three weeks prior to the hearing as shown in Table 1. Copies of the affidavits of publication for these notices are included in the administrative record. The notices invited individuals to submit written comments or give oral comments at the hearing and included contact information for the DOE NEPA Document Manager. Individuals wishing to give oral comments were invited to submit a request to speak to DOE in advance or to sign up at the public hearing. Seven individuals contacted DOE expressing their intent to speak at the hearing.

Table 1. Public Hearing Notices in Regional Media

Newspaper	Dates of Publication
Jacksonville Journal-Courier	Sunday 5/5/13; Wednesday 5/8/13; Sunday 5/12/13; Wednesday 5/15/13; Sunday 5/19/13
Springfield State Journal-Register	Sunday 5/5/13; Wednesday 5/8/13; Sunday 5/12/13; Wednesday 5/15/13; Sunday 5/19/13
Illinois Farm Week	Monday 5/6/13; Monday 5/13/13; Monday 5/20/13

The same information was also provided in notification letters that were sent on April 26, 2013, to interested parties, elected officials, federal and state agencies, and non-governmental organizations based on the distribution list in the Draft EIS. DOE distributed notifications including 147 letters each with a hardcopy of the Draft EIS, 164 notification letters alone, and 180 notifications by email.

A total of 46 people signed the attendance sheets for the public hearing, and a total of seven individuals were signed up to give oral comments. During the informational session, the public was invited to view various displays about the NEPA process and the FutureGen 2.0 Project staffed by DOE and Alliance representatives, and the public was encouraged to ask questions of the subject matter experts. The DOE NEPA Document Manager opened the public hearing with welcoming remarks and introduced the Alliance's Chief Executive, who presented an overview of the FutureGen 2.0 Project. The DOE NEPA Document Manager followed with a brief overview of DOE's role in the NEPA process and discussed the various methods by which the public could provide comments on the Draft EIS during the official 45-day comment period. A court reporter recorded the formal presentations and oral comments, as documented in the transcript beginning on page I2-13 in Appendix I2. In addition to the oral comments, a representative of one organization submitted a written comment at the public hearing.

During the official 45-day comment period, DOE ultimately received comments from two federal agencies, two state agencies, one local elected official, four non-governmental or public-private organizations, and seven members of the public, including the oral comments at the hearing. DOE also accepted and considered comments that were received after the June 17, 2013 closing date for public comments.

METHODOLOGY FOR ADDRESSING COMMENTS

In preparing the Final EIS, DOE considered all comments to the extent practicable. An identification code was assigned to each originator of a comment (i.e., each commentor), including those given orally at the public hearing. One individual, who submitted comments in multiple separate submissions, was assigned a separate commentor code for each submission. Each specific comment by the same commentor was assigned a sequential comment number (e.g., 11-10 is the tenth comment by commentor 11).

A transcript of the public hearing and scanned images of the original comment submissions are included in their entirety in Appendix I2. The commentors and their comments are identified and labeled on each comment submission image. All comments received on the Draft EIS, as well as any supporting attachments, have been entered into the administrative record for this EIS. DOE's response to each comment is included on the right side of the page in Appendix I2 in close proximity to the corresponding comment. In cases where subsequent comments address the same issue, references are made to the earlier comment number for appropriate responses.

Based on the comments received on the Draft EIS, DOE modified the Summary, Final EIS (Volume 1), and Appendices (Volume 2) as appropriate. The EIS was also revised based on DOE's internal technical and editorial review of the Draft EIS (i.e., changes made to the EIS that were not in response to a comment received). In most of these instances, the revisions were based on events that took place or actions that occurred between the publication of the Draft EIS and the preparation of the Final EIS.

IDENTIFICATION OF COMMENTORS

Table 2 lists commentors in order of their first appearance in the comment and response document in Appendix I2, their assigned identification codes, their affiliations, and the page numbers where the respective comments and DOE's responses can be found in Appendix I2.

Table 2. List of Commentors

ID Code	Name	Affiliation	Page No. (Appendix I2)
USEPA	Kenneth A. Westlake	USEPA	I2-1 through I2-6
USDOI	Lindy Nelson	USDOI	I2-7 through I2-10
IDOA	Robert F. Flider	IDOA	I2-11 through I2-12
1	Adam Pollet	IDCEO	I2-21 through I2-26
2	Betty Niemann	Private person	I2-26 through I2-41
3	Richard Johnson	Private person	I2-41 through I2-42
4	Pamela Hardwicke	CATF	I2-42 through I2-47
5	Axel Steuer	Private person	I2-47 through I2-50
6	Terry Denison	JREDC	I2-50 through I2-53
7	Tom Grojean	Private person	I2-53 through I2-55
8	Jim Duncan	AMVETS Post 100	I2-57

Table 2. List of Commentors

ID Code	Name	Affiliation	Page No. (Appendix I2)
9	Steve Warmowski	Alderman, Jacksonville	I2-58
10	Elizabeth Rigor	Private person	I2-59
11	Andrea Issod	Sierra Club	I2-60 through I2-77
12	Elizabeth (Betty) Niemann	Private person	I2-78 through I2-112
13	Marilyn Schutt	Private person	I2-113
14	Jeffrey Niemann	Private person	I2-114 through I2-122
15	Elizabeth (Betty) Niemann	Private person	I2-123 through I2-131
16	Elizabeth (Betty) Niemann	Private person	I2-132

CATF – Clean Air Task Force; IDCEO – Illinois Department of Commerce and Economic Opportunity; IDOA – Illinois Department of Agriculture; Jacksonville Regional Economic Development Corporation; USDOI – U.S. Department of Interior; USEPA – U.S. Environmental Protection Agency

SUMMARY OF COMMENTS

In aggregate, a total of 116 comments were received in 19 separate submissions from 16 individuals (one member of the public spoke at the hearing and also submitted three sets of written comments). The largest proportion of comments related to the adequacy of information provided about the project and potential impacts. The majority of resource-specific comments focused on socioeconomic issues, geology, and climate and greenhouse gas emissions. Another substantial group of comments were distributed relatively evenly among concerns about health and safety, biological resources, NEPA requirements, and air quality. The balance of comments addressed eleven other subject areas: alternatives, land use, purpose and need, cumulative impacts, environmental justice, regulatory issues, surface water, wetlands, groundwater, physiography and soils, and utilities. The categories and principal issues expressed in the comments are summarized below based on the full text of comments in Appendix I2.

Adequacy of Information about the Project

- The Draft EIS did not provide adequate details about project components and engineering features.
- The Alliance withheld important information about the project from the public or provided inconsistent information about the project and made revisions to prior information.
- Questioned the Alliance’s qualifications to successfully complete the project.
- The Draft EIS did not provide adequate information about financial assurances and monitoring for the geologic CO_2 storage component.
- Concerned about the use of bounding conditions in the impact analysis, counties excluded from the region of influence for analysis, the proposed depth of the CO_2 pipeline, insufficient pipeline design details, and the unexplained poor generation efficiency of the project.

Socioeconomic Conditions

- Stated support for the FutureGen 2.0 Project based on the potential for economic stimulus, job creation, promotion of clean fossil fuel development, and opportunities for educational and technology advancement.

- Concerned about the potential for project cost overruns and excessive costs to be borne by taxpayers and ratepayers.
- Concerned about whether a full cost-benefit analysis would show that the project could be justified in comparison to potential risks.
- Concerned about the economic risks from inadequate financial assurances for the project and the questionable economic and job creation benefits of the project and the visitor center.

Geology

- Concerned about whether the selection of the proposed CO_2 storage site was justified based on geologic data and whether the geologic storage formation could adequately support the project.
- Questioned the integrity of the caprock formation and whether it could withstand the chemical effects of CO_2 injection and storage.
- Concerned about the potential for land deformation from CO_2 injection and storage with adverse effects on agricultural drainage and whether the displacement of brine in the storage formation might necessitate extraction and disposal of brine aboveground.

Climate and GHG Emissions

- Stated support for the FutureGen 2.0 Project based on the potential for reductions in GHG emissions from fossil fuel combustion.
- Argued that the EIS analysis could not assume that the planned reductions in CO_2 emissions would occur, because no permit limitations are applicable to CO_2 emissions.
- Stated that the effects of GHG emissions on climate change are not scientifically proven.
- Recommended a revision in the Final EIS to explain net GHG emissions considering the same contemporaneous GHG emissions decreases as addressed in the Clean Air Act construction permit application, stated an opinion that methane emissions from natural gas wells should be more of a concern than CO_2 emissions, and expressed disagreement about whether the FutureGen 2.0 Project would have near-zero emissions.

Other Subjects

- Health and Safety – Concerned about potential health and safety risks associated with leakage from the CO_2 storage formation or the pipeline, including concentrations of hydrogen sulfide in the CO_2 and potential risks from inadequate monitoring.
- Biological Resources – Provided recommendations or expressed concerns about the protection of threatened and endangered species, forest habitat, and migratory birds, as well as emphasizing the need for coordination with the U.S. Fish and Wildlife Service.
- NEPA – Addressed issues relating to DOE’s conformance with the intent of NEPA, including allegations that the Draft EIS is deficient and should be revised, a claim that the impact of coal mining should be addressed as a connected action, an allegation that the public hearing was not properly announced in one newspaper, and a suggestion for additional mitigation of impacts.
- Air Quality – Addressed topics including an analysis for prevention of significant deterioration (PSD), an analysis of fine particulate matter ($PM_{2.5}$) emissions, the alleged reliance on improper assumptions about baseline conditions, and suggestions for reduction of diesel emissions during construction.

- Alternatives – Argued that the Draft EIS did not adequately consider alternatives, including alternatives to the use of coal, alternative CO_2 storage sites, and that the no action alternative was improperly defined to consider the Meredosia Energy Center as continuing to operate.
- Land Use – Addressed the irreversibility of pipeline easements, protection for farmers, and potential effects on Centennial Farm status.
- Purpose and Need – Alleged that DOE did not properly define the purpose for action, that carbon capture was not justified, and that the purpose for action was based on arbitrary assumptions about future coal use.
- Cumulative Impacts – Argued that the success of the project would stimulate additional coal-fueled power plants to be built with associated impacts; questioned aspects of the relationship between FutureGen 2.0 and an Ameren transmission line project.
- Environmental Justice – Concerned about potential impacts on low-income ratepayers and rural farmers.
- Regulatory – Implied that the Alliance was attempting to avoid permitting requirements; questioned whether a new state law regulating hydraulic fracturing would apply to the FutureGen 2.0 injection wells.
- Surface Water – Addressed stream crossings by the pipeline and the potential use of impervious pavements.
- Wetlands – Addressed the impacts on wetlands from injection well siting and the location of wetland crossings by the pipeline.
- Groundwater – Concerned about groundwater contamination by leakage from the CO_2 storage formation.
- Physiography and Soils – Addressed the analysis of impacts on prime farmlands.
- Utilities – Concerned about the demand for water during well drilling operations and the disposal of drilling wastes.

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APPENDIX I2

COMMENTS ON THE DRAFT EIS AND DOE RESPONSES

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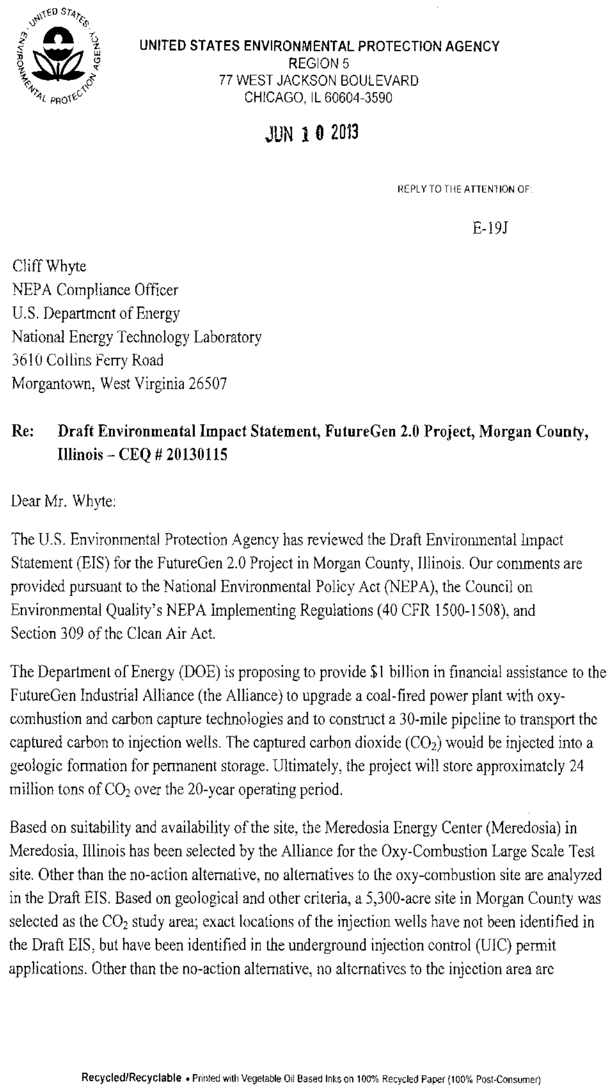
Commentor - USEPA



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

JUN 10 2013

REPLY TO THE ATTENTION OF:

E-19J

Cliff Whyte
NEPA Compliance Officer
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
Morgantown, West Virginia 26507

Re: Draft Environmental Impact Statement, FutureGen 2.0 Project, Morgan County, Illinois – CEQ # 20130115

Dear Mr. Whyte:

The U.S. Environmental Protection Agency has reviewed the Draft Environmental Impact Statement (EIS) for the FutureGen 2.0 Project in Morgan County, Illinois. Our comments are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementing Regulations (40 CFR 1500-1508), and Section 309 of the Clean Air Act.

The Department of Energy (DOE) is proposing to provide $1 billion in financial assistance to the FutureGen Industrial Alliance (the Alliance) to upgrade a coal-fired power plant with oxy-combustion and carbon capture technologies and to construct a 30-mile pipeline to transport the captured carbon to injection wells. The captured carbon dioxide (CO_2) would be injected into a geologic formation for permanent storage. Ultimately, the project will store approximately 24 million tons of CO_2 over the 20-year operating period.

Based on suitability and availability of the site, the Meredosia Energy Center (Meredosia) in Meredosia, Illinois has been selected by the Alliance for the Oxy-Combustion Large Scale Test site. Other than the no-action alternative, no alternatives to the oxy-combustion site are analyzed in the Draft EIS. Based on geological and other criteria, a 5,300-acre site in Morgan County was selected as the CO_2 study area; exact locations of the injection wells have not been identified in the Draft EIS, but have been identified in the underground injection control (UIC) permit applications. Other than the no-action alternative, no alternatives to the injection area are

Response

Commentor - USEPA

analyzed in the Draft EIS. In addition to the no-action alternative, two pipeline routes are analyzed in the Draft EIS, the northern route and the southern route.

The proposed project will require a Class VI UIC permit under the Safe Drinking Water Act for each of the four proposed injection wells. Class VI wells are for the injection of CO_2 into underground geologic formations. The permit applications for the proposed project are currently under review by EPA. Therefore, we reserve the right to provide additional comments during the UIC permit process.

Based on the provided materials, we have rated the proposed project and Draft EIS as **LO - Lack of Objections.** However, we recommend several mitigation measures that would improve the proposed project. We also identify some areas where additional information would benefit review of the Final EIS. A summary of our rating system is enclosed. **USEPA-01**

<u>Air Quality</u>

The modeling discussion on pages 3.1-21 through 3.1-23 does not include fine particulate matter ($PM_{2.5}$) emissions. The document included modeling for other criteria pollutants, but the modeling that was done for $PM_{2.5}$ was not included.

> **Recommendation:** The Final EIS should include the analysis of $PM_{2.5}$ emissions as a result of the project.

USEPA-02

The discussion on page 3.1-27 regarding impacts to Prevention of Significant Deterioration (PSD) increments under the Clean Air Act (CAA) suggests that a PSD increments analysis has been conducted. However, there is no conclusion or discussion of how the impacts of the project would avoid an exceedance of PSD increment levels in the impact area.

> **Recommendation:** The results of the PSD increments analysis should be discussed in the Final EIS.

USEPA-03

The Alliance has submitted a CAA construction permit to Illinois EPA. We note that the construction permit application presents an accounting of the reduction of greenhouse gases (GHG) as a result of the shutdown of the existing boilers at Meredosia. The Draft EIS includes a discussion on emissions of GHGs and applicability of PSD on pages 3.2-11 through 3.2-14. This discussion states that the proposed project will result in an increase in emissions of GHGs by more than 150,000 tons per year (TPY) of CO_2-eq[1]. The significance level that would trigger PSD applicability for GHGs is 75,000 TPY of CO_2-eq. The Draft EIS concludes that the project will not trigger PSD, but does not include a complete explanation of how the contemporaneous decreases (from the shutdowns) will result in a net emissions increase that will not be considered significant for PSD. **USEPA-04**

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[1] CO_2-eq = CO_2 equivalent

Response

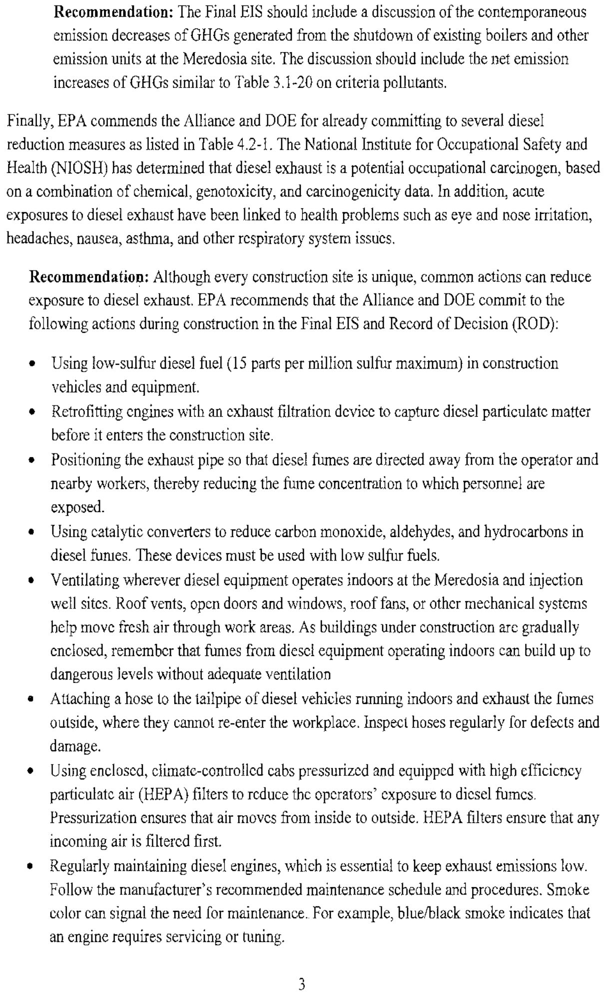
USEPA-01 Thank you for your comment.

USEPA-02 Modeling analysis for particulate matter of 2.5 micrometers or less ($PM_{2.5}$) has been added to Section 3.1, Air Quality, of the Final Environmental Impact Statement (EIS).

USEPA-03 The Department of Energy (DOE) analyzed the impacts of the gross and net emissions of the oxy-combustion facility, with and without taking into account the reduction from historic emissions from the Meredosia Energy Center. This analysis, presented in Section 3.1, Air Quality, of the Draft EIS, indicates that the emissions from the energy center would not violate the National Ambient Air Quality Standards (NAAQS). Based on the analysis, DOE determined that a Prevention of Significant Deterioration (PSD) increment analysis was not required and, therefore, was not conducted. The discussion referred to in the comment has been clarified in Section 3.1, Air Quality, of the Final EIS, specifically in Section 3.1.3.2 under Emissions Analysis.

USEPA-04 A discussion of the contemporaneous decreases in net greenhouse gas (GHG) emissions from the Meredosia Energy Center operations in relation to the PSD significance increase threshold has been added to Section 3.2, Climate and Greenhouse Gases, of the Final EIS, specifically in Section 3.2.3.2 under GHG Emissions Impact Summary in Relation to Historical Baseline Conditions at the Meredosia Energy Center.

Commentor - USEPA



Recommendation: The Final EIS should include a discussion of the contemporaneous emission decreases of GHGs generated from the shutdown of existing boilers and other emission units at the Meredosia site. The discussion should include the net emission increases of GHGs similar to Table 3.1-20 on criteria pollutants.

USEPA-04 ***con't***

Finally, EPA commends the Alliance and DOE for already committing to several diesel reduction measures as listed in Table 4.2-1. The National Institute for Occupational Safety and Health (NIOSH) has determined that diesel exhaust is a potential occupational carcinogen, based on a combination of chemical, genotoxicity, and carcinogenicity data. In addition, acute exposures to diesel exhaust have been linked to health problems such as eye and nose irritation, headaches, nausea, asthma, and other respiratory system issues.

Recommendation: Although every construction site is unique, common actions can reduce exposure to diesel exhaust. EPA recommends that the Alliance and DOE commit to the following actions during construction in the Final EIS and Record of Decision (ROD):

- Using low-sulfur diesel fuel (15 parts per million sulfur maximum) in construction vehicles and equipment.
- Retrofitting engines with an exhaust filtration device to capture diesel particulate matter before it enters the construction site.
- Positioning the exhaust pipe so that diesel fumes are directed away from the operator and nearby workers, thereby reducing the fume concentration to which personnel are exposed.
- Using catalytic converters to reduce carbon monoxide, aldehydes, and hydrocarbons in diesel fumes. These devices must be used with low sulfur fuels.
- Ventilating wherever diesel equipment operates indoors at the Meredosia and injection well sites. Roof vents, open doors and windows, roof fans, or other mechanical systems help move fresh air through work areas. As buildings under construction are gradually enclosed, remember that fumes from diesel equipment operating indoors can build up to dangerous levels without adequate ventilation
- Attaching a hose to the tailpipe of diesel vehicles running indoors and exhaust the fumes outside, where they cannot re-enter the workplace. Inspect hoses regularly for defects and damage.
- Using enclosed, climate-controlled cabs pressurized and equipped with high efficiency particulate air (HEPA) filters to reduce the operators' exposure to diesel fumes. Pressurization ensures that air moves from inside to outside. HEPA filters ensure that any incoming air is filtered first.
- Regularly maintaining diesel engines, which is essential to keep exhaust emissions low. Follow the manufacturer's recommended maintenance schedule and procedures. Smoke color can signal the need for maintenance. For example, blue/black smoke indicates that an engine requires servicing or tuning.

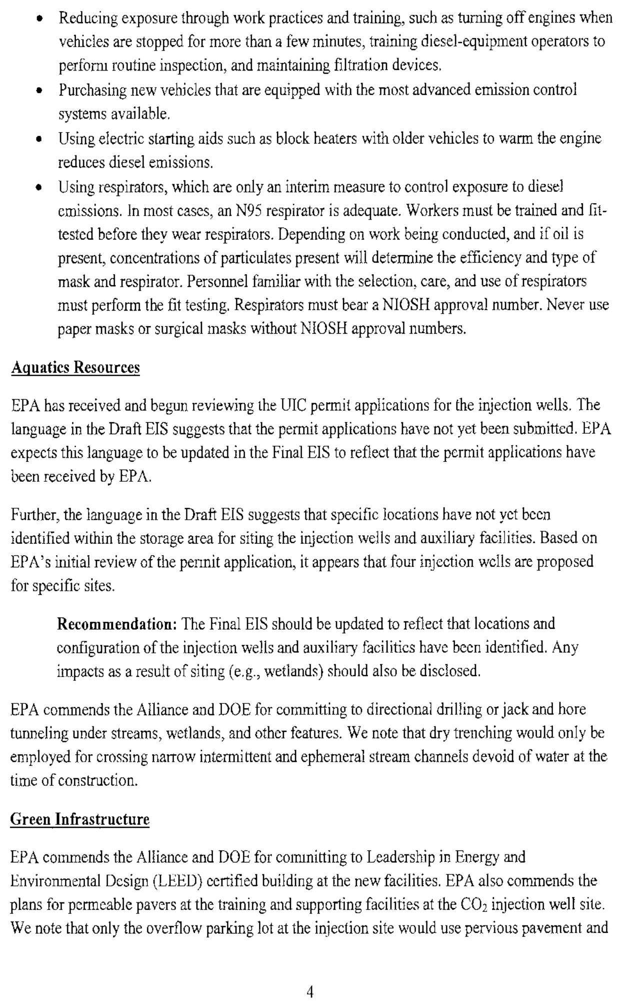
USEPA-05

3

Response

USEPA-05 Thank you for your comment. DOE and the Alliance have given close consideration to the United States Environmental Protection Agency's (USEPA's) recommended measures to reduce pollutant emissions during construction for the FutureGen 2.0 Project. The Alliance would minimize worker exposures to diesel emissions to the fullest extent practicable, along with following best management practices and meeting all regulatory requirements. The Alliance maintains a strong safety focus and implementation of these and other best management practices would allow the Alliance to prevent workplace accidents and exposures to potentially hazardous materials. The Alliance is committed to developing and implementing workplace safety measures including reducing exposure to diesel fuel emissions. The actions committed to by the Alliance and DOE are presented in Table 4.2-1 (under Air Quality) and in Section 3.1.3 of the Draft EIS. DOE believes these measures will adequately protect worker and public health.

Commentor - USEPA



- Reducing exposure through work practices and training, such as turning off engines when vehicles are stopped for more than a few minutes, training diesel-equipment operators to perform routine inspection, and maintaining filtration devices.
- Purchasing new vehicles that are equipped with the most advanced emission control systems available.
- Using electric starting aids such as block heaters with older vehicles to warm the engine reduces diesel emissions.
- Using respirators, which are only an interim measure to control exposure to diesel emissions. In most cases, an N95 respirator is adequate. Workers must be trained and fit-tested before they wear respirators. Depending on work being conducted, and if oil is present, concentrations of particulates present will determine the efficiency and type of mask and respirator. Personnel familiar with the selection, care, and use of respirators must perform the fit testing. Respirators must bear a NIOSH approval number. Never use paper masks or surgical masks without NIOSH approval numbers.

USEPA-05 ***con't***

Aquatics Resources

EPA has received and begun reviewing the UIC permit applications for the injection wells. The language in the Draft EIS suggests that the permit applications have not yet been submitted. EPA expects this language to be updated in the Final EIS to reflect that the permit applications have been received by EPA.

Further, the language in the Draft EIS suggests that specific locations have not yet been identified within the storage area for siting the injection wells and auxiliary facilities. Based on EPA's initial review of the permit application, it appears that four injection wells are proposed for specific sites.

> **Recommendation:** The Final EIS should be updated to reflect that locations and configuration of the injection wells and auxiliary facilities have been identified. Any impacts as a result of siting (e.g., wetlands) should also be disclosed.

USEPA-06

EPA commends the Alliance and DOE for committing to directional drilling or jack and bore tunneling under streams, wetlands, and other features. We note that dry trenching would only be employed for crossing narrow intermittent and ephemeral stream channels devoid of water at the time of construction.

USEPA-07

Green Infrastructure

EPA commends the Alliance and DOE for committing to Leadership in Energy and Environmental Design (LEED) certified building at the new facilities. EPA also commends the plans for permeable pavers at the training and supporting facilities at the CO_2 injection well site. We note that only the overflow parking lot at the injection site would use pervious pavement and

USEPA-08

4

Response

USEPA-06 DOE updated the Final EIS to reflect the locations and configuration of injection wells and associated facilities based on the Underground Injection Control (UIC) Class VI permit applications submitted by the Alliance on March 15, 2013 (updated May 13, 2013 following USEPA's completeness review). New text has been added in Section 2.5.2.1 describing the proposed injection well site as depicted on Figure 2-20. The descriptions of impacts for injection well sites have been updated where appropriate in the Final EIS; however, none of the impacts would be greater than those described in the Draft EIS for the bounding conditions and assumptions about the sites.

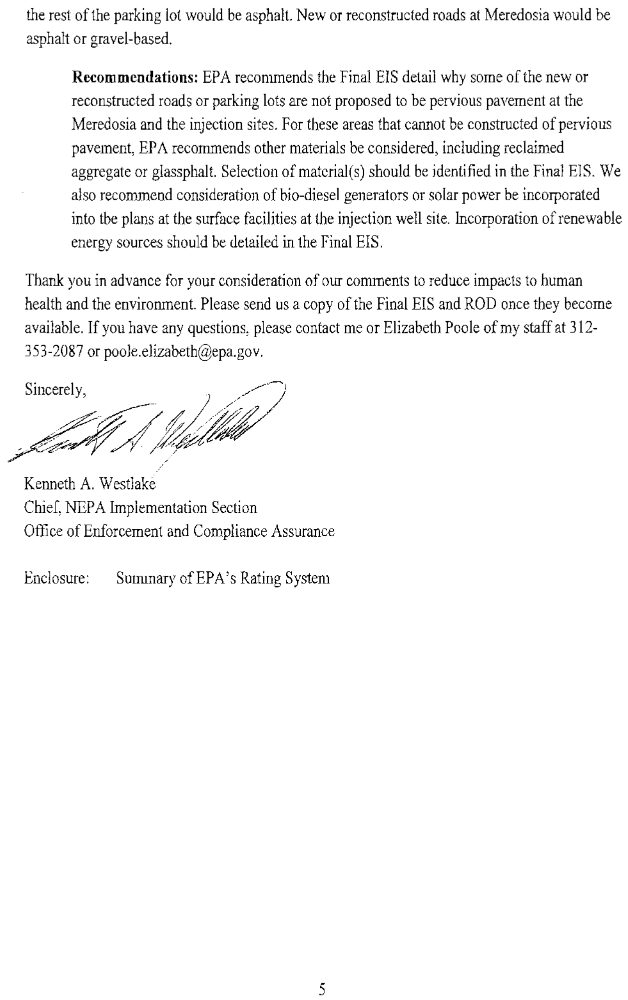
USEPA-07 Thank you for your comment.

USEPA-08 Thank you for your comments. DOE and the Alliance continue to collaborate on the incorporation of green design concepts into FutureGen 2.0 facilities with the objective of obtaining Leadership in Energy and Environmental Design (LEED) certification. The Alliance considered the use of pervious pavement wherever possible in its conceptual designs and will continue to consider this option as the detailed design progresses. In areas where impervious pavement must be used, the Alliance will consider using reclaimed aggregate or glassphalt (a variety of asphalt that uses crushed glass). Reasons why the Alliance has not proposed the use of pervious pavement in some areas at this time include:

- Some roads and parking areas need to be built to handle very heavy construction traffic. Pervious pavement typically has permeable gravel underneath; but for construction equipment, it is preferable that the underlying layer be "road pack" gravel to withstand heavy construction traffic. When construction is complete, only a thin layer of asphalt would be placed over the compacted rock that makes up the construction traffic areas. Similarly, the injection well and monitoring well pads also require a compacted, impermeable gravel layer as a base.
- At this stage of design, the Alliance has not determined the infiltration potential of the affected soils. If, as expected, clayey soils underlie the areas to be paved, there may be difficulty in obtaining the proper infiltration rates. Water should be able to infiltrate quickly so as to protect the road surfaces from freeze and thaw effects.
- Hard pavement is required in some areas in order to support ice and snow removal by snowplows, which can damage some permeable pavements.

With respect to the use of solar power at the injection well surface facilities, the planned site control and maintenance building is small in size and would be nestled behind southerly trees to minimize

Commentor - USEPA



the rest of the parking lot would be asphalt. New or reconstructed roads at Meredosia would be asphalt or gravel-based.

> **Recommendations:** EPA recommends the Final EIS detail why some of the new or reconstructed roads or parking lots are not proposed to be pervious pavement at the Meredosia and the injection sites. For these areas that cannot be constructed of pervious pavement, EPA recommends other materials be considered, including reclaimed aggregate or glassphalt. Selection of material(s) should be identified in the Final EIS. We also recommend consideration of bio-diesel generators or solar power be incorporated into the plans at the surface facilities at the injection well site. Incorporation of renewable energy sources should be detailed in the Final EIS.

Thank you in advance for your consideration of our comments to reduce impacts to human health and the environment. Please send us a copy of the Final EIS and ROD once they become available. If you have any questions, please contact me or Elizabeth Poole of my staff at 312-353-2087 or poole.elizabeth@epa.gov.

Sincerely,

Kenneth A. Westlake
Chief, NEPA Implementation Section
Office of Enforcement and Compliance Assurance

Enclosure: Summary of EPA's Rating System

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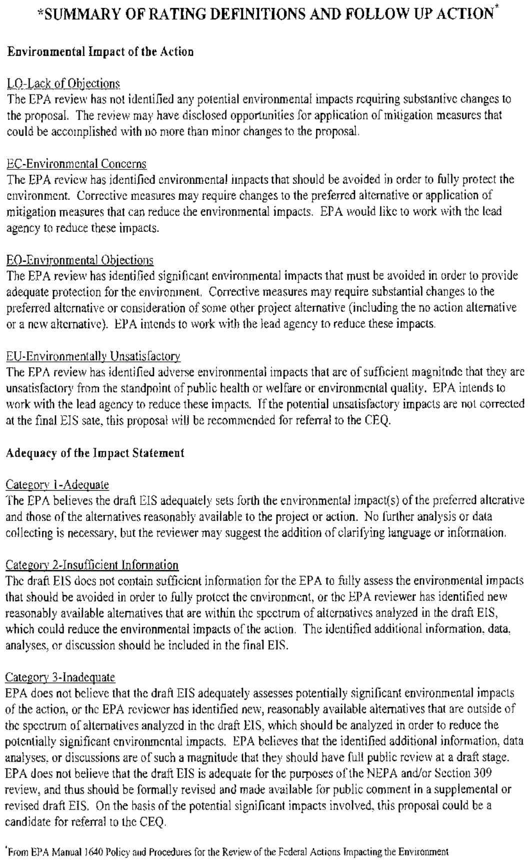
USEPA-08
con't

Response

visual impacts on the surrounding landowners; hence, solar power may not be sufficiently effective. The Alliance will investigate and consider the use of bio-diesel generators at the injection well site. As noted in the Draft EIS, the Alliance is considering the use of photovoltaic solar panels with battery storage at each monitoring well location. This would decrease the total construction impact in supplying power by overhead electric lines, although it would entail higher maintenance costs and activity over the life of the project due to battery maintenance and solar cell cleaning.

Commentor - USEPA



SUMMARY OF RATING DEFINITIONS AND FOLLOW UP ACTION

Environmental Impact of the Action

LO-Lack of Objections
The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC-Environmental Concerns
The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impacts. EPA would like to work with the lead agency to reduce these impacts.

EO-Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU-Environmentally Unsatisfactory
The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS sate, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1-Adequate
The EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alterative and those of the alternatives reasonably available to the project or action. No further analysis or data collecting is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2-Insufficient Information
The draft EIS does not contain sufficient information for the EPA to fully assess the environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3-Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640 Policy and Procedures for the Review of the Federal Actions Impacting the Environment

Response

Commentor - USDOI	Response

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Custom House, Room 244
200 Chestnut Street
Philadelphia, Pennsylvania 19106-2904

IN REPLY REFER TO:

June 17, 2013

9043.1
ER 13/0293

Cliff Whyte, Director, Environmental Compliance Division
Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880

Re: Draft Environmental Impact Statement (DEIS) Department of Energy (DOE), FutureGen 2.0 Program; (DOE/EIS-0460D), Morgan, Christian, and/or Douglas Counties, Illinois.

Dear Mr. Whyte:

The U.S. Department of the Interior (Department) has reviewed the referenced DEIS. This response is provided in accordance with provisions of the National Environmental Policy Act (NEPA) of 1969 (83 Stat. 852; 42 U.S.C. 4321 et seq.), the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d), the Migratory Bird Treaty Act (MBTA) (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The proposed project would be located in Morgan County, Illinois, and involves the construction and operation of a 168-megawatt gross output coal-fueled electric generation plant using advanced oxy-combustion technology and construction of a new underground pipeline approximately 30 miles long and 12 inches in diameter to transport captured CO_2 from the generation plant to a geologic storage area in eastern Morgan County, approximately 4,000 to 4,500 feet below the ground surface. The proposed project will also employ systems for the monitoring, verification, and accounting of the CO_2 being permanently stored in the Mount Simon geologic formation.

Commentor - USDOI

Fish and Wildlife Resources

USDOI-01

Information in the DEIS indicates that the Southern pipeline route will cross 2 perennial streams, 89 intermittent streams, and will impact no wetlands and that the Northern pipeline route will cross 8 perennial streams, 75 intermittent streams, and potentially impact 0.2 acres of wetlands. We would recommend that impacts to wetlands be avoided or impacts minimized to the greatest extent possible. Activities in the project area that would alter these wetlands may require a Section 404 permit from the US Army Corps of Engineers. Pipelines installed in wetland areas and at stream crossings should be directional bored rather than trenched if possible and installed with sufficient depth below stream bottoms so that they will not become exposed.

USDOI-02

According to the DEIS (Table 3.8-4), 33 acres of forested habitat may potentially be lost at the Meredosia Energy Center, 8 acres of forested habitat may potentially be lost along the proposed Southern CO_2 pipeline route, and 21 acres of forested habitat may potentially be lost along the proposed Northern CO_2 pipeline route. We are concerned about the potential loss of forested habitat from the proposed project and the potential impact to the Indiana bat and migratory birds. We recommend that forest impacts be minimized or avoided if possible.

- Table 4.1-1. Summary of Environmental Impacts by Alternative for the FutureGen 2.0 Project: The Biological Resources Section discusses clearing of forested habitats and habitat fragmentation along the proposed pipeline routes; however, this section does not include a discussion regarding the potential clearing of 33 acres of forested habitat at the Meredosia Energy Center. The potential habitat loss at the Meredosia Energy Center should be discussed in this section.

Federally Threatened and Endangered Species

USDOI-03

To facilitate compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, Federal agencies are required to obtain from the US Fish and Wildlife Service (USFWS) information concerning any species, listed or proposed to be listed, which may be present in the area of the proposed action. The list for Morgan County includes the endangered Indiana bat (*Myotis sodalis*), threatened decurrent false aster (*Boltonia decurrens*), and threatened eastern prairie fringed orchid (*Platanthera leucophaea*). There is no designated critical habitat in the project areas at this time.

A current list of species in Illinois by county can be found at the following website: http://www.fws.gov/midwest/endangered/lists/illinois-cty.html.

Information in the DEIS (Table 3.8-1) indicates that the suitable habitat for the Indiana bat, decurrent false aster, and the eastern prairie fringed orchid exists in the Region of Influence (ROI). According to the DEIS (Table 3.8-4), 33 acres of forested habitat may potentially be lost at the Meredosia Energy Center, 8 acres of forested habitat may potentially be lost along the proposed Southern CO_2 pipeline route, and 21 acres of forested habitat may potentially be lost along the proposed Northern CO_2 pipeline route. The USFWS is concerned about the potential loss of forested habitat from the proposed project and the potential impact to the Indiana bat. We

Response

USDOI-01 The southern pipeline route is the Alliance's proposed alternative for the carbon dioxide (CO_2) pipeline. Minor adjustments continue to be made to the route to avoid biological and cultural resources, to avoid constructability issues, and to accommodate the concerns of landowners. The proposed southern route would cross 2 perennial streams, 13 intermittent streams (as classified by the U.S. Geological Survey [USGS]), and many ephemeral streams, swales, and ditches. A wetland survey of the southern pipeline route was completed in spring 2013. The delineation was completed in accordance with the U.S. Army Corps of Engineers (USACE) Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0) along with the Midwest 2012 Final Regional Wetland Plant List (USACE 2010; Lichvar 2012). Based on the delineation, 14 wetland areas (excluding open waters), ranging in size from about 0.02 to 0.1 acre for a total of approximately 0.5 acre of wetland, were identified within the ROW along the approximately 30 miles of pipeline. The Alliance is coordinating with USACE for a determination with respect to wetlands that are considered waters of the U.S. and to identify permitting requirements. The Alliance intends to avoid wetlands by boring under them where appropriate using directional drilling methods described in the Draft EIS in order to meet the requirement of Nationwide Permit No. 12 (Utility Line Activities) that "the activity does not result in the loss of greater than ½-acre of waters of the United States." The Alliance plans to trench through only 0.03 acre of wetland, as authorized by the USACE, in an area that is currently and will return to agriculturally cultivated land. Stream and wetland information has been updated in Section 3.6, Surface Water, Section 3.7, Wetlands and Floodplains, and Section 4.1, Comparative Impacts of Alternatives, of the Final EIS.

USDOI-02 Through ongoing refinements in siting plans, the amount of forested habitat that could be lost will likely be significantly lower than the upper bound identified in the Draft EIS (i.e., 33 acres at the Meredosia Energy Center site and 8 acres along the southern pipeline route). Based on current plans, it is estimated that impacts could range from less than 1 acre to as many as 9 acres of forested lands (depending on availability of construction areas) at the Meredosia Energy Center.

Refinements to the alignment of the southern pipeline route would also avoid forested areas. Where complete avoidance would not be possible, the pipeline would be routed to avoid additional habitat fragmentation by skirting the edges of forest patches or by minimizing the crossing distance at linear forested areas. Some of the linear forested areas would be avoided by boring under them

Commentor - USDOI

recommend that forest impacts be minimized or avoided if possible to reduce impacts to potential habitat for the Indiana bat. If forest impacts are necessary, than we recommend that Indiana bat habitat assessments be conducted in the forested areas potentially impacted by the proposed project in order to assess the value of the habitat to Indiana bats. These results should be coordinated with the USFWS and depending on the results of the habitat assessments it may be necessary to conduct additional acoustic or mist net surveys to ascertain whether Indiana bats occur in the proposed project area.

- Section 3.8.2.5 CO_2 Pipeline: We recommend that the Indiana bat be included in the protected species section since the species could potentially occur within the CO_2 pipeline corridor.

Information in the DEIS indicates that the decurrent false aster is known to occur approximately 1.5 miles northwest and approximately 2.5 miles south of the proposed project area. Surveys of the project area were unclear if the species may or may not be present in the project area. Since the decurrent false aster is known to occur in the vicinity of the project area and given the opportunistic nature of the decurrent false aster to colonize open moist or wet areas that experience natural or man-made disturbances and its ability to disperse over shorter distances by seeds carried by wind or animals, we recommend that additional surveys for the decurrent false aster be conducted in areas of suitable habitat within the ROI. Should the species be found, than additional coordination with the USFWS should occur.

USDOI-03
con't

Information in the DEIS indicates that it is possible that the eastern prairie fringed orchid could occur in lowland or wetland areas in the ROI. We recommend that searches for this species be conducted if wet prairie remnants are encountered in the ROI. Should the species be found, than additional coordination with the USFWS should occur.

In accordance with section 7 of the Endangered Species Act, it is the responsibility of the Federal action agency; in this case the DOE, to determine if the action may adversely affect listed species. If the DOE determines that the action is not likely to adversely affect these listed species, and the USFWS concurs with this finding, section 7 consultation is concluded. If it is determined that the action may adversely affect listed species, the DOE is required to initiate formal section 7 consultation with the USFWS. At the conclusion of formal consultation, the Service issues a biological opinion that determines whether the action is likely to jeopardize the continued existence of the listed species. Biological opinions also may contain measures to minimize the incidental take of listed species resulting from the action.

Migratory Birds

USDOI-04

The forested wetlands along the Illinois River provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which has officially been removed from the List of Endangered and Threatened Species as of August 8, 2007. Although the bald eagle has been removed from the threatened and endangered species list, it continues to be protected under the MBTA and the BGEPA. The USFWS developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations regarding how to minimize potential project impacts to bald eagles, particularly where such impacts may

Response

using directional drilling methods for the pipeline, because they are associated with streams, wetlands, or road crossings. Over the 30-mile pipeline route, there are approximately 10 areas of forested lands, the majority of which would be unaffected because boring under the forested areas would be employed to avoid wetland areas within the forest. Because the forested areas are scattered along the route, the impact at each area would be small and range from about 0.03 acres to 1.7 acres, for an approximate total loss of 6 acres compared to the upper bound of 8 acres provided in the Draft EIS. In all cases, the small areas of forest that would be affected are part of larger swaths of available forested habitat.

The forested areas along the pipeline and at the Meredosia Energy Center site would be cleared between September and February to avoid disturbing the Indiana bat and migratory birds. Based on the revised estimate of affected forested lands in the Final EIS and because only a small amount of forested habitat would be affected in relation to the available habitat in the region, DOE does not consider that a conservation plan for restoration and enhancement of migratory bird habitat in the vicinity of project area would be warranted. In consideration of the reduced forest acreage impacts, the USFWS concurred with DOE's position at a meeting held on June 28, 2013.

DOE has updated Section 3.8, Biological Resources, and Section 4.1, Comparative Impacts of Alternatives, of the Final EIS to reflect the most recent data. Table 4.1-1 has been revised to list the acreages of forest habitat that would be lost permanently for construction at the Meredosia Energy Center, the Alliance's proposed southern CO_2 pipeline route, and the alternative northern CO_2 pipeline route. Text has also been added for "Biological Resources" under "Construction" in Table 4.1-1, summarizing the impacts on forests and explaining how potential impacts would be reduced as discussed in this response.

USDOI-03 DOE has been engaged in ongoing consultations with the U.S. Fish and Wildlife Service (USFWS) regarding updates to the project footprint and the status of threatened or endangered species surveys. Also, DOE will continue to consult with the Illinois Department of Natural Resources regarding state-listed species. DOE is preparing a Biological Assessment for submission to the USFWS that addresses the three federally-listed species for which suitable habitat occurs in the project area: the Indiana bat, decurrent false aster, and eastern prairie fringed orchid. In the spring and summer of 2013, Indiana bat habitat assessment surveys were completed at the Meredosia Energy Center and along the current southern pipeline route. Bat

Commentor - USDOI

constitute “disturbance,” which is prohibited by the BGEPA. A copy of the guidelines is available at:

http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BaldEagle/NationalBaldEagleManagementGuidelines.pdf

The USFWS is unaware of any bald eagle nests in the proposed project area; however, given that there is suitable habitat within the ROI we recommend that surveys be conducted to ascertain whether bald eagle nests occur in the proposed project area or vicinity of the proposed project area. If a bald eagle nest is found then the USFWS should be contacted and the guidelines implemented.

In addition to habitat for bald eagles, habitat for a variety of other migratory birds species also occur in the project vicinity. This includes the Illinois River, the forested habitat along the Illinois River, and Meredosia National Wildlife Refuge. We are concerned about the potential loss of forested habitat from the proposed project and the potential impact to migratory bird trust resources. Per Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds), appropriate measures should be taken during construction to avoid or minimize take of migratory birds. In addition, the USFWS recommends that a conservation plan be developed to restore or enhance migratory bird habitat in the vicinity of the project area to mitigate for any forested habitat loss caused by the proposed project.

USDOI-04
con’t

Consultation

Questions or comments for the USFWS can be directed to Mr. Matt Mangan at the Ecological Services Sub-Office, 8588 Route 148, Marion, Illinois 62959-4555; telephone 618-997-3344, ext. 345; facsimile: 618-997-8961.

Conclusion

Given the increased potential for impacts upon fish and wildlife resources from the proposed Northern pipeline route, the USFWS would concur with the Southern pipeline route as the preferred option.

We appreciate the opportunity to review the DEIS and provide these comments.

USDOI-05

Sincerely,

Lindy Nelson
Regional Environmental Officer

Response

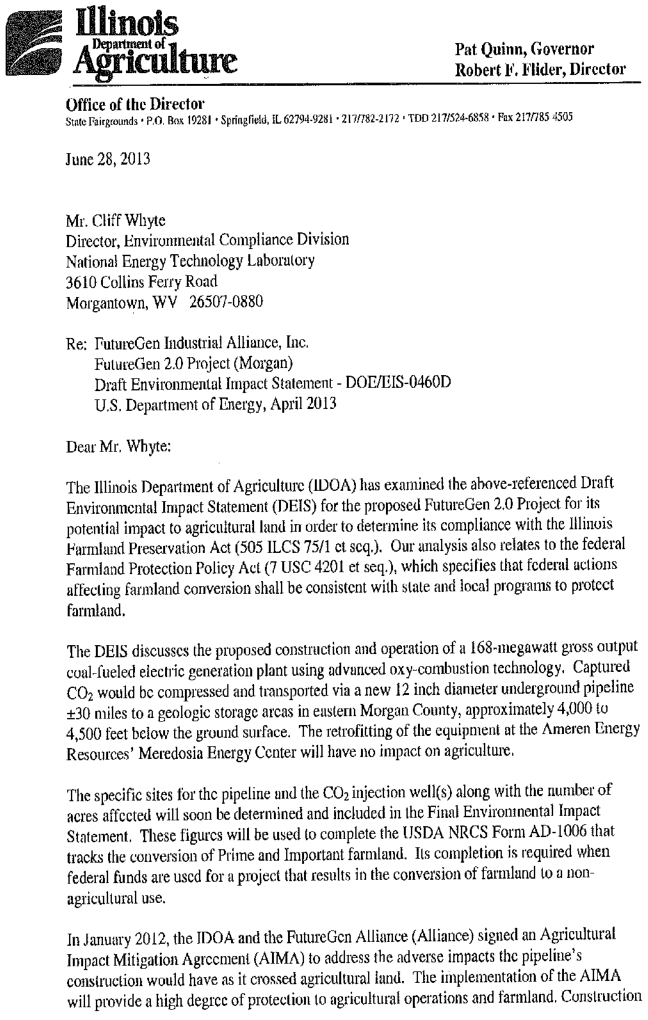
surveys were conducted according to methods outlined in the 2013 Indiana Bat Summer Survey Guidance Overview (USFWS 2013). As described in response to Comment USDOI-02, the affected forested areas would be limited in size as practicable, and all affected areas would be adjacent to larger areas of available forest habitat. Decurrent false aster surveys will be conducted during flowering in autumn 2013 where potential habitat has been identified in the areas that would be impacted by project activities. DOE oversaw an initial survey for the eastern prairie fringed orchid in the project area where potential habitat was identified. The soil types found in this area are not suitable for this species, and no individuals were found.

Appendix E to the Final EIS has been updated to include the status of surveys completed since the Draft EIS was published. The Biological Assessment was not yet completed for inclusion in the Final EIS. However, DOE understands its obligations under Section 7 of the Endangered Species Act to determine whether the proposed action may adversely affect listed species. Based on the progress of the Biological Assessment at publication of the Final EIS, DOE believes that the proposed action is not likely to adversely affect any of the listed species. The Biological Assessment, when submitted, will inform DOE’s final determination and will identify measures as appropriate to minimize impacts to federally listed species. The Biological Assessment would also support the USFWS in issuing its Biological Opinion for the project, if one is needed.

USDOI-04 DOE conducted bald eagle surveys on the Meredosia Energy Center site in June 2013 and determined that there are no nesting bald eagles onsite. These results will be communicated to USFWS in the Biological Assessment as part of the Section 7 consultations. As described in response to Comment USDOI-02, the forested acreage expected to be disturbed has been substantially reduced, and the forested areas along the pipeline and at the Meredosia Energy Center site would be cleared between September and February to avoid disturbances to the Indiana bat and migratory birds. Because only a small amount of forested habitat would be affected in relation to the available habitat in the region, DOE does not consider that a conservation plan for restoration and enhancement of migratory bird habitat in the vicinity of the project area would be warranted as was suggested in the comment.

USDOI-05 DOE and the Alliance appreciate the concerns of the USDOI regarding the potential impacts of the FutureGen 2.0 Project on fish and wildlife resources, threatened and endangered species, and migratory birds. This is one of the factors that led to selection of the southern option as the proposed pipeline route.

Commentor IDOA



Illinois Department of Agriculture
Pat Quinn, Governor
Robert F. Flider, Director

Office of the Director
State Fairgrounds • P.O. Box 19281 • Springfield, IL 62794-9281 • 217/782-2172 • TDD 217/524-6858 • Fax 217/785 4505

June 28, 2013

Mr. Cliff Whyte
Director, Environmental Compliance Division
National Energy Technology Laboratory
3610 Collins Ferry Road
Morgantown, WV 26507-0880

Re: FutureGen Industrial Alliance, Inc.
FutureGen 2.0 Project (Morgan)
Draft Environmental Impact Statement - DOE/EIS-0460D
U.S. Department of Energy, April 2013

Dear Mr. Whyte:

The Illinois Department of Agriculture (IDOA) has examined the above-referenced Draft Environmental Impact Statement (DEIS) for the proposed FutureGen 2.0 Project for its potential impact to agricultural land in order to determine its compliance with the Illinois Farmland Preservation Act (505 ILCS 75/1 et seq.). Our analysis also relates to the federal Farmland Protection Policy Act (7 USC 4201 et seq.), which specifies that federal actions affecting farmland conversion shall be consistent with state and local programs to protect farmland.

The DEIS discusses the proposed construction and operation of a 168-megawatt gross output coal-fueled electric generation plant using advanced oxy-combustion technology. Captured CO_2 would be compressed and transported via a new 12 inch diameter underground pipeline ±30 miles to a geologic storage areas in eastern Morgan County, approximately 4,000 to 4,500 feet below the ground surface. The retrofitting of the equipment at the Ameren Energy Resources' Meredosia Energy Center will have no impact on agriculture.

The specific sites for the pipeline and the CO_2 injection well(s) along with the number of acres affected will soon be determined and included in the Final Environmental Impact Statement. These figures will be used to complete the USDA NRCS Form AD-1006 that tracks the conversion of Prime and Important farmland. Its completion is required when federal funds are used for a project that results in the conversion of farmland to a non-agricultural use.

IDOA-01

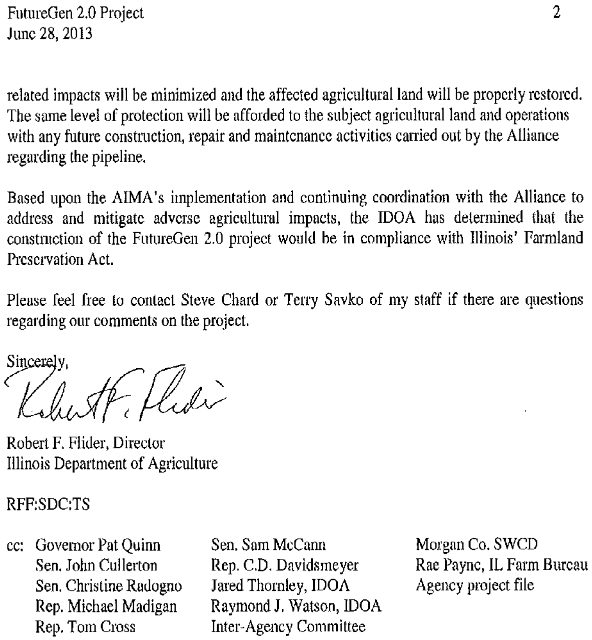
In January 2012, the IDOA and the FutureGen Alliance (Alliance) signed an Agricultural Impact Mitigation Agreement (AIMA) to address the adverse impacts the pipeline's construction would have as it crossed agricultural land. The implementation of the AIMA will provide a high degree of protection to agricultural operations and farmland. Construction

Response

IDOA-01 Thank you for your comment. The Final EIS has been updated in Section 3.3, Physiography and Soils, and Section 4.1, Comparative Impacts of Alternatives, to identify the acreage of prime farmland that would be affected based on the proposed injection well site and final CO_2 pipeline route. Also, DOE added the AIMA to the Final EIS as Appendix H. If required, DOE and the Alliance will work with the State NRCS office to complete the USDA NRCS Forms AD-1006. DOE understands that the forms may not be required for lands that would be leased only during the period of construction and returned to their prior use after completion.

Commentor IDOA

Response



FutureGen 2.0 Project 2
June 28, 2013

related impacts will be minimized and the affected agricultural land will be properly restored. The same level of protection will be afforded to the subject agricultural land and operations with any future construction, repair and maintenance activities carried out by the Alliance regarding the pipeline.

Based upon the AIMA's implementation and continuing coordination with the Alliance to address and mitigate adverse agricultural impacts, the IDOA has determined that the construction of the FutureGen 2.0 project would be in compliance with Illinois' Farmland Preservation Act.

IDOA-01
con't

Please feel free to contact Steve Chard or Terry Savko of my staff if there are questions regarding our comments on the project.

Sincerely,

Robert F. Flider

Robert F. Flider, Director
Illinois Department of Agriculture

RFF:SDC:TS

cc: Governor Pat Quinn
Sen. John Cullerton
Sen. Christine Radogno
Rep. Michael Madigan
Rep. Tom Cross
Sen. Sam McCann
Rep. C.D. Davidsmeyer
Jared Thornley, IDOA
Raymond J. Watson, IDOA
Inter-Agency Committee
Morgan Co. SWCD
Rae Payne, IL Farm Bureau
Agency project file

UNITED STATES DEPARTMENT OF ENERGY

IN RE:

FUTUREGEN 2.0 DRAFT

ENVIRONMENTAL IMPACT STATEMENT

PUBLIC COMMENT MEETING

MAY 21, 2013

I N D E X

UNITED STATES DEPARTMENT OF ENERGY

IN RE:

FUTUREGEN 2.0 DRAFT

ENVIRONMENTAL IMPACT STATEMENT

PUBLIC COMMENT MEETING, on the 21st day of May, 2013, between the hours of 5:00 P.M. and 7:15 P.M. of that day, at the Jacksonville High School, 1211 North Diamond Street, Jacksonville, Illinois 62650, before Robin A. Enstrom, Registered Professional Reporter, Certified Shorthand Reporter, and a Notary Public within and for the State of Illinois.

A P P E A R A N C E S

UNITED STATES DEPARTMENT OF ENERGY:
Mr. Cliff Whyte
Mr. Jeff Hoffmann
Mr. Tom Sarkus
Mr. Nelson Rekos

FUTUREGEN ALLIANCE:
Mr. Ken Humphreys
Mr. Tyler Gilmore
Ms. Gretchen Hund

POTOMAC-HUDSON ENGINEERING:

Mr. Fred Carey
Ms. Melissa Sanford
Ms. Andrea Wilkes
Ms. Jamie Martin-McNaughton

Court Reporter:
Robin A. Enstrom, RPR, CSR
Illinois CSR #084-002046
Midwest Litigation Services
15 S. Old State Capitol Plaza
Springfield, Illinois 62701
217.522.2211
800.280.3376

* * * * * * *

(Meeting commenced at 6:12 P.M.)

MR. WHYTE: At this time we will go on the record.

Let the record show that the meeting began on May 21, 2013, at approximately 6:10, at the Jacksonville High School in Jacksonville, Illinois.

First, I want to thank the high school for allowing us to use the facility and thank all those who have come out this evening to hopefully provide some comments and pick up additional information on the project.

As part of our compliance with the National Environmental Policy Act -- you'll hear it referred to as NEPA several times this evening -- DOE determined that an environmental impact statement or EIS should be prepared for this project. The scoping process included public meetings that were held in June of 2011. Your comments that were provided during that time were used as a guide in preparing the draft EIS that's now available.

The purpose of tonight's meeting is to provide an opportunity for oral comments on the draft EIS. For your convenience, comment sheets are available on the table in the back. These sheets are located at several DOE exhibits. Oral and written comments will be given equal consideration, and the comment sheets can be sent in to DOE. The return address is on them and can be submitted anytime before June 17th.

In case you were unable to meet everyone during the informal session this evening, I'd like to introduce a few of the representatives that we have here this evening.

First of all, from the Department of Energy, I have the director of the FutureGen program, Tom Sarkus, and we also have the two federal project managers, Nelson Rekos and Jeffrey Hoffmann.

I'd also like to introduce Mr. Ken Humphreys, the CEO of the FutureGen Alliance. Gretchen Hund, who is the stakeholder involvement coordinator. There she is. Tyler Gilmore is the senior geologist. He's there in the back.

Also like to acknowledge some of the folks who have come out this evening: Dick

Rawlings, county commissioner; Steve Warmowski, city council; Andy Ezard, Gordon Jumper, Brad Zeller, Terry Denison, the Jacksonville Area Regional Development; and Ginny Fanning with the Chamber of Commerce.

And, once again, I appreciate everyone in the public who's come out this evening.

We will now -- also like to acknowledge from Potomac-Hudson Engineering -- they're the contractor who is working with the Department of Energy -- several other folks who do an outstanding job. We have with us tonight Mr. Fred Carey, Andrea Wilkes, Melissa Sanford, and Jamie Martin-McNaughton.

At this time I was going to see if Mr. Humphreys would give us a brief update on the project.

MR. HUMPHREYS: Well, thanks.

First of all, I just really want to thank all of you for taking time out of your evening to be here tonight, and while I'm going to talk for a few minutes right at the beginning, certainly our primary objective here tonight is to listen to your input that you're providing to the Department of Energy.

And it's been about 24 months since the Department of Energy started the environmental impact statement process. We're, of course, quite pleased with the draft conclusions that suggest the project has very, very low negative environmental impact and significant positive benefits. Ultimately you get to be the judge of that.

But while the environmental impact statement process was ongoing over the past 24 months, our engineering work continued in the background; and we had a tremendous opportunity to learn a lot from the engineering work, learn from the geologic characterization work we did at the storage site and scientific investigations, learn from talking to regulators at various agencies to understand the performance and expectations they have of this project -- we can take those learnings and feed them back into the design -- and, quite importantly, having the opportunity to talk with so many local landowners as well as community leaders. I think they provided valuable perspectives that helped us shape the project.

Next slide, please.

So our goal remains the same, and that is to take the Meredosia Energy Center, which is now an idle plant, and turn it into the cleanest coal-fired power plant in the U.S. and most likely the world.

Next slide, please.

A number of things have been accomplished over the past 24 months. The conceptual design work is complete.

We have a whole portfolio of permit applications that sit in front of various agencies. Behind each of those permit applications is a tremendous amount of engineering work and reflects the learnings of the past two years. So as you can see on the chart, air permit, water permit, permission to connect to the transmission grid, pipeline permit, CO2 storage permit all pending before regulatory agencies.

We've made tremendous strides in terms of acquiring subsurface rights from local

landowners to store the CO2. Talk a little bit more about that later.

We also last December had a major success with the Illinois Commerce Commission when the primary terms of our power purchase agreement were approved. And the power purchase agreement is incredibly important because it governs the long-term sales of electricity from the plant, and it's the basis by which you can get commercial financing to complement the DOE funding to begin to start construction.

And, of course, draft EIS was released.

And right now the second phase of work: $140 million of design and permitting activities are now underway.

Next slide.

So if you don't mind a bit, I have a bit of a bad leg here. So I'm going to take a seat while I go through a few of these slides.

As many of you know, we drilled a geologic characterization well at the storage site over 4,000 feet deep. We spent about $10 million characterizing the geology and getting ourselves comfortable that it's a high quality storage reservoir. That storage reservoir is located about two miles northwest of Old State Road and Route 123. We've been really privileged that more than 45 individual landowners, all through mutual transaction, have agreed to allow us to acquire their subsurface storage site -- space.

Next slide, please.

And so, as we look ahead to next spring, we will complete the permitting and the final designs. Early summer we'll move to commercial financing and construction. By the fall of 2015, the pipeline, the storage site, and, quite importantly, visitor, research, and training facilities here in Jacksonville will be constructed. By the spring of 2017, the power plant will complete construction, and by the fall of that year, will be in full commercial power generation.

Next slide, please.

And so just to wrap up, we're working on building the cleanest coal-fired power plant in the U.S. Some of the local benefits that are

extremely important are the construction and permanent jobs that can be an economic shot in the arm to Morgan County. It increases property tax revenue to the county by million or millions of dollars. We'll be investing more than $25 million in visitor, research, and training facilities in Jacksonville. That leads to expanded educational opportunities, and it also is a -- spurs tourism and other business growth.

And in addition to the local benefits, more broadly in Illinois we have manufacturers and contractors who ultimately support construction. We'll be using Illinois coal. That spurs broader growth across the state. So all in all, in our view, we see this as a win-win project for industry, for the folks in Morgan County, as well as the nation.

And so thanks very much for your time, and I will spend the rest of my evening listening to you.

MR. WHYTE: Thank you, Mr. Humphreys.

I have just a few slides on the NEPA process that we'll move through this evening.

Go ahead, Jamie.

The very, very brief history of NEPA. This is a federal law. It's been effective since 1970. It applies to all federal agencies and major federal actions. It is the national charter for protection of the environment, and it certainly promotes environmental considerations in the decision-making process.

Next slide.

If you haven't had an opportunity to look at the EIS, very briefly you would see there are basically three documents. There is a summary, which is about a 50-page document that is sort of the high-level basics, if you will. There is the Volume I, which happens to be the majority of the analysis and more detail with each resource area that was looked at. And then there is a second volume that is basically the appendixes. It also includes, for those who might be particularly interested in more detail, maps of the CO2 pipeline routing. We tried to provide the best scope so that that could be looked at, and that's included, again, in Volume II.

All those are available online. You can see me after the meeting. I'll be happy to provide with you links. If you would like a copy of any or all of those documents and you have not received one, please let me know. Be happy to get those out to you.

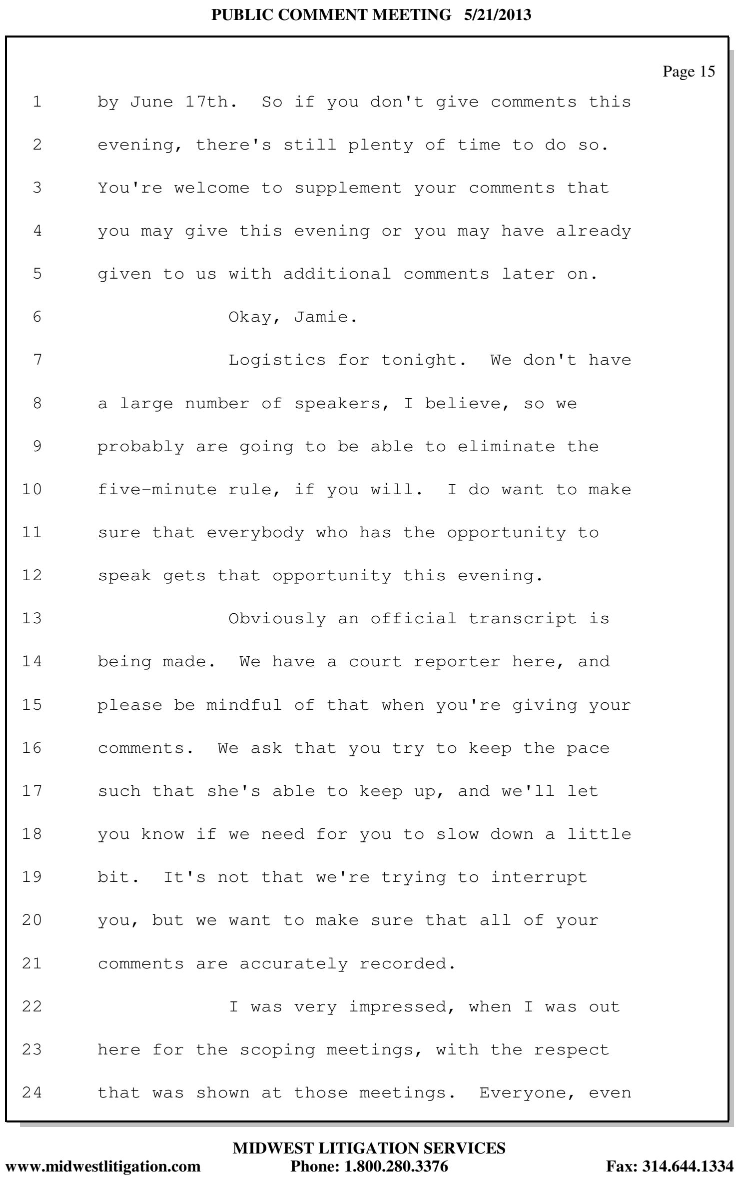
Next slide, please.

As you can see, we are moving through the NEPA process. The scoping meetings that I spoke of earlier that were held a couple years ago -- they were the first public involvement in the process, at least as far as NEPA is concerned.

The public comment period that we're in right now is the second public comment process where we're inviting your participation and comments on the draft documents before they would become final.

You can see the rest of the NEPA process there involves the preparation of the final EIS, then a waiting period of at least 30 days, and then the potential for a ROD or record of decision to be issued at that point.

This is the basic schedule that we are on. As you've heard me say, comments are due



by June 17th. So if you don't give comments this evening, there's still plenty of time to do so. You're welcome to supplement your comments that you may give this evening or you may have already given to us with additional comments later on.

Okay, Jamie.

Logistics for tonight. We don't have a large number of speakers, I believe, so we probably are going to be able to eliminate the five-minute rule, if you will. I do want to make sure that everybody who has the opportunity to speak gets that opportunity this evening.

Obviously an official transcript is being made. We have a court reporter here, and please be mindful of that when you're giving your comments. We ask that you try to keep the pace such that she's able to keep up, and we'll let you know if we need for you to slow down a little bit. It's not that we're trying to interrupt you, but we want to make sure that all of your comments are accurately recorded.

I was very impressed, when I was out here for the scoping meetings, with the respect that was shown at those meetings. Everyone, even

Commentor 1 - Adam Pollet

PUBLIC COMMENT MEETING 5/21/2013

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with different opinions, had the opportunity to speak and all parties were respectful and gave everybody that opportunity. I'll ask that you continue that tonight.

And I guess also, in observing some of the destruction and devastation that has happened in the south over the last couple of days, it kind of puts things into perspective.

At this time I think we will move to our first registered speaker. We'll leave this information up for those who want to write down my e-mail or telephone number to provide comments at a later date.

The first registered speaker this evening is the acting director of DCEO, Adam Pollet.

MR. POLLET: Thank you.

My name is Adam Pollet. I'm the acting director for the Illinois Department of Commerce and Economic Opportunity, and I appreciate the opportunity to make a few remarks here tonight.

Before I begin, I just want to say that, on behalf of the Governor, I'd like to

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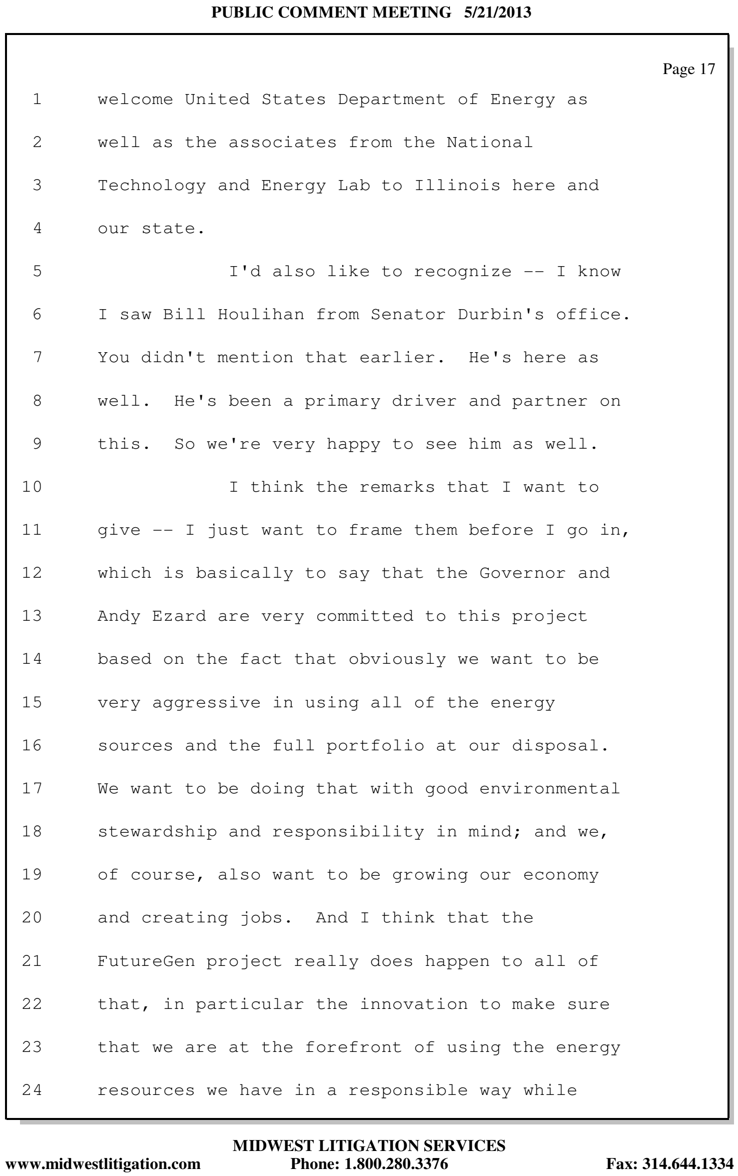
Response

Commentor 1 - Adam Pollet



PUBLIC COMMENT MEETING 5/21/2013

Page 17

welcome United States Department of Energy as well as the associates from the National Technology and Energy Lab to Illinois here and our state.

I'd also like to recognize -- I know I saw Bill Houlihan from Senator Durbin's office. You didn't mention that earlier. He's here as well. He's been a primary driver and partner on this. So we're very happy to see him as well.

I think the remarks that I want to give -- I just want to frame them before I go in, which is basically to say that the Governor and Andy Ezard are very committed to this project based on the fact that obviously we want to be very aggressive in using all of the energy sources and the full portfolio at our disposal. We want to be doing that with good environmental stewardship and responsibility in mind; and we, of course, also want to be growing our economy and creating jobs. And I think that the FutureGen project really does happen to all of that, in particular the innovation to make sure that we are at the forefront of using the energy resources we have in a responsible way while

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1-01

Response

1-01 Thank you for your comment.

Commentor 1 - Adam Pollet	Response
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creating the best jobs for the 21st century economy.

I'd just like to talk a little bit about the project, probably things that you already know but just to lay them out. The FutureGen Alliance is proposing to construct and operate a 168-megawatt, coal-fueled electric generation facility using oxy-combustion technology. The power side of the project will be located at the old Ameren Energy Resources Meredosia plant based in Meredosia. It will use the existing infrastructure and is designed to capture at least 90 percent of the carbon dioxide generated at the plant. The reduced carbon dioxide along with the other emission reductions will make FutureGen, as I think was stated early, the cleanest coal-fueled power plant in the United States, something we're very proud of and love to see happen.

COURT REPORTER: I'm sorry. Can you slow down?

MR. POLLET: Sure. The captured carbon dioxide will be compressed and transported by a new underground pipeline to a geologic

1-01
con't

Commentor 1 - Adam Pollet

Response

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storage area in eastern Morgan County.

As important as the low emission electric generation side of the project is, the storage of the carbon dioxide and its long-term monitoring and verification of its permanent storage is equally important to the viability of future energy generation.

And I think, just to note again, that's obviously where we're very excited to see new technology applied and proven out in this project.

Governor Quinn has made energy conservation and low carbon emission energy a priority in his administration. Illinois has seen significant growth in renewable resources.

And so just to understand, our commitment is very much to a broad portfolio of energy resources. We've invested in battery technology as well to support renewables by making them even more efficient and reliable.

But we do recognize we need a portfolio of energy resources, and the significant reserves of coal under Illinois can play a vital role in providing Illinoisans,

1-01
con't

Commentor 1 - Adam Pollet

Response

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Americans, and others with energy independence.

It is a worthy goal the FutureGen Alliance, the President of the United States, Senator Durbin, Governor Quinn, and the U.S. DOE has set to build a coal plant that operates more cleanly than a natural gas electric generator.

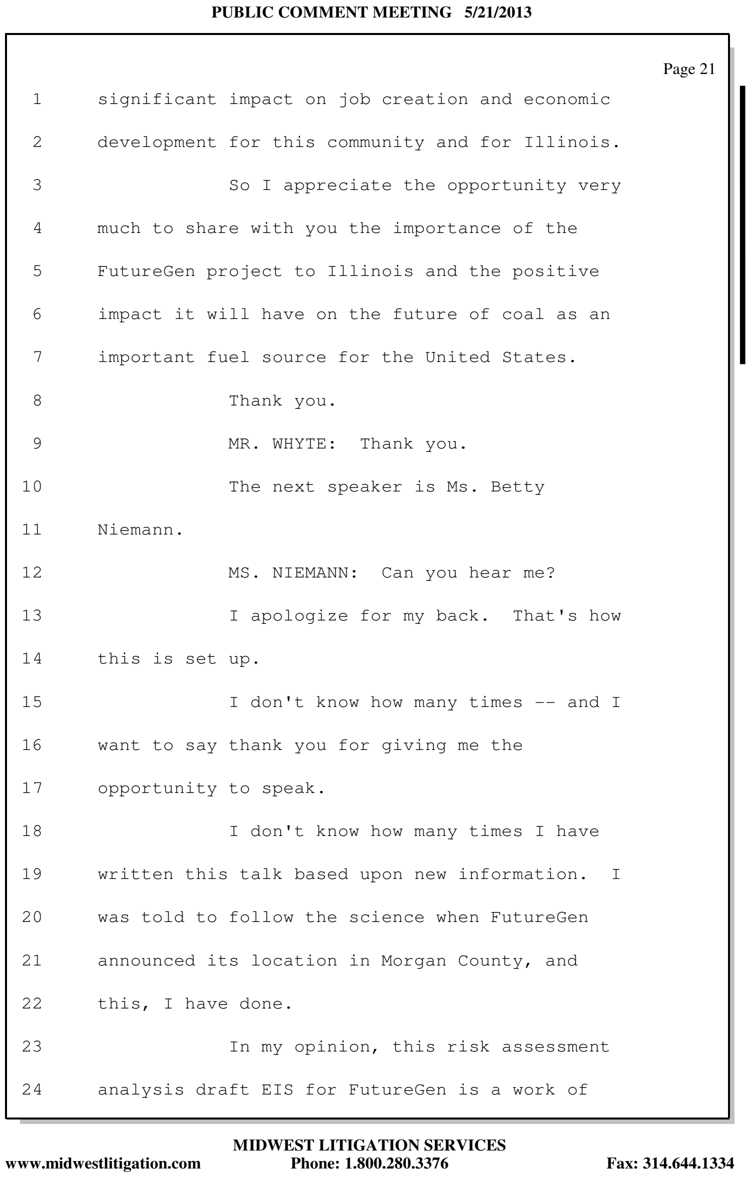
When it comes to thinking -- and this is our pitch for Illinois -- big thoughts and when it comes to innovation, we believe you should do what FutureGen has done -- you should come to Illinois.

In a recent report called Cyerstates, Illinois outpaced the U.S. by adding 3400 tech jobs in 2012. The publisher of the report, a high tech trade association known as the TechAmerica Foundation, also noted that Illinois, with nearly 210,000 jobs in the tech sector, outpaced other Midwest states by a large margin.

So as we try to sustain this important type of economic growth, the scientists of FutureGen -- the engineers, the geologists, the chemists, and the physicists -- they'll also add their names to the TechAmerica jobs roster, and we recognize that this project has a

1-01
con't

Commentor 1 - Adam Pollet; Commentor 2 - Betty Niemann



PUBLIC COMMENT MEETING 5/21/2013

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significant impact on job creation and economic development for this community and for Illinois.

So I appreciate the opportunity very much to share with you the importance of the FutureGen project to Illinois and the positive impact it will have on the future of coal as an important fuel source for the United States.

Thank you.

MR. WHYTE: Thank you.

The next speaker is Ms. Betty Niemann.

MS. NIEMANN: Can you hear me?

I apologize for my back. That's how this is set up.

I don't know how many times -- and I want to say thank you for giving me the opportunity to speak.

I don't know how many times I have written this talk based upon new information. I was told to follow the science when FutureGen announced its location in Morgan County, and this, I have done.

In my opinion, this risk assessment analysis draft EIS for FutureGen is a work of

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1-01 *con't*

2-01

Response

2-01 The Draft EIS identified the incomplete and unavailable information at the time of publication in Section 4.4, Incomplete and Unavailable Information, of the document consistent with the Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations (40 CFR 1502.22). The NEPA regulations also direct agencies to "…integrate the NEPA process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts" (40 CFR 1501.2). The incomplete and unavailable information regards specific design details, several of which have been addressed in the Final EIS. It has long been accepted that the NEPA process can and should be performed during the planning phase of a project, before detailed designs are complete and final decisions about site plans and layouts have been made.

The NEPA regulations allow for decisions to be made in the absence of information relevant to reasonably foreseeable significant environmental impacts, provided that the agency takes the specific steps (under 40 CFR 1502.22(b)) outlined in the four bullets listed at the beginning of Section 4.4, Incomplete and Unavailable Information, of the Draft EIS. The fourth item under 40 CFR 1502.22(b)(4) supports agency "…evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community." As further stated in Section 4.4, Incomplete and Unavailable Information, "To account for uncertainties caused by incomplete and unavailable information, DOE developed bounding conditions and assumptions based on the most current and available data and project plans in evaluating the range of potential impacts that could occur under the proposed project consistent with the fourth item in the list above." This approach ensures informed decision-making. The balance of Section 4.4, Incomplete and Unavailable Information, identifies the nature of the incomplete and unavailable information and explains how the potential impacts were analyzed consistent with the regulations in the absence of the information.

The Final EIS includes additional information for some of the items identified in Section 4.4, Incomplete and Unavailable Information, which has not substantially affected the analyses and descriptions of impacts. Section 4.4, Incomplete and Unavailable Information, has been updated in the Final EIS to reflect the status of information at the time of Final EIS publication, and the analyses in Chapter 3 and 4 have been updated as appropriate. Table S-1 in the Summary outlines the major changes from the Draft to the Final EIS, some of

Commentor 2 - Betty Niemann

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opinion and conjecture because of missing data identified in Section 4.4 of Chapter 1 or Volume I. The data -- the missing data is the oxy-combustion large scale test design; the oxy-combustion large scale test general arrangement and site plan; CO2 pipeline routes; CO2 injection and monitoring wells, specifically location and actual number of acres in the storage area; and the educational facilities.

I believe these are key components of the entire project and are very crucial for valid site-specific EIS risk assessments in order for the DOE to make an informed, educated, and valid decision. Instead, the DOE made general risk assessments, and FutureGen announced an opinion that the project will have no significant impacts based on the EIS summary. If anything, I believe the omission of this data casts more doubts of the validity of the project.

2-01 *con't*

By the way, region of influence is missing data for three adjacent counties -- Greene, Macoupin, and Sangamon Counties -- and should also be identified in Section 4.4 and included in all pertinent region of influence

2-02

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Response

which reflect the availability of new information and data.

2-02 DOE defined the Region of Influence (ROI) as appropriate for each respective environmental resource in Chapter 3 of the Draft EIS. As stated in the text box on page 3.0-1, "The Region of Influence (ROI) defines the extent of the areas where direct effects from construction and operation may be experienced, and it encompasses the areas where indirect effects from the proposed project would most likely occur." Because the spatial effects of the project would differ depending upon the specific resource in question, a single ROI was not considered appropriate for all resources. For example, potential impacts on cultural resources would occur at locations of direct land disturbance and within the viewshed of project structures, while potential impacts on air quality would occur on a regional scale.

The ROI for socioeconomic impacts was defined in Section 3.18.1.1 of the Draft EIS to include the counties of Morgan, Brown, Cass, Pike, and Scott. The counties of Greene, Macoupin, and Sangamon were omitted from the ROI based on the distances from FutureGen 2.0 Project components to the borders of these respective counties. DOE determined that potential effects on population, housing, employment, and economic conditions would be experienced most directly by Morgan County, because all project components would be located there. Also, because the duration of construction would be longest and involve the largest workforce at the Meredosia Energy Center site, DOE determined that other counties closest to Meredosia may be affected by project activities. As described in Section 3.18, Socioeconomics, the project would have a net beneficial effect on socioeconomic conditions, which would be experienced in Morgan County, other counties in the ROI, and the state as a whole. Therefore, Greene, Macoupin, and Sangamon counties would potentially share in the net beneficial impacts, although no project components would be located in any of the three.

Commentor 2 - Betty Niemann

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sections.

The DOE evaluated the potential range of impacts based upon conceptual design for the missing information so as "to provide decision-makers with information that would support a reasoned choice among all the alternatives." Conceptual design, in my opinion, is a far cry from reality.

It further states, "As the design progresses and new data becomes available, DOE will review the analysis conducted in the draft EIS to confirm that the analysis properly bounds the range of impacts identified with each alternative." What does this mean? Is this putting the cart before the horse? Shouldn't analyses be performed on the new data to identify real impacts and not see if current analyses compare with the new idea -- or new data?

It is my believe that the citizens should have all the information available to them in this draft EIS on which to comment here tonight. Otherwise, I believe that we citizens are denied due process and due diligence when researching to make our comments about this draft

2-03

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Response

2-03 As explained in response to Comment 2-01, DOE developed bounding conditions and assumptions based on the most current data for the FutureGen 2.0 Project to account for uncertainties caused by incomplete and unavailable information. In all such cases, the bounding conditions were based on assumptions representing the highest levels in the range of reasonably foreseeable conditions during construction and operation of project components. Where appropriate, and particularly for human health and safety analysis, assumptions considered the most severe reasonably foreseeable conditions to address potential risks and to support design-related decisions to avoid these risks.

What DOE meant by the statement, “As the design process progresses, and new data become available, DOE will review the analysis conducted in the Draft EIS to confirm that the analysis properly bounds the range of impacts identified for each alternative” on page 4.4-2 of the Draft EIS, is that DOE will evaluate changes in the project during ongoing design to determine whether the impacts could exceed those described in the Draft EIS. If the anticipated impacts based on changes could exceed the upper bounds described in the Draft EIS, DOE would then update the impacts analysis in the Final EIS accordingly. This approach to impact analysis for the purposes of agency decision-making is consistent with NEPA regulations as discussed in the response to Comment 2-01. Section 4.4, Incomplete and Unavailable Information, has been updated in the Final EIS to reflect the status of information at the time of Final EIS publication, and the analyses in Chapters 3 and 4 have been updated as appropriate. Table S-1 in the Summary outlines the major changes from the Draft to the Final EIS, some of which reflect the availability of new information and data.

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EIS. Again, how can there be a valid scientific decision when there is missing data?

2-03 con't

I have found more than one inconsistency in FutureGen documentation. These inconsistencies are FutureGen's request for site proposal, dated 25 October 2010, was then -- had to be amended on the 11th of November 2010; FutureGen's initial power sourcing agreement first submitted to the Illinois power agency was riddled with inconsistencies, paragraph numbering errors, and reference errors; lack of detailed information on the CO2 pipeline to landowners as well as to the Illinois Commerce Commission in its request for pipeline certification; lack of injection wellhead placement detail on EPA Region 5 website in the Class VI UIC permitting; and the pertinent data missing to the DOE for this draft environmental impact statement.

This is not the first time -- and I can go on too.

2-04

This is not the first time the Alliance has gone through this EIS process. And I'm asking you would you enter a business contract for a $4-plus billion project with a

2-05

Response

2-04 DOE described the history of the FutureGen Initiative in Section 1.2 of the Draft EIS and acknowledged the evolving nature of the FutureGen 2.0 Project in a text box on page 2-2 of the Draft EIS. The regulatory and permitting processes for a complex power plant that would also involve underground injection of CO_2 are substantial and may require multiple submissions based on regulatory and procedural reviews. The Draft EIS evaluated and described the potential impacts of the project based on the data and information available at the time of publication. As explained in response to Comment 2-03, the Draft EIS used bounding assumptions when determining the significance of potential impacts in cases where certain information was incomplete or unavailable. The Final EIS has been updated as appropriate based on data available from the ongoing detailed design effort. Table S-1 in the Summary outlines the major changes from the Draft to the Final EIS, some of which reflect the availability of new information and data. The updated analyses have not substantially changed the descriptions and conclusions about the potential impacts on environmental resources as determined for the Draft EIS.

2-05 This comment addresses topics that are not relevant to the EIS. As explained in Section 1.2, the EIS for the FutureGen 2.0 Project is the second EIS that DOE has prepared for a proposed action in response to the President's FutureGen Initiative. The Alliance participated with DOE on both efforts. As stated in response to Comment 2-04, the regulatory and permitting requirements for a complex power plant that would also involve geologic storage of CO_2 are substantial. Also, during the process of meeting the regulatory and permitting requirements, needs and priorities for a proposed action may change, and the funding agency must adapt to accommodate these changes.

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company with this kind of reputation?

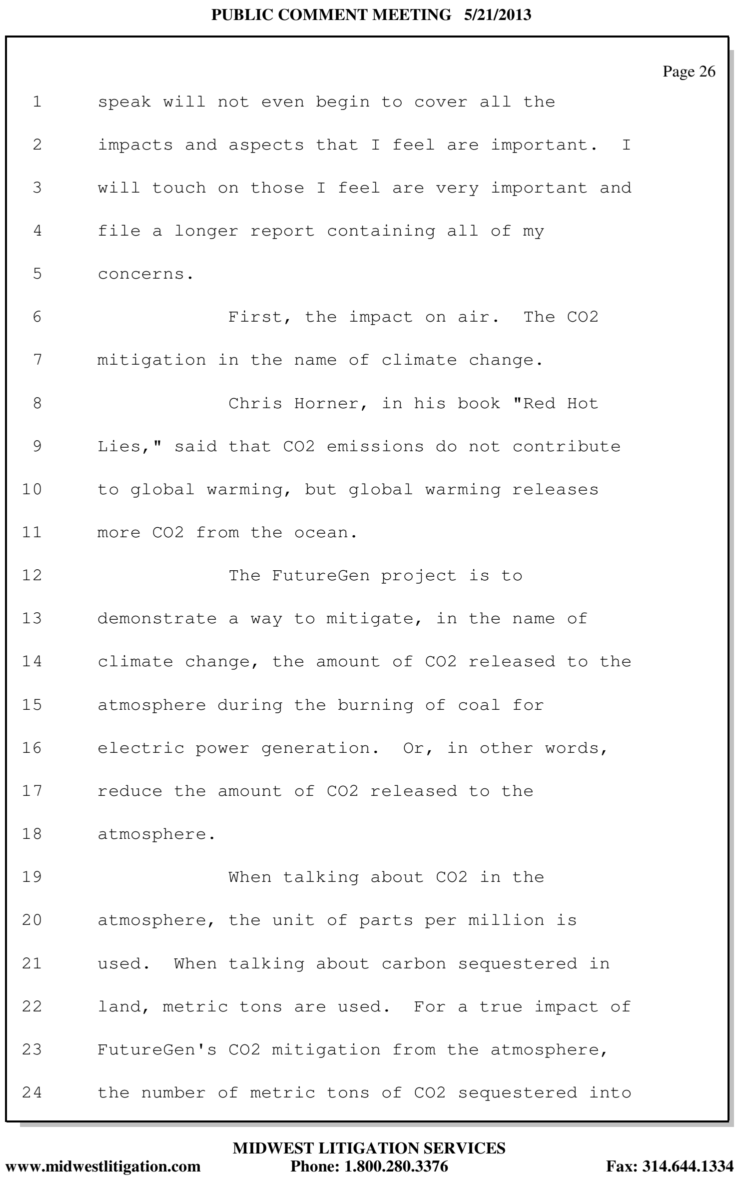
My research discovered a revealing letter Exelon wrote to Senator Durbin explaining why it dropped out as an Alliance member. When it joined the Alliance, Exelon understood the expenses for the entire FutureGen 2.0 project would be carried out -- carried by the DOE and the 20 Alliance members, each paying 30 million to cover the total 1.6 billion needed for the project. Exelon pulled out when FutureGen changed its parameters of operation with its power sourcing agreement with Illinois Power Agency such that now Illinois power consumers reimburse FutureGen for the construction and the and operating costs, paying $150 million per year for 30 years. Now the consumer cost of FutureGen is calculated at $4.5 billion in addition to the almost 1 billion from the DOE, bringing the total cost to $5.5 billion for a 30-year project. If the project only goes for 20 years where the power sourcing agreement is in play, the cost would be 3 billion plus 1 billion of the DOE for a total of $4 billion.

The time I have been given here to

2-05
con't

Response

Commentor 2 - Betty Niemann



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speak will not even begin to cover all the impacts and aspects that I feel are important. I will touch on those I feel are very important and file a longer report containing all of my concerns.

First, the impact on air. The CO2 mitigation in the name of climate change.

Chris Horner, in his book "Red Hot Lies," said that CO2 emissions do not contribute to global warming, but global warming releases more CO2 from the ocean.

The FutureGen project is to demonstrate a way to mitigate, in the name of climate change, the amount of CO2 released to the atmosphere during the burning of coal for electric power generation. Or, in other words, reduce the amount of CO2 released to the atmosphere.

When talking about CO2 in the atmosphere, the unit of parts per million is used. When talking about carbon sequestered in land, metric tons are used. For a true impact of FutureGen's CO2 mitigation from the atmosphere, the number of metric tons of CO2 sequestered into

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2-06

Response

2-06 DOE acknowledges that the direct contribution of any single coal-fueled power plant equipped with carbon capture and storage to reducing worldwide atmospheric concentration of CO_2 would be negligible and the incremental impacts on global climate change cannot be determined effectively. Therefore, DOE considered the impacts of CO_2 emissions on global climate to be a subject for cumulative impact analysis addressed in Section 4.3, Potential Cumulative Impacts of the Draft EIS. As stated on page 4.3-25 of the Draft EIS, “These reductions in emissions alone would not appreciably reduce global concentrations of GHG emissions. However, these emissions changes would incrementally affect (reduce) the atmosphere’s concentration of GHGs, and, in combination with past and future emissions from all other sources, contribute incrementally to future change in atmospheric concentrations of GHGs.” As stated under Climate and Greenhouse Gases in Table 4.3-3 of the Draft EIS, “the successful implementation of the project may lead to widespread acceptance and deployment of oxy-combustion technology with geologic storage of CO_2, thus fostering a beneficial long-term reduction in the rate of CO_2 emissions from power plants across the United States.” DOE agrees with the scientific community that the cumulative effects of CO_2 emissions on global climate change cannot be ignored, which is why the agency is participating in the FutureGen 2.0 Project and continues to fund other demonstration projects involving carbon capture and storage. Please refer to DOE’s response to Comment 14-01 for further discussion on this topic.

Commentor 2 - Betty Niemann

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2-06 con't

the ground has to be converted to parts per million. I calculated what the parts per million would be for one metric ton of CO2 sequestered. This calculates out to be .00047 parts per million removed from the atmosphere per one million metric tons of coal per year.

Therefore, the annual impact of the CO2 mitigation by FutureGen for its 1.1 metric tons is .005 [sic] parts per million to the air environment. This amount is so small that the impact is so negligible that it's almost nonexistent. The draft EIS even states this on page 4.3-25 of Volume I.

2-07

Second, sequestration impact to agricultural surface land.

To understand the impact of the 1.1 million metric tons of CO2 captured, injected, and stored in the Mt. Simon layer of northeastern Morgan County per year, I calculated the number of gallons per metric ton of CO2 using Praxair's MSDS for liquefied CO2 from Duke Energy's Edwardsport IGCC CCS project. My calculations resulted in approximately 350 gallons of supercritical CO2 per metric ton. Scott

Response

2-07 CO_2 would be injected into the Mt. Simon Formation as a supercritical fluid. The actual volume of the injected CO_2 would be a function of fluid density, temperature, and pressure. While volumes of up to 1.1 million metric tons would be injected per year, the properties of the supercritical CO_2 would allow it to behave similar to both a gas and a liquid, enabling the CO_2 to permeate through and fill the pore space of the target storage formation. Injection of a fluid into the deep subsurface can under certain circumstances result in very small topographic changes at the surface. Measuring the rate of very small surface changes is a standard method for measuring the extent of the CO_2 plume, and can provide an early indication of permeable pathways through any existing fracture networks (NETL 2012b).

Because any changes to the surface would be very small and can be obscured by seasonal changes or other activities, satellite remote sensing and stationary tiltmeters are used to measure these changes. Surface deformation from injection does not appear to occur at a set rate, so some areas may experience a positive or negative displacement, which would be limited to the plume extent. The ground surface levels also routinely change from agricultural practices, water well withdrawals, and gas well withdrawals. Therefore, the agricultural drainage is not anticipated to be affected by CO_2 injection. As part of the monitoring, verification, and accounting (MVA) plan, deformation monitoring would provide an indirect method to measure the plume development. Note that the value of 0.3 inch per year as measured in the Algerian gas field was the observed maximum at the In Salah CO_2 injection site and is intended as an upper bound for this analysis and is not a direct prediction of the potential deformation rate at the proposed site in Morgan County.

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MacDonald, Archer Daniels Midland's sequestration project manager, confirmed my calculation in March of 2012.

Therefore, the 1.1 million metric tons of CO2 sequestered under Morgan County's prime farmland will approximately be 385 million gallons per year. This, I do believe, will have impact on land surface.

This 380 [sic] million gallons as the potential to cause land deformation, defined as a rise in the surface or to cause sinkholes within the CO2 storage area. Land deformation can be used to monitor the CO2 plume movement by satellite telemetry from sensors buried just beneath the surface and out of the reach of agricultural machinery in an agricultural sequestration field.

Page 3.4-20 of the EIS indicates a potential rise of three tenths of an inch per year. Over 20 years, this could have a potential six-inch rise to upset drainage and/or tiling of those agricultural areas over time.

If satellite telemetry can be used to monitor the CO2 plume through detection of land

2-07
con't

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Response

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deformation, then the impact of sequestered CO2 is substantial and has the potential to compromise agricultural drainage which may not be able to be mitigated.

2-07 *con't*

In summary, it is my firm belief that, in the haste to sign the first documents by Farmers State Bank to commit 600 of the 1,000 acres of Morgan County to FutureGen 2.0, there was lack of due diligence and knowledge of the agricultural impact mitigation agreement by the bank. Pore space landowners who signed options may have been denied those rights accorded pipeline landowners to protect their land with agricultural impact mitigation agreements.

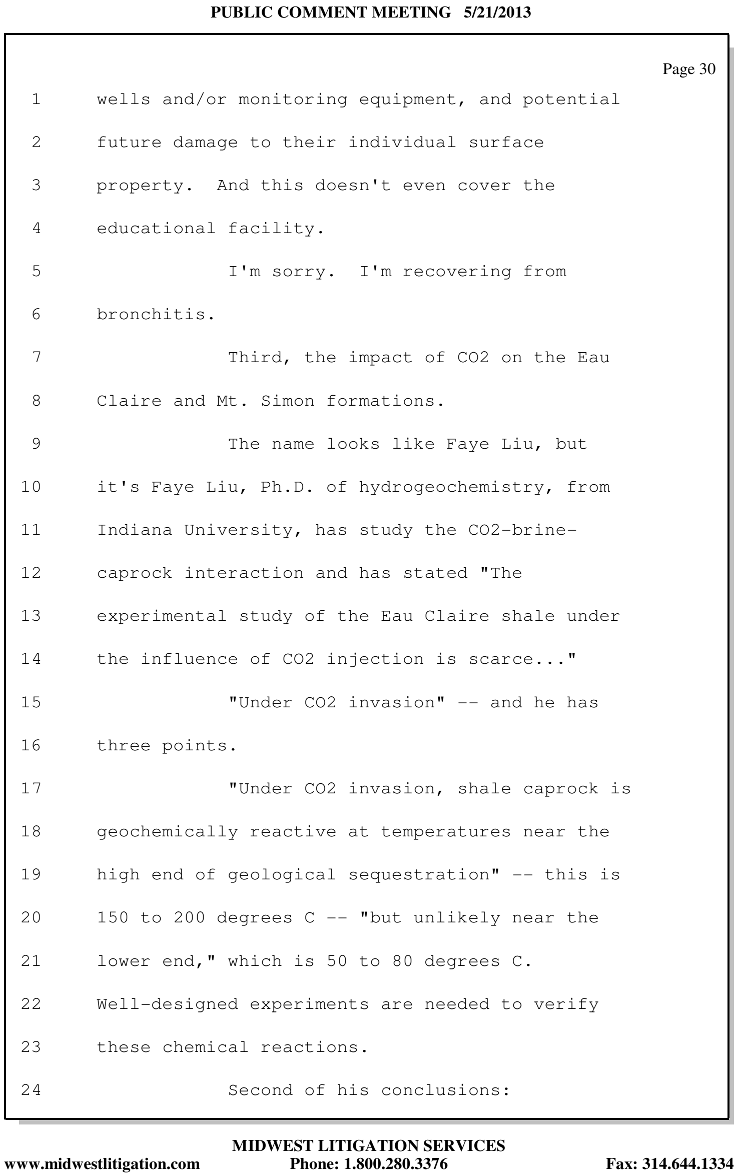
Thus, if the FutureGen project does go forward -- and I pray that it doesn't -- those landowners who committed their land to the sequestration pore space or carbon storage area must be granted the same protections as those landowners impacted by FutureGen's pipeline in that each landowner shall be able to negotiate an agricultural mitigation agreement to cover damages from the construction of injection and monitoring wells, electricity right of way to

2-08

Response

2-08 As discussed in Section 2.5.1, Section 3.3, Physiography and Soils, and Section 3.10, Land Use, of the Draft EIS, the Alliance has entered into an Agricultural Impact Mitigation Agreement with the Illinois Department of Agriculture in consultation with the Illinois Farm Bureau. The agreement is required by the Illinois Carbon Dioxide Transportation and Sequestration Act (220 ILCS 75/20(b)(6)), and it applies specifically to the effects from construction of a CO_2 pipeline. Under the agreement, the FutureGen 2.0 Project is committed to implementing important mitigation measures to protect farmland and compensating farmers for crop damages. Although the agreement is not applicable to the surface or subsurface areas in the CO_2 storage study area, the agreements between the Alliance and participating landowners for subsurface CO_2 storage rights provide similar protection for agricultural land and are specifically designed for impacts pertaining to CO_2 storage. The landowner agreements provide compensation for damages resulting from adverse impacts to the land (including deformation), groundwater, crops, land improvements, livestock, timber, buildings, fences, drainage systems, and equipment that could occur as a result of CO_2 injection and storage activities.

Commentor 2 - Betty Niemann



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wells and/or monitoring equipment, and potential future damage to their individual surface property. And this doesn't even cover the educational facility.

I'm sorry. I'm recovering from bronchitis.

Third, the impact of CO2 on the Eau Claire and Mt. Simon formations.

The name looks like Faye Liu, but it's Faye Liu, Ph.D. of hydrogeochemistry, from Indiana University, has study the CO2-brine-caprock interaction and has stated "The experimental study of the Eau Claire shale under the influence of CO2 injection is scarce..."

"Under CO2 invasion" -- and he has three points.

"Under CO2 invasion, shale caprock is geochemically reactive at temperatures near the high end of geological sequestration" -- this is 150 to 200 degrees C -- "but unlikely near the lower end," which is 50 to 80 degrees C. Well-designed experiments are needed to verify these chemical reactions.

Second of his conclusions:

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2-08
con't

2-09

Response

2-09 Formation temperature measurements were taken throughout the stratigraphic well that was drilled in the CO_2 storage study area. The temperature measured at the top of the injection interval (approximately 4,000 feet below ground surface) was 105 degrees Fahrenheit (40.5 degrees Celsius), which is below the lower end (50-80 degrees Celsius) stated by the author in the study cited, and was consistent with the modeled temperature prediction and temperature data collected at the Illinois Basin-Decatur Project. The author is pointing out that shale may be more chemically reactive at the upper end of the cited temperature range and is alluding to the fact that, at lower temperatures, shale is less chemically reactive. The deep underground conditions at the FutureGen 2.0 storage site would not approach the temperatures at which the author has recommended the need for additional research.

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"Reactivity in mixed gas systems needs to be measured. H2S and SO2 are typical impurities in the flue gas for subsurface sequestration. How the shale caprock would respond to the induced acidic plume is crucial to the sealing integrity in the co-injection scenario."

My concerns are what are and at what concentrations make up the remainder of the 3 to 10 percent of the supercritical CO2 for sequestration? Will there be H2S in the supercritical CO2 as stated in the Mattoon final EIS? Will the concentration of H2S be enough to categorize the supercritical CO2 as sour? If so, the Illinois Lincoln Project, which is a CO2 pipeline study done in 2009, recommends that the self-imposed buffer zone between the pipeline and a public or private occupied building be at least 150 -- or no -- 1,500 feet and not -- what? 100 -- what did I say? 150 feet?

2-10

And the third one is "Moderate brine" -- which is buoyant -- "migration through the caprock" -- and he says it does happen -- "can be beneficial in terms of the relief of pressure buildup in the reservoir and the

2-11

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Response

2-10 As stated in Table 2-10 of the Draft EIS, the CO_2 stream must meet the acceptance specifications identified by the Alliance before being allowed to be transported through the pipeline to the sequestration site. In accordance with these specifications the stream would contain 97 percent dry basis CO_2, with inert constituents consisting of 1 percent, and trace constituents making up the remaining 2 percent of the stream. Current analysis indicates that there would be no H_2S in the CO_2 stream because of the oxidizing nature of the oxy-combustion process. However, for purposes of analysis, the Alliance used the commercially accepted CO_2 pipeline standard of less than 20 parts per million (ppm) H_2S by weight, which is the standard specification for pipeline quality gas and below the threshold for sour gas. Even if the oxy-combustion process resulted in the production of H_2S, the CO_2 captured at the Meredosia Energy Center would be cleaned and preconditioned before entering the pipeline and no detectible amounts of H_2S would be expected in the CO_2 stream from the energy center.

2-11 The Draft EIS discusses potential impacts from lateral and vertical brine migration in Section 3.4.3.2, under the subheading "CO_2 Migration." DOE used past studies and models of brine migration during CO_2 sequestration to discuss the movement of the brine as a result of the proposed action (Zhou et al. 2010; Birkholzer et al. 2009; Lemieux 2011). Any brine movement through the confining zone would be in response to the pressure buildup as a result of injection, not density differentials. These studies have determined that diffuse amounts of brine would have no impact to the overlying groundwater resources because of the very small flow velocity and displacement length (Zhou and Birkholzer 2011).

Commentor 2 - Betty Niemann

geomechanical stresses to the sealing caprock," but the consequences have not been explored, and further study is needed to fully elucidate or find out about this problem.

2-11 *con't*

My fourth concern is the longevity effects of acidic plume in the Eau Claire and Mt. Simon layers.

This is one of my greatest fears, and this is from Faye Lui's and others research paper entitled "Coupled Reactive Flow and Transport Modeling of CO2 Sequestration in the Mt. Simon Sandstone Formation, Midwest, U.S.A.," which discusses long-term risk assessment of the acidic plume.

There's several points on this. Acid plume forms from the interaction between brine, which is salt water, and the supercritical CO2 -- in chemical terms, it's called CO2 dissolution -- in the storage layer and could persist for a long time even after there is complete dissolution of the CO2. Replenishment of the upstream groundwater flow -- the brine movement -- through the storage sandstone facilitates the spread of the CO2 plume and promotes and replenishes the

2-12

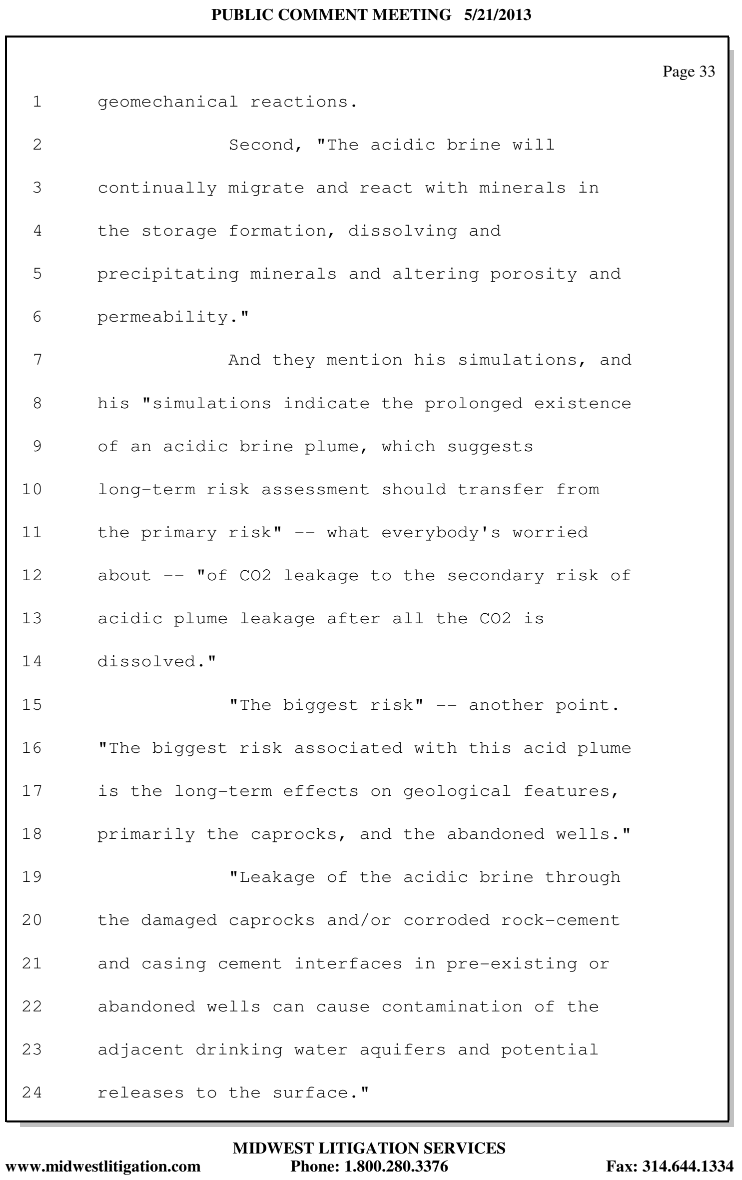
Response

2-12 The "acidic plume" discussed in the study cited by the commentor is the portion of the native brine that would have a reduced pH as a result of CO_2 dissolution into the brine within the injection zone (Liu et al. 2011). This is the same as the solubility trapping mechanism, which is described in Draft EIS Section 3.4.3.2 under the subheading "CO_2 Migration." Once CO_2 is dissolved into the formation water, it no longer exists in a separate phase (i.e. supercritical), so there would be no buoyant forces pushing the dissolved CO_2 upwards (IPCC 2005). In fact, brine with dissolved CO_2 has a higher density than the native brine and will tend to sink in the injection zone. While the deep groundwater flow through the Mt. Simon could increase the brine-CO_2 plume interaction, the flow is gradual, on the order of inches in a hundred years (Birkholzer et al. 2009). Figure 2-26 has been updated in the Final EIS with the latest modeled subsurface plume extent (i.e., the Area of Review of the UIC permit applications), which includes the furthest extent of all phases of the injected CO_2 stream (e.g., 99 percent of the separate-phase of CO_2 mass).

As the CO_2 dissolves into the brine, it starts a series of chemical reactions, as the weak acid reacts with minerals within the injection zone formation and gradually increases the pH (Liu and Maroto-Valer 2011). Eventually, on a scale of 1,000 to 10,000 years, CO_2 precipitates out of the brine by forming carbonate minerals, which is considered the most stable of all of the CO_2 trapping mechanisms. The Mt. Simon Formation is a quartz-rich sandstone, which is also cemented with silica-rich minerals that are less likely to react to the increased acidity in the brine. Minerals that would be more likely to react, such as feldspar, clay and mica, are found in much lower concentrations in the Mt. Simon Formation (O'Connor and Rush 2005). As a result of the formation composition, the simulations of Liu et al. (2011) found that the Mt. Simon Formation would have a relatively low reactivity, with the conclusion that substantial chemical changes are very unlikely to occur as a consequence of CO_2 injection.

As explained in Section 3.4.3.2 of the Draft EIS, under the subheading "CO_2 Migration," the cement to be used in well construction through the injection and confining zones is specially formulated to prevent dissolution from contact with the acidic brine. This specially formulated cement would be used in the injection and monitoring well casings progressively up to the ground surface, which would prevent the buoyant CO_2 from migrating up the borehole and into drinking water aquifers or to the land surface. Aside from the stratigraphic well, which was also constructed with CO_2-resistant cement, there are no other wells that penetrate the Eau Claire Formation in the

Commentor 2 - Betty Niemann



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geomechanical reactions.

Second, "The acidic brine will continually migrate and react with minerals in the storage formation, dissolving and precipitating minerals and altering porosity and permeability."

And they mention his simulations, and his "simulations indicate the prolonged existence of an acidic brine plume, which suggests long-term risk assessment should transfer from the primary risk" -- what everybody's worried about -- "of CO2 leakage to the secondary risk of acidic plume leakage after all the CO2 is dissolved."

"The biggest risk" -- another point. "The biggest risk associated with this acid plume is the long-term effects on geological features, primarily the caprocks, and the abandoned wells."

"Leakage of the acidic brine through the damaged caprocks and/or corroded rock-cement and casing cement interfaces in pre-existing or abandoned wells can cause contamination of the adjacent drinking water aquifers and potential releases to the surface."

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2-12
con't

Response

UIC Survey Area (as discussed in response to Comment 12-20). The well construction BMPs are designed to minimize the risk of potential impact from the supercritical and dissolved CO_2.

Commentor 2 - Betty Niemann

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What this means is, as the wells -- the sealed wells and the casing dissolve, the acidic plume is going to rise, and it could find a potable aquifer and contaminate it. I won't even go into all that.

Since this plume persists in the storage area longer than the buoyant CO2, it has a very prolonged damage potential, longer than any discussed liability. The acid plume impact, therefore, in my opinion, is substantial.

In other words, the long-term effects of the acid plume exist long after the supercritical CO2 is dissolved, even after a hundred years. We're even talking 10,000. Therefore, who assumes the liability for damages a hundred years or more from now? Has man created a larger environmental risk that can't be mitigated in order to mitigate CO2 for the short term?

2-12 *con't*

The Government Accounting Office thought that a cost analysis of cost versus benefit should be done on FutureGen's reorganization, but it was not done as the DOE then felt that it would not come to an agreement

2-13

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Response

2-13 In response to comments submitted during the scoping phase of the EIS, DOE explained its position on a life-cycle cost analysis in Section 1.6.2 of the Draft EIS as follows: "Among the purposes for DOE's involvement in the FutureGen 2.0 Project are the demonstration of the technologies involved, the identification of potential efficiencies, and the development of a reference base for the costs associated with an oxy-combustion facility integrated with CO$_2$ capture and storage. Thus, the life-cycle cost of the project relative to other technologies is not currently known with certainty, but it is not relevant in DOE's decision-making process for the proposed action." With respect to a cost-benefit analysis, the CEQ NEPA regulations state: "For purposes of complying with the Act, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are important qualitative considerations." DOE has not completed a cost-benefit analysis for the FutureGen 2.0 Project because of the uncertainties involved in estimating the potential costs and benefits on a demonstration project for which a key purpose is to establish the reference base for those costs and benefits.

Commentor 2 - Betty Niemann	Response

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with the Alliance. This is for the Mattoon aspect.

Before the DOE makes a decision on FutureGen in Morgan County, it should sit down with the Alliance and perform a cost analysis considering all incomes, expenditures, and all environmental short-term and long-term impacts to see if the project is actually worth doing. The DOE should share this with Morgan County citizens who will be most affected by this project. Also, U.S. taxpayers and Illinois rate payers are stakeholders in this venture and are owed this accountability. The Congressional Research Service's report "FutureGen: A Brief History on Issues for Congress" is even skeptical about the FutureGen -- the success of the FutureGen project.

With the crucial missing data in this draft EIS, we Illinois citizens have been dealt a project driven more by money than by scientific study with the potential to possibly harm the most precious of Illinois commodities -- it's breadbasket farmland.

In summary, is this project worth the

2-13
con't

Commentor 2 - Betty Niemann; Commentor 3 - Richard Johnson

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$4-plus billion expense with this research that is becoming available since it's not CO2 causing global warming and the amount of CO2 mitigated by the project per year is miniscule and the annual volume of CO2 injected can be detrimental to both surface and subsurface land and there is a great potential for permanent damage to the cropland.

2-13
con't

I leave you with these words from Bill and Oley. For those of you who don't know, they are the relatives who own the land where the characterization well was drilled. "We consider interests in farm real estate as proper investments of trust property..."

Thank you.

MR. WHYTE: Thank you, Ms. Niemann.

The next speaker is Mr. Richard Johnson.

MR. JOHNSON: My name is Richard Johnson, an interested citizen.

My purpose of comments is toward the participation by our community with DOE and FutureGen for its project -- a project realizing educational, monetary, and jobs. And I feel that this is a very important project for our

3-01

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Response

3-01 Thank you for your comment.

Commentor 3 - Richard Johnson; Commentor 4 - Pamela Hardwicke

3-01
con't

community, our state, and for future science.

Thank you.

MR. WHYTE: Thank you, Mr. Johnson.

Next speaker is Ms. Pamela Hardwicke.

MS. HARDWICKE: Hi. My name is Pamela Hardwicke. I am a special project coordinator for the Clean Air Task Force.

I'm going to give a short background on the Clean Air Task Force, and then I'll talk about the EIS.

Founded in 1996, the Clean Air Task Force is a nonprofit environmental group headquartered in Boston, Massachusetts, and with offices in Illinois, Ohio, Washington, D.C., Texas, New Hampshire and Maine, as well as in Beijing, China.

Our mission includes advocacy to reduce atmospheric pollution associated with climate change and premature death and disease.

COURT REPORTER: Okay. You need to slow down.

MS. HARDWICKE: Okay. We work throughout the United States and China on these issues. CATF's Fossil Transition Project works

Response

Commentor 4 - Pamela Hardwicke

PUBLIC COMMENT MEETING 5/21/2013

to shift fossil power generation toward technologies that reduce its environmental impact.

The Clean Air Task Force welcomes this opportunity tonight to comment on the EIS for the FutureGen 2.0 project. Our review of the EIS is forthcoming. We may file more substantive comments on the EIS prior to the close of the public comment period on June 17.

Tonight I would like to take [sic] more general comments on the need for oxy-combustion technology demonstrations like those proposed for FutureGen because of the importance that technology plays in addressing CO2 emissions that drive climate change.

Last week CO2 concentrations in the atmosphere approached 400 parts per million as measured at the Mauna Loa observatory in Hawaii, a level not seen on Earth in three million years. More alarming than this one measurement is the larger concentration trend. Atmospheric CO2 concentrations have been growing since the start of the industrial revolution, and this rate has increased even more rapidly in the past few

4-01

Response

4-01 Thank you for your comment.

Commentor 4 - Pamela Hardwicke

Response

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decades. Left unchecked, growing CO2 emissions from human activity will drive increases in global temperatures and changes in the Earth's climate that will profoundly alter the environment as well as pose grave dangers to public health in this country and abroad.

COURT REPORTER: Okay. Slow down.

MS. HARDWICKE: Reducing CO2 emissions will not be easy. In 2012 global carbon dioxide emissions grew by 2.6 percent. Power sector emissions accounted for a large share of this increase, with the world bringing on line each year more than 100 gigawatts of new coal- and gas-fired generating capacity. Despite an annual expenditure for wind and solar energy of more than $150 billion, coal remains the fastest growing world fuel by volume. In 2011 coal use climbed 20 times faster than wind and solar and three times faster than gas. Today fossil energy provides about 87 percent of total global primary energy demand, an amount which the IEA projects will drop only slightly to about 80 percent by 2035.

So while it's important to find and

4-01
con't

Commentor 4 - Pamela Hardwicke

Response

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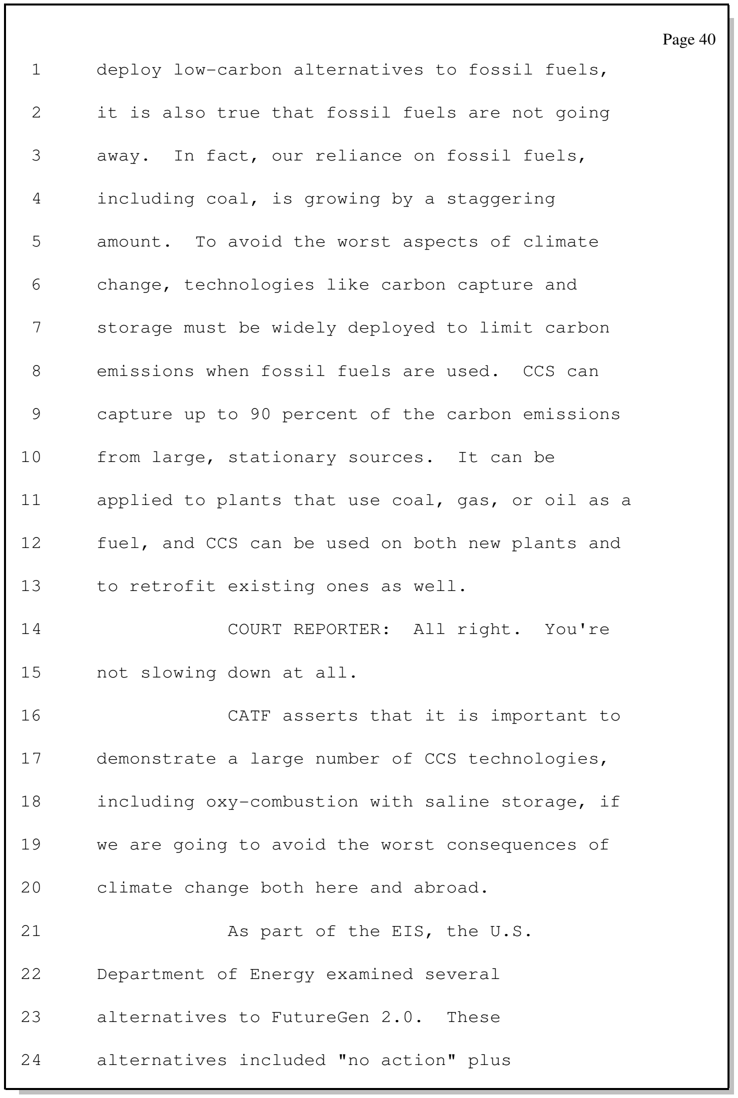

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deploy low-carbon alternatives to fossil fuels, it is also true that fossil fuels are not going away. In fact, our reliance on fossil fuels, including coal, is growing by a staggering amount. To avoid the worst aspects of climate change, technologies like carbon capture and storage must be widely deployed to limit carbon emissions when fossil fuels are used. CCS can capture up to 90 percent of the carbon emissions from large, stationary sources. It can be applied to plants that use coal, gas, or oil as a fuel, and CCS can be used on both new plants and to retrofit existing ones as well.

COURT REPORTER: All right. You're not slowing down at all.

CATF asserts that it is important to demonstrate a large number of CCS technologies, including oxy-combustion with saline storage, if we are going to avoid the worst consequences of climate change both here and abroad.

As part of the EIS, the U.S. Department of Energy examined several alternatives to FutureGen 2.0. These alternatives included "no action" plus

4-01
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Commentor 4 - Pamela Hardwicke

PUBLIC COMMENT MEETING 5/21/2013

alternatives that were dismissed from further evaluation, including alternative fuels, alternative coal technologies, different plant sites, and other locations for CO2 storage.

CATF agrees with the statements in the EIS that a no-action alternative would slow development of oxy-combustion with saline storage.

We agree with the following statement found on page S-31 of the EIS: "On a broader scale, successful implementation of the project may lead to widespread acceptance and deployment of oxy-combustion technology with geologic storage of CO2 thus fostering a long-term reduction in the rate CO2 emissions from power plants across the United States."

We also agree with various conclusions within the EIS that other alternatives to FutureGen 2.0 would not meet DOE's objectives as well as the current configuration of FutureGen.

4-01
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We note that FutureGen 2.0 is a demonstration. It is the nature of demonstrations that they are never perfect.

4-02

Response

4-02 Thank you for your comment.

Commentor 4 - Pamela Hardwicke; Commentor 5 - Axel Steuer

Response

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Compared to the plants that will follow, demonstrations are more costly to build. They have higher heat rates and therefore incur more costs to operate. Demonstrations typically involve more situations in which ideal functioning may be disrupted, and they run less often than fully commercial plants, precisely so that research can be conducted.

But demonstrations are a tangible step forward. They enable gains in cost savings, environmental benefits, and technology know-how that could dwarf the initial investment in and associated costs of the project itself.

If the Alliance and U.S. DOE can finish what they have started at FutureGen 2.0 and prove out this oxy-combustion saline injection for carbon pollution reduction, the potential benefits to climate protection will be huge. This is our hope.

Thank you for your attention.

MR. WHYTE: Thank you.

The next speaker is Axel Steuer.

MR. STEUER: My name is Axel, A-x-e-l, Steuer, S-t-e-u-e-r. I'm president of

4-02
con't

Commentor 5 - Axel Steuer

PUBLIC COMMENT MEETING 5/21/2013

one of the higher education institutions in this fair city.

I have long had a personal interest in environmental issues and some, I guess, three years ago became a signatory to the American College and University Presidents' Climate Commitment where we are committed to reducing carbon dioxide and all carbon footprint that would come from the college. And so I speak just very briefly, very informally from that perspective.

And maybe the prefatory comment is here that as we -- this project was being talked about originally, in the interest of the college and in the interest of the people of Jacksonville, I attended almost every meeting that took place here, and I heard very thoughtful conversations, concerns expressed by citizens from all perspectives, but I did try to do my best to be as informed as possible.

I made a trip to Washington, D.C. I was very lucky that the -- or fortunate that an under secretary of energy spent two hours with me to answer questions that I had about this. I've

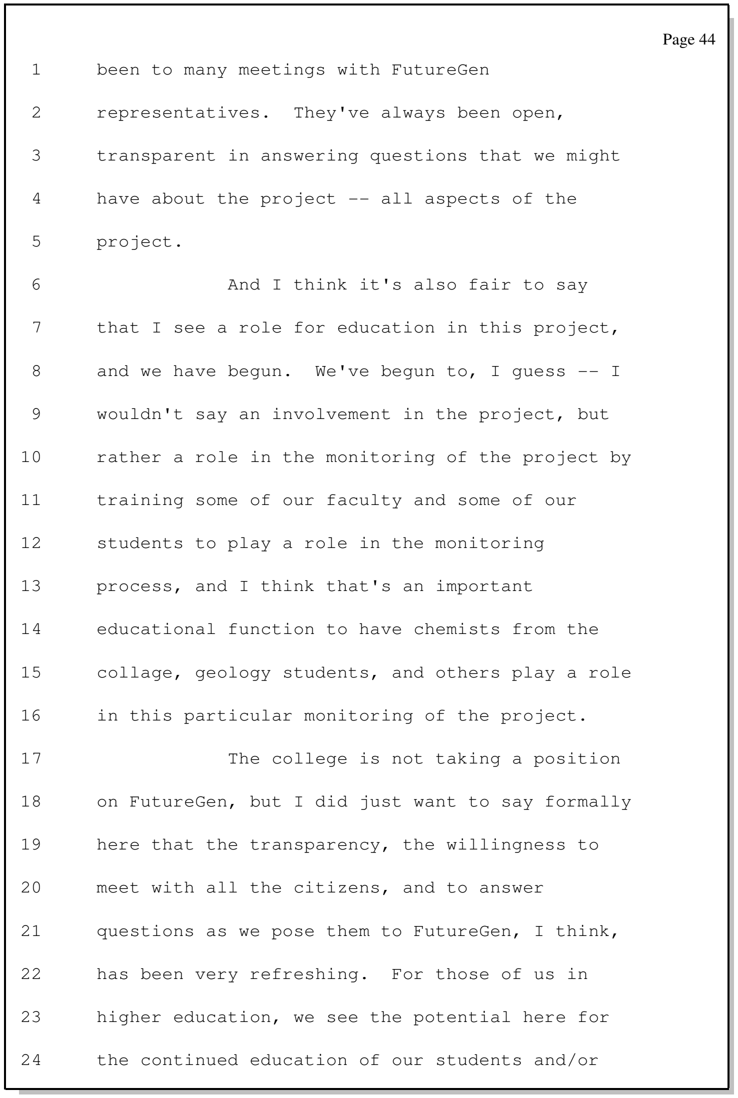
5-01

Response

5-01 Thank you for your comment.

Commentor 5 - Axel Steuer

PUBLIC COMMENT MEETING 5/21/2013



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been to many meetings with FutureGen representatives. They've always been open, transparent in answering questions that we might have about the project -- all aspects of the project.

And I think it's also fair to say that I see a role for education in this project, and we have begun. We've begun to, I guess -- I wouldn't say an involvement in the project, but rather a role in the monitoring of the project by training some of our faculty and some of our students to play a role in the monitoring process, and I think that's an important educational function to have chemists from the collage, geology students, and others play a role in this particular monitoring of the project.

The college is not taking a position on FutureGen, but I did just want to say formally here that the transparency, the willingness to meet with all the citizens, and to answer questions as we pose them to FutureGen, I think, has been very refreshing. For those of us in higher education, we see the potential here for the continued education of our students and/or

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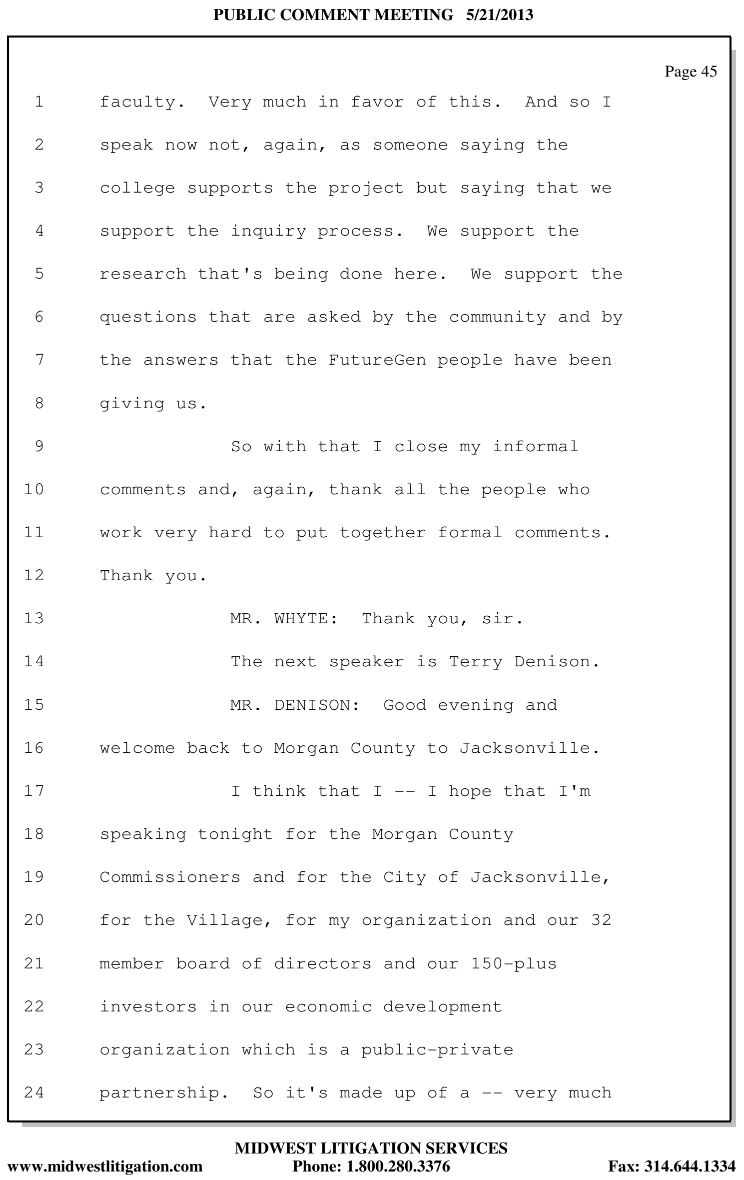
Response

Commentor 5 - Axel Steuer; Commentor 6 - Terry Denison



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faculty. Very much in favor of this. And so I speak now not, again, as someone saying the college supports the project but saying that we support the inquiry process. We support the research that's being done here. We support the questions that are asked by the community and by the answers that the FutureGen people have been giving us.

So with that I close my informal comments and, again, thank all the people who work very hard to put together formal comments. Thank you.

MR. WHYTE: Thank you, sir.

The next speaker is Terry Denison.

MR. DENISON: Good evening and welcome back to Morgan County to Jacksonville.

I think that I -- I hope that I'm speaking tonight for the Morgan County Commissioners and for the City of Jacksonville, for the Village, for my organization and our 32 member board of directors and our 150-plus investors in our economic development organization which is a public-private partnership. So it's made up of a -- very much

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Response

Commentor 6 - Terry Denison	Response
PUBLIC COMMENT MEETING 5/21/2013 Page 46 of a cross-section of our area. FutureGen is progress. In today's economic environment, it's very tough to attract new industry or a new business to our Jacksonville region of Morgan and Scott County, but we have had some good fortune. We've had some luck to attract some of these new companies into our area. They're not quite as large as maybe what we've been used to in our community, but FutureGen is one of those that we were lucky enough to entice to come and be a part of our community, and they have become a part of our community. FutureGen represents an excellent opportunity to give our community kind of an economic shot in the arm, particularly, like, during the construction phase when there's -- we can see thousands of construction jobs in our area and also then during the operation phase there's going to be some good-paying permanent jobs that will be created for our community. So in the long term, FutureGen will produce increased tax revenues and more than replace some of the jobs that we've lost because of the **6-01** **MIDWEST LITIGATION SERVICES** www.midwestlitigation.com Phone: 1.800.280.3376 Fax: 314.644.1334	**6-01** Thank you for your comment.

Commentor 6 - Terry Denison

PUBLIC COMMENT MEETING 5/21/2013

6-01 con't

closure of the Meredosia power plant when Ameren was running it in 2011.

And speaking of Meredosia, we're already seeing some economic benefits of FutureGen in the Meredosia area. As I just mentioned, when the Meredosia power plant ceased generating power in December of 2011, the county faced the potential loss of more than a half a million dollars per year in property taxes or real estate taxes. Most of that money goes to the Meredosia school district, and without those funds and with the economy going on nowadays, it was really going to create an uncertain financial future for that school district.

However, with FutureGen's project and their active maintenance of the plant and the preparation for the future construction, those property taxes have continued to be paid, and that makes a real difference -- real financial difference for the county and for our schools.

6-02

And then just to kind of summarize up, we are -- we are in rural America. We are a part of rural America. We have a strong agricultural community. 58 percent of power

Response

6-02 Thank you for your comment.

Commentor 6 -Terry Denison; Commentor 7 - Tom Grojean

Response

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that's delivered to the rural electric cooperatives nationwide, not just here, they're coal based. So coal is very important to rural America and to all of us for the power. However, with ever-tightening environmental regulations, which you gentlemen are very much aware of, we need new technology to make coal cleaner and usable. So FutureGen is a great opportunity to demonstrate clean coal technology, and we're proud that we're a part of that. So let's build this plant, and let's protect the coal power for America.

6-02
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So thank you.

MR. WHYTE: Thank you.

The next speaker is Tom Grojean.

MR. GROJEAN: Thank you.

I appreciate the opportunity to be here and welcome you to Jacksonville. This far down the line, you're bound to -- I'm bound to repeat some of the other things that people have said. So forgive me, but a few things I do want to say.

I'll let the science folks figure all that out from this prediction or that prediction.

Commentor 7 -Tom Grojean

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I don't know that, but I do know that, through this process of being on the advisory committee and, even prior to that, being involved as a community citizen wanting to know what's going on in my own yard and my backyard and my neighbor's yard, that the FutureGen project has been very, very transparent. Questions have been asked; questions have been answered. Questions have been prompted so that, if you didn't have the question, you were given the question so that you knew the answer. I can't say enough about the transparency of all the people that have come to our community and told us about this project. I don't know of one instance where a question was not answered, and I'm sure honestly.

So where I really want to speak from, though, is the economic impact which Ken Humphreys showed on his summary slide. It's tough in small-town America. Every community's looking for an opportunity. And I'm sure, between Mr. Denison and Mayor Ezard and Village President Jumper, you look for those opportunities where you can create jobs. We look at FutureGen as a job creator. Whether a new

7-01

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Response

7-01 Thank you for your comment.

Commentor 7 -Tom Grojean

PUBLIC COMMENT MEETING 5/21/2013

student comes to the colleges, whether a construction company buys a 2 x 4 or gets gas or goes to the grocery store, or a new professor comes in to teach the education of FutureGen, we look at that as an opportunity and a job creator.

Just in yesterday's Springfield paper, it talked about small business is the creator of jobs. This will create jobs and enhance small business and enhance the entire region.

So for that I wholeheartedly support the FutureGen project.

Thank you.

7-01
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MR. WHYTE: That actually concludes the list of folks who signed up to speak at the beginning when they came in this evening.

Is there anyone that I missed who had signed up that wanted to speak?

At this time I will ask, if there's anyone here who didn't sign up to speak that would like to say a few words, now would be the time to do that.

Or any speaker that would like to add something to the comments they've already given

Response

this evening.

Okay. Well, I'd like to thank everybody for coming out this evening. I appreciate the respectful way that everyone who was interested in providing comments this evening was able to do so.

Please remember that the comment period will be open until June 17.

We will continue the informal process this evening. If there's any particular issue or questions and answers that you'd like to have, we'll stay around here. I believe we have the building till about 9:00 o'clock, and at that point we need to start cleaning up, but be glad to entertain any questions or any discussions until that time.

Let the record show that this concludes the formal session of the public comment meeting for the FutureGen 2.0 draft EIS, and this meeting is adjourned at 7:15.

Thank you.

(Meeting adjourned at 7:15 P.M.)

CERTIFICATE OF REPORTER

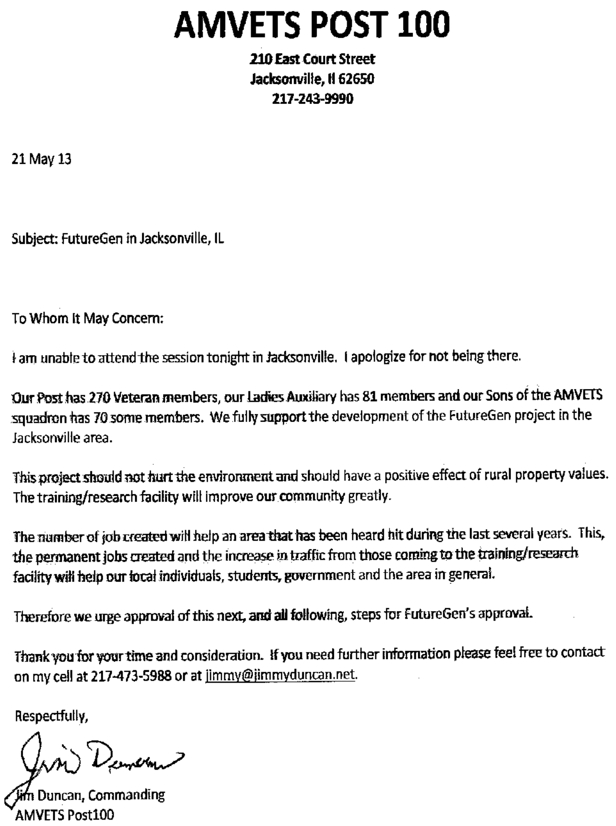
STATE OF ILLINOIS)
) ss.
COUNTY OF SANGAMON)

I, ROBIN A. ENSTROM, a Registered Professional Reporter, Certified Shorthand Reporter, and Notary Public within and for the State of Illinois, do hereby certify that the foregoing proceedings were taken by me to the best of my ability and thereafter reduced to typewriting under my direction; that I am neither counsel for, related to, nor employed by any of the parties to the action in which these proceedings were taken; and further that I am not a relative or employee of any attorney or counsel employed by the parties thereto, nor financially or otherwise interested in the outcome of the action.

Robin A. Enstrom

ROBIN A. ENSTROM

Commentor 8 - Jim Duncan



AMVETS POST 100

210 East Court Street
Jacksonville, Il 62650
217-243-9990

21 May 13

Subject: FutureGen in Jacksonville, IL

To Whom It May Concern:

I am unable to attend the session tonight in Jacksonville. I apologize for not being there.

Our Post has 270 Veteran members, our Ladies Auxiliary has 81 members and our Sons of the AMVETS squadron has 70 some members. We fully support the development of the FutureGen project in the Jacksonville area.

This project should not hurt the environment and should have a positive effect of rural property values. The training/research facility will improve our community greatly.

The number of job created will help an area that has been heard hit during the last several years. This, the permanent jobs created and the increase in traffic from those coming to the training/research facility will help our local individuals, students, government and the area in general.

Therefore we urge approval of this next, and all following, steps for FutureGen's approval.

Thank you for your time and consideration. If you need further information please feel free to contact on my cell at 217-473-5988 or at jimmy@jimmyduncan.net.

Respectfully,

Jim Duncan

Jim Duncan, Commanding
AMVETS Post100

8-01

Response

8-01 Thank you for your comment.

Commentor 9 - Steve Warmowski

From: steve warmowski [warmowski@frontier.com]
Sent: Wednesday, May 22, 2013 1:31 AM
To: cliff.whyte@netl.doe.gov
Subject: FutureGen 2.0 public comment in support of EIS

Writing in support of the environmental review for FutureGen 2.0 project in Jacksonville, Illinois. Public input meeting Tuesday 21 May 2013 at Jacksonville High School.

This past month my Ameren/Illinois bill included an electricity sourcing statement that said two-thirds of my power game from coal. Out of all the comments from tonight's meeting none touched on what NOT building FutureGen would mean – that coal emissions, with its CO2 NOx SOx Mercury and other pollutants, would continue unabated.

FutureGen 2.0 will make it such that my electricity usage doesn't contribute Carbon Dioxide emissions. The process will also drastically cut back on Nitrogen, Sulphur, Mercury and other emissions.
Not only that, this example project will show that it's possible to cut emissions from coal plants around the country (and world) using carbon capture.

I appreciate this project pushed by Sen. Dick Durbin, in partnership with coal and power generation companies.

9-01

Steve Warmowski
217.245.4178
warmowski@frontier.com
1815 Mound Road - Jacksonville IL 62620

Alderman, City of Jacksonville, Ward 5

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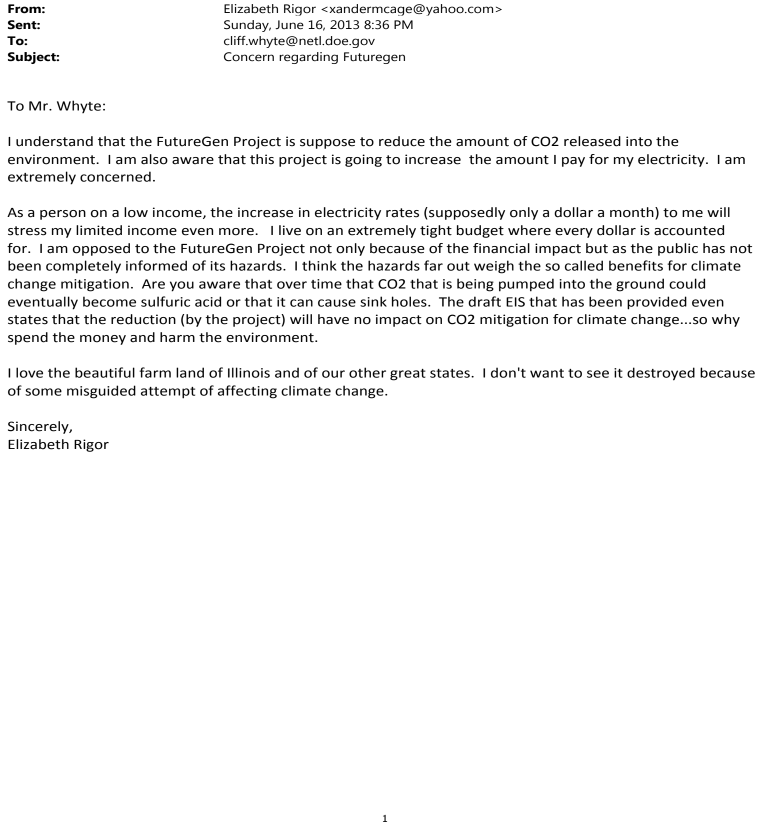
Response

9-01 Thank you for your comment.

Commentor 10 - Elizabeth Rigor



From: Elizabeth Rigor <xandermcage@yahoo.com>
Sent: Sunday, June 16, 2013 8:36 PM
To: cliff.whyte@netl.doe.gov
Subject: Concern regarding Futuregen

To Mr. Whyte:

I understand that the FutureGen Project is suppose to reduce the amount of CO2 released into the environment. I am also aware that this project is going to increase the amount I pay for my electricity. I am extremely concerned. 10-01

As a person on a low income, the increase in electricity rates (supposedly only a dollar a month) to me will stress my limited income even more. I live on an extremely tight budget where every dollar is accounted for. I am opposed to the FutureGen Project not only because of the financial impact but as the public has not been completely informed of its hazards. I think the hazards far out weigh the so called benefits for climate change mitigation. Are you aware that over time that CO2 that is being pumped into the ground could eventually become sulfuric acid or that it can cause sink holes. The draft EIS that has been provided even states that the reduction (by the project) will have no impact on CO2 mitigation for climate change...so why spend the money and harm the environment. 10-02

I love the beautiful farm land of Illinois and of our other great states. I don't want to see it destroyed because of some misguided attempt of affecting climate change.

Sincerely,
Elizabeth Rigor

1

Response

10-01 The Illinois Commerce Commission approved a 20-year power purchase agreement for the FutureGen 2.0 Project. As part of the approval process, the cost of the FutureGen 2.0 Project was independently evaluated against a cost benchmark designed to protect Illinois ratepayers. The costs are estimated to be less than the cost benchmark. Under the power purchase agreement, Ameren and Commonwealth Edison (an Exelon subsidiary) would enter into contracts with the Alliance to purchase the electricity generated by the FutureGen 2.0 Project. The average monthly bill impact for residential customers serviced by either Ameren or Commonwealth Edison is estimated to be less than $1.50 per month. Customers of rural electric cooperatives would see no impact to their monthly electric bills.

10-02 The Draft EIS described and summarized potential hazards and impacts of the FutureGen 2.0 Project in Chapters 3 and 4. Section 3.4.3.2 of the Draft EIS addressed the potential impacts from the injection of CO_2 into the Mt. Simon Formation under the subheading "CO_2 Storage Study Area" and determined that significant effects would not be experienced at the land surface. The CO_2 would be injected at a depth of more than 3,900 feet below ground surface (bgs) and confined by a 400-foot thick layer of low-permeability siltstone and shale (the Eau Claire Formation) above the storage formation. There is also a secondary confining layer (Franconia Dolomite) above the Eau Claire at the CO_2 injection site. The response to Comment 2-10 provides additional information in response to concerns about the potential acidity of the CO_2 plume. There is no scientific basis for concluding that sinkholes would develop in a sandstone formation. The MVA program for the CO_2 storage area would identify any unanticipated changes in conditions during operations that would be addressed expeditiously to avoid significant impacts. The response to Comment 2-06 addresses the points regarding CO_2 emissions and global climate change.

Commentor 11 - Andrea Issod, Sierra Club

SIERRA
CLUB
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June 17, 2013

Mr. Cliff Whyte, M/S:
I07, National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880
Cliff.whyte@netl.doe.gov

Re: Comments on Draft Environmental Impact Statement for the FutureGen 2.0 Project (DOE/EIS-0460D)

Summary of Comments

The Department of Energy is proposing to provide $1 billion dollars of federal funding to support construction of a new 168-megawatt coal-fired plant using oxy-combustion technology integrated with carbon capture and storage. The plant would utilize some existing infrastructure at Ameren Energy Resources' ("Ameren") Meredosia Energy Center, which ceased operations in 2011. The proposed project would capture at least 90% of the carbon dioxide from the new coal-fired plant, compress it, and transport it 30 miles away via an underground pipeline to Morgan County, where it would be injected and stored in the Mt. Simon Formation. The project would include a visitor and research center and training facility in Jacksonville Illinois.

The Draft Environmental Impact Statement for FutureGen 2.0 ("DEIS") is legally and technically flawed. Most egregiously, the DEIS relieson a fictional "no action" alternative that pretends the Meredosia facility is operating like it did between 2007-2009. The Meredosia facility, however, has not been operating for the last two years. Ameren shut down operations because it is an old, uncontrolled, and uneconomic plant. The facility could not simply flip a switch and resume operations; it does not even have a valid operating permit. Comparing the proposed project to this fictitious baseline, the DEIS concludes that the FutureGen project will be **11-01**

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Response

11-01 Thank you for your comment. DOE prepared the Draft EIS in accordance with Council on Environmental Quality regulations (40 CFR 1500 through 1508) and DOE regulations for implementing NEPA (10 CFR 1021).

The Sierra Club's comments as summarized here (Comment 11-1) are individually addressed in DOE's comment responses 11-02 through 11-16. Specifically, for Purpose and Need (see responses to Comments 11-02 and 11-03); Alternatives (see responses to Comments 11-04, 11-05, and 11-06); and Environmental Impacts (see responses to Comments 11-07 through 11-16). DOE's response to Comment 11-06 explains that the Draft EIS compares impacts of the proposed action with the current non-operational status, and when appropriate, with historic conditions, in order to provide reviewers with meaningful scale and perspective. Also, please see DOE's response to Comment 11-07, which specifically discusses that Section 3.1, Air Quality, in the Draft EIS states that "DOE evaluated potential air quality impacts using current baseline conditions where the energy center is no longer in operation, as well as using historical baseline conditions prior to the 2011 suspension of operations at the energy center."

Commentor 11 - Andrea Issod, Sierra Club	Response

beneficial because the new coal plant will have lower emissions than the old plant that already shut down. A federal agency should not espouse such an absurd, biased analysis. The residents surrounding the Meredosia facility have breathed air free from its pollution for the last two years. DOE must re-evaluate the full impacts of the proposed project from this current baseline and "no action" benchmark of zero emissions.

The DEIS also narrowly constrains the project's purpose and need to a choice between FutureGen 2.0 or a "no action" alternative, and it fails to consider and analyze reasonable, available, and less environmentally harmful alternatives. Further, the Department of Energy ("DOE") failed to adequately assess all of the direct, indirect, and cumulative environmental impacts of the project. Among other failures of the DEIS:

- The purpose and need is defined narrowly as a demonstration of one specific technology, oxy-combustion, which arbitrarily constrains the alternatives analysis.
- The purpose and need is based on the false premise that coal will be a vital part of this country's future energy supply.
- The DEIS considers no alternatives to the project other than no-action, which defeats NEPA's primary purpose to compare environmental consequences of different alternatives.
- The DEIS's analysis of potential environmental impacts relies on FutureGen obtaining Clean Air Act and Class VI injection permits that it does not currently hold.
- The DEIS fails to address the cumulative impacts of a successful FutureGen 2.0 project, such as construction of additional coal plants. The DEIS should consider the foreseeable environmental impacts of continued coal mining, transportation, and emissions.

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The Sierra Club is the nation's oldest and largest grassroots environmental group, with over 1.3 million members and supporters nationwide, and 23,000 members in Illinois. Sierra Club members are dedicated to exploring, enjoying, and protecting the wild places of the earth; to practicing and promoting the responsible use of the earth's ecosystems and resources; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and to using all lawful means to carry out these objectives. Through its Beyond Coal campaign, Sierra Club members are working to reduce reliance on coal and replace it with cleaner, less damaging alternatives. Sierra Club members live, work, attend school,

Commentor 11 - Andrea Issod, Sierra Club	Response

travel and recreate in areas surrounding the proposed FutureGen facility. Sierra Club members and their families include members of sensitive populations such as asthmatics, the elderly and children who are at elevated risk for the deleterious health effects posed by emissions from this proposal.

The Sierra Club requests that DOE fully and completely address the following concerns and re-issue the DEIS for further public comment.

I. Introduction

The National Environmental Policy Act (NEPA) is our "basic national charter for the protection of the environment."[1] Congress enacted NEPA "[t]o declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; [and] to enrich the understanding of the ecological systems and natural resources important to the Nation."[2] To accomplish these purposes, NEPA requires all agencies of the federal government to prepare a "detailed statement" that discusses the environmental impacts of, and reasonable alternatives to, all "major Federal actions significantly affecting the quality of the human environment."[3] This statement is commonly known as an environmental impact statement ("EIS").[4]

The EIS must "provide full and fair discussion of significant environmental impacts and shall inform decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment."[5] This discussion must include an analysis of "direct effects," which are "caused by the action and occur at the same time and place," as well as "indirect effects which . . . are later in time or farther removed in distance, but are still reasonably foreseeable."[6] An EIS must also consider the cumulative impacts of the proposed federal agency action together with past, present and reasonably foreseeable future actions, including all federal and non-federal activities.[7] Furthermore, an EIS must "rigorously explore and objectively evaluate all

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[1] 40 C.F.R. § 1500.1.
[2] 42 U.S.C. § 4321.
[3] 42 U.S.C. § 4332(2)(C).
[4] *See* 40 C.F.R. § 1502.
[5] 40 C.F.R. § 1502.1.
[6] Id. § 1508.8.
[7] Id. § 1508.7.

Commentor 11 - Andrea Issod, Sierra Club	**Response**

reasonable alternatives" to the proposed project.[8] In conducting its analysis, DOE must consider:

> [E]nvironmental impacts of the alternatives including the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented.
>
> * * *
>
> Possible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned.
>
> * * *
>
> Energy requirements and conservation potential of various alternatives and mitigation measures. Natural or depletable resource requirements and conservation potential of various alternatives and mitigation measures…. [H]istoric and cultural resources, and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures. [9]

NEPA requires the DOE to assess all impacts of the FutureGen 2.0 project. Specifically, the EIS must "present the environmental impacts of the proposal and the alternatives in a comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public."[10] In order to adequately assess the environmental impacts of the project and of reasonable alternatives to the proposed project (including, but not limited to, the proposed project plus additional mitigation measures), DOE must assess the direct, indirect, and cumulative impacts that the proposed project and each alternative would have.

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[8] Id. § 1502.14(a).
[9] Id. § 1502.16.
[10] Id. § 1502.14.

Commentor 11 - Andrea Issod, Sierra Club

II. Purpose and Need

a. The DEIS Does Not Reasonably Define Purpose and Need

11-02

The DEIS identifies a general need to address environmental and climate change challenges related to the nation's use of coal, and it assumes that agency action is needed to support the coal industry's efforts to develop new technologies that will complete in the low-carbon future energy world.[11] The purpose is broadly stated to "demonstrate advanced technologies to meet the nation's energy needs with an abundant natural resource and reduce the nation's output of GHG emissions."[12] Contrary to the broadly stated purpose, the DEIS later narrowly defines the need to demonstrate one particular coal combustion technology that lends itself to carbon capture.[13]

The DEIS arbitrarily constrained the alternatives analysis by narrowly defining the purpose and need to demonstrate a particular type of coal combustion technology. The purpose should not be limited to simply demonstrating commercial feasibility of one oxy-combustion technology for carbon capture, but should rather be expanded to include consideration of other technologies and alternative projects such as renewable energy plants that would address the environmental and climate impacts related to coal. The limited purpose and need constrained the alternatives analysis to an analysis of FutureGen as proposed or a "no action" alternative. Because of the narrow purpose and need, the DEIS does not assess alternatives such as alternative technologies or projects, renewable energy projects, conservation and efficiency, or using other sources or blends of fuel.

DOE has effectively ensured that construction of the FutureGen plant as proposed is the only means of achieving the stated purpose and need in the DEIS. If the agency constricts the definition of the project's purpose and thereby excludes what truly are reasonable alternatives, the EIS cannot fulfill its role.[14] This is a completely impermissible construction of "purpose and need" that taints the remainder of the DEIS.

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[11] DEIS, at p. 1-6.

[12] Id. at 1-7.

[13] Id. at 1-6 – 7.

[14] *Simmons v. U.S. Army Corps of Engineers*, 120 F.3d 664, 667 (7th Cir. 1997).

Response

11-02 The purpose and need for DOE action are reasonably defined in the Draft EIS and are consistent with the definition of purpose and need that DOE has used in NEPA documents for comparable projects involving financial assistance by DOE. As explained in Section 1.2 of the Draft EIS, DOE originally undertook the proposed action in response to the President's FutureGen Initiative to create a near-zero emissions power plant fueled by coal. DOE defined its purpose and need for action consistent with the FutureGen Initiative. In Section 1.4 of the Draft EIS, DOE acknowledged the current and expected future importance of coal within the national mix of fuels for electric power generation based on predictions by the Energy Information Administration. DOE also acknowledged that the aging national power generation infrastructure is or soon will be in need of refurbishment or replacement. DOE further acknowledged in Section 1.4 that potential rules limiting future CO_2 emissions could significantly affect the development of coal-based power generation unless methods to reduce CO_2 emissions are successfully demonstrated and adopted.

Within the context of the purpose and need as consistent with the President's FutureGen Initiative, DOE's consideration of alternatives was necessarily limited to the reasonable alternatives that could fulfill the objectives of that initiative. In Section 1.2, the Draft EIS explains the history of the FutureGen Project and its evolution leading to the FutureGen 2.0 Project. The Draft EIS describes the alternatives DOE considered and the reasons for their elimination in Section 2.3.1, Alternative Fuel Sources, Section 2.3.2, Alternative Advanced Coal-based Electric Generating Technologies, Section 2.3.3, Alternative Retrofitting Technologies, Section 2.3.4, Alternative Sites for the Oxy-Combustion Large Scale Test, and Section 2.3.5, Alternative CO_2 Pipeline and Storage Reservoir Locations. DOE considered all reasonable alternatives and mitigation measures suggested in comments on the Draft EIS. Responses to such specific comments are provided in this Final EIS.

Commentor 11 - Andrea Issod, Sierra Club

b. The DEIS Arbitrarily Assumes that Coal is a Necessary Part of the Nation's Energy Supply

11-03

The DEIS is based on the assumption that coal "serves an important role in the nation's energy supply."[15] This is an arbitrary conclusion that is not supported by the DEIS, and it ignores the increasing availability and economic viability of cleaner energy sources, including solar and wind power.

According to a 2009 Union of Concerned Scientists (UCS) report, the United States will be able to meet projected consumer demand for electricity over at least the next 20 years without building any new coal-fired power plants.[16] Increasing renewable energy and improving energy efficiency can completely eliminate the need for new coal power plants and shut down the oldest, dirtiest plants without adverse effects to our electricity supply.[17]

Coal is an inefficient and outdated source of energy, and coal-fired power plants are the dirtiest source of energy that we use today. Using coal for electricity scars lungs, tears up the land, pollutes water, devastates communities, and makes global warming worse. Using coal for energy has devastating environmental impacts during every point in its lifecycle. Mining coal from the ground damages lands, water, and air. Transporting and burning it releases toxic air and greenhouse gas pollution, and coal-combustion waste contaminates land and water. From cradle to grave, the damages coal causes to our environment and society are too large to ignore.

The Sierra Club strongly espouses the abundant non-coal alternatives that avoid the toxic problems of mining and coal waste disposal while creating sustainable, family-supporting jobs. In order to improve our nation's energy infrastructure, federal taxpayer dollars should focus on energy sources that do not cause health problems and global warming pollution. Renewable energy sources are increasing nationwide, and federal investments in renewables will help lower energy prices and help create a cleaner energy future.

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[15] DEIS, at p. S-3.

[16] Climate 2030: A National Blueprint for a Clean Energy Economy, available at http://www.ucsusa.org/global_warming/solutions/big_picture_solutions/climate-2030-blueprint.html

[17] Id.

Response

11-03 As explained in response to Comment 11-02, DOE's consideration of alternatives was necessarily limited to the reasonable alternatives that could fulfill the objectives of the President's FutureGen Initiative. That initiative was driven in part by Energy Information Administration predictions about the current and expected future importance of coal within the national mix of fuels for electric power generation. DOE acknowledges that the national mix of energy sources will vary over time, and the reductions attainable from conservation measures will continue to affect demand. As stated in Section 2.3.1 of the Draft EIS, DOE oversees a diverse portfolio of energy research, development, and demonstration efforts, including alternative fuels, renewable energy sources, and energy conservation improvements. However, none of these other efforts support the specific objective of the President's FutureGen Initiative to demonstrate a coal-based power generation facility with near-zero emissions.

Commentor 11 - Andrea Issod, Sierra Club

III. Alternatives

a. The DOE Failed to Consider Renewable Energy or Alternative Projects

NEPA requires federal agencies to consider reasonable and feasible alternatives to the proposed action. "A thorough study and a detailed description of alternatives . . . is the linchpin of the [EIS]."[18] The DEIS is flawed because it fails to consider any meaningful alternatives to the proposed action.[19] The DEIS only considers two alternatives: the "no-action alternative" and the building of the proposed FutureGen 2.0 project. Where, as here, an agency considers only the preferred alternative and the no action alternative, courts usually find the resulting EIS is deficient.[20]

Because the DOE created a restrictive purpose and need for the proposed action, the DEIS does not consider any reasonable alternative technology. The DEIS has constrained the review to one project – the oxy-combustion carbon capture sequestration. It does not consider alternative technologies or design plans such as alternative fuel sources or blends, locations, alternative electric generating technologies, or alternative retrofitting technologies. The DEIS also completely lacks any mention of using renewable power resources in place of building a new boiler and constructing carbon capture sequestration technology. The DOE has a broad mandate to consider all reasonable alternatives, even those that are "not within the jurisdiction of the lead agency."[21] **11-04**

b. The DOE Failed to Adequately Consider Alternative Locations for the CO2 Storage

The DOE has an obligation under NEPA to consider alternative sites to host the project. DOE is required to "[r]igorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated."[22] **11-05**

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[18] *Monroe County Conservation Council, Inc. v. Volpe*, 472 F.2d 693, 697-98 (2nd Cir. 1972).

[19] 40 C.F.R. § 1502.14(a) (agencies must "[r]igorously explore and objectively evaluate all reasonable alternatives").

[20] *See, e.g., Illio'ulaokalani Coaltion v. Rumsfield*, 464 F.3d 1083, 1098 (9th Cir. 2006).

[21] 40 C.F.R. § 1502.14(c).

[22] Id. § 1502.14(a).

Response

11-04 DOE explained the basis for consideration of alternatives in the Draft EIS in response to Comment 11-02. As explained in response to Comment 11-03, alternatives involving different fuel sources (other than coal), renewable energy, and energy conservation improvements would not support the specific objectives of the President's FutureGen Initiative.

11-05 Alternatives considered by DOE originate as private-party (e.g., electric power industry) applications submitted to DOE in response to requirements specified by respective Presidential or Congressional directives and resulting programs, in this case the Presidential FutureGen Initiative. The Draft EIS explains the FutureGen Industrial Alliance's process for the identification and consideration of alternative locations for the CO_2 storage facility in Section 2.3.5. DOE reviewed and monitored the process for fairness, technical accuracy, and compliance with the intent of NEPA. DOE does not consider alternative sites or locations that have been removed from consideration by the Alliance to be reasonable alternatives.

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11-05 *con't* DOE directed FutureGen to pick two alternative sites for the carbon storage. FutureGen picked Christian County and Douglas County, but then dismissed those sites on the basis that they were not economically viable.[23] The DEIS does not address additional sites raised as carbon storage possibilities in the public scoping process, such as Fayette County, which was alleged to have more available area to store CO2 than the proposed Morgan County.[24] The DOE should consider these alternate locations.

11-06

c. The No-Action Alternative is Based on the Fiction that the Facility is Still Operating

As required by law, the DEIS includes a "no-action" alternative.[25] This provides "the standard by which the reader may compare the other alternatives' 'beneficial and adverse impacts related to the applicant doing nothing.'"[26] To fulfill this requirement, DOE must "compare the potential impacts of the proposed major federal action to the known impacts of maintaining the status quo."[27] The analysis of the no-action benchmark in the DEIS is severely flawed because it is based on the fiction that the Meredosia facility is operating when it has in fact been dormant since 2011. Maintaining the "status quo" means the facility would not operate and it would not generate any emissions.

Ameren ceased operation of the Meredosia Energy Center in 2011.[28] Nevertheless, the DOE compares the potential impacts from the proposed new plant to a no-action benchmark that pretends the old facility is still operating. The DEIS then concludes that building a new cleaner plant is a better option than the fictitious status-quo.[29] This improper baseline taints the DEIS' analysis of environmental impacts, as described in detail below.

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[23] DEIS, at p. 2-5.

[24] Transcript of FutureGen 2.0 Public Scoping Meeting at 69-70, in Jacksonville, Illinois (June 9, 2011), http://www.netl.doe.gov/publications/others/nepa/FG2_scoping%20transcript_Jacksonville06092011.pdf

[25] 40 C.F.R. § 1502.14(d).

[26] *Kilroy v. Ruckelshaus*, 738 F.2d 1448, 1453 (9th Cir. 1984).

[27] *Custer County Action Assn v. Garvey*, 256 F.3d 1024, 1040 (10th Cir. 2001).

[28] DEIS, at p. 2-13.

[29] *See, e.g.*, DEIS, at Table 4.1-1 (finding project would have beneficial impact due to "overall lower emissions" and sequestration of CO2 emissions from the power plant).

Response

11-06 Section 2.2 of the Draft EIS clearly states that the no action alternative represents a "no-build" alternative. The Draft EIS explains in Section 2.4.1.5 that Ameren suspended operations at the Meredosia Energy Center at the end of 2011 and that the facility is currently not operating. For each environmental resource in Chapter 3 of the Draft EIS, DOE described the impacts of the no action alternative based on status quo conditions with a non-operational energy center. For the proposed action, DOE described the impacts for each respective resource in Chapter 3 both in terms of the changes from the current non-operational status and in comparison to conditions during historical operations at the facility. These comparisons were intended to provide reviewers with meaningful scale and perspective for the proposed action. Also, in Table 4.1-1 of the Draft EIS, DOE summarized the potential impacts of no action and the proposed action for each environmental resource. Table 4.1-1 compares the uses, demands, emissions, and/or discharges as appropriate for the proposed action to the historical operating conditions for purposes of providing scale and perspective. These comparisons were not intended to imply that the facility is still operating.

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IV. Environmental Impacts

a. The DOE Used a Fictitious Baseline for Analyzing the Environmental Impacts of FutureGen 2.0

The DEIS's analysis of air quality and climate impacts rests on the false premise that the existing facility continues to operate and generate pollution. Elsewhere, however, the DEIS acknowledges that this is not true. The facility voluntarily chose to shut down operations two years ago because it is very old and inefficient and cannot comply with Clean Air Act regulations. It has no plans to continue operations. It does not even have a valid Title V operating permit. Yet the DEIS assumes the new facility would decrease emissions by comparing the proposed facility's potential emissions to emissions that the old plant generated between 2007-2009. This is an improper analysis under NEPA, as well as the Clean Air Act.

The Meredosia plant shut down operations in March 2011.[30] According to Ameren, the plant was closed due to stricter air pollution regulations on fine particulate matter and ozone, including the cross-state rule.[31] The plant was also very old, the least efficient in the company's fleet, and could not be run economically.[32] According to Steven R. Sullivan, the head of Ameren Energy Resources Co.:

> We cannot continue to economically operate these units. Numerous options to bring these units into compliance were explored, including installing additional environmental controls, but the costs were just too high to be justified.[33]

Data from EPA databases confirms that this plant generated zero emissions in 2012.[34]

11-07

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[30] DEIS, at p. S-7.

[31] Id. at p. 2-13; Jeffrey Tomich, Ameren Corp. prepares to close two old power plants in Illinois, St. Louis Post Dispatch (Oct. 5, 2011), available at http://www.stltoday.com/business/local/ameren-corp-prepares-to-close-two-old-power-plants-in/article_0a82d93f-52c8-5f43-a2d9-303e8ef438dc.html; WUIS, Ameren To Close Meredosia Plant (Oct. 4, 2011), available at http://wuisnews.wordpress.com/2011/10/04/ameren-to-close-meredosia-plant/

[32] Tomich.

[33] Tomich.

[34] Coal-fired Characteristics and Controls: 2012, U.S. Environmental Protection Agency Clean Air Markets Program, available at http://www.epa.gov/airmarket/quarterlytracking.html.

Response

11-07 Defining the baseline conditions for NEPA purposes was not a simple matter, as the Meredosia Energy Center was both active and inactive in recent history. Given the two scenarios, DOE opted to present both in the Draft EIS. Section 3.1, Air Quality, in the Draft EIS states that "DOE evaluated potential air quality impacts using current baseline conditions where the energy center is no longer in operation, as well as using historical baseline conditions prior to the 2011 suspension of operations at the energy center." DOE evaluated estimated emissions from the FutureGen 2.0 Project combined with regional "current" data to determine whether projected emissions from operation of the FutureGen 2.0 Project would cause or contribute to NAAQS exceedances. Historical emissions from the energy center prior to the 2011 shutdown were presented in the Draft EIS for the purpose of explaining why a PSD permit would likely not be required in accordance with the requirements of the Clean Air Act as implemented by Illinois Environmental Protection Agency (IEPA). As explained in the response to Comment 11-06, the comparisons of future conditions (with the FutureGen 2.0 Project operating) to historical conditions (with the pre-2011 Meredosia Energy Center operating) were intended to provide reviewers with meaningful scale and perspective for the impacts of the proposed action. DOE did not intend to imply that the Meredosia Energy Center was still operating or that it would be restarted in its prior configuration in the future.

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Ameren does not plan to restart the facility. According to the DEIS, "Ameren has no current plans to resume operation of the power generation infrastructure at the energy center."[35] In fact, Ameren disclosed to investors in its most recent annual report that the company has been required by the Illinois Pollution Control Board "to refrain from operating the Meredosia . . . energy center through December 31, 2020" in order to obtain a waiver for its failure to bring SO2 emissions at its remaining facilities into compliance with state standards.[36] The company also announced it would exit the Illinois merchant energy business altogether in a recent SEC filing.[37] Among other factors, Ameren cited the reduced energy demand from advances such as energy efficiency, the level of volatility of future prices for power, and of course, environmental compliance as part of its decision to exit the merchant business. Ameren has now proposed to sell its coal-fired power plants to Dynegy.[38]

The DEIS ignores all of this information. It contains no analysis of whether the plant could legally resume operations under the existing permits aside from the conclusory statement that that Ameren is "complying with applicable permits and their associated requirements."[39] In fact, the facility does not have a valid Title V operating permit. According to the DEIS,

> The Meredosia Energy Center Title V Operating Permit (called a CAA Permit Program permit in Illinois) was originally issued in September 2005 but was appealed to the Illinois Pollution Control Board by Ameren. As a result of the appeal, Ameren was granted a stay of the permit and the permit never took effect. Ameren is currently in negotiation with the IEPA to resolve the issues identified in the appeal of the permit so that a Title V Operating Permit can be put into effect. Until the appeal is resolved and the stay is lifted by the Illinois Pollution Control Board, IEPA cannot modify the Title V Operating Permit.[40]

11-07
con't

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[35] DEIS, at p. 2-13.

[36] Ameren Corporation, Form 10-K Annual Report for the Fiscal Year Ended December 31, 2012, available at http://www.sec.gov/Archives/edgar/data/18654/000144530513000414/aee-2012x1231x10k.htm

[37] Ameren Corporation. Form 8k. Securities and Exchange Commission. (Dec.12, 2012), available at http://www.sec.gov/Archives/edgar/data/1002910/000119312512509316/d456963d8k.htm

[38] Molly Ryan, Dynegy hits a roadblock in Ameren acquisition, Houston Business Journal (Jun. 8, 2013), available at http://www.bizjournals.com/houston/morning_call/2013/06/dynegy-hits-a-roadblock-in-ameren.html

[39] DEIS, at p. 2 - 6.

[40] Id. at p. 3.1-8 – 9.

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Title V permits ensure that a plant's emissions comply with all federal and state Clean Air Act regulations. Many of these regulations have changed significantly in the past seven years since the original permit was issued, including more stringent ambient air quality standards, and the requirement to regulate emissions of greenhouse gases. Because the operating permit has been stalled at the administrative agency for the last seven years, it is unreasonable to assume the matter will be settled any time soon. Additionally, the stalled 2005 operating permit is already outdated and cannot ensure compliance with updated regulations. Meredosia cannot legally resume operations without a valid operating permit.

The DOE's assumption that the plant could restart operations under existing permits is pure fiction. The plant is shut down and Ameren has announced publicly to shareholders and the SEC that the company is exiting the coal plant business. The company has no plans to resume operations nor could it legally restart under current permits or its agreement with the Illinois Pollution Control Board. The DOE must redo its analysis of environmental impacts in the DEIS based on a zero emissions baseline.

i. Air Quality Impacts

11-07
con't

DOE must evaluate the potential air quality impacts of the proposed facility from current baseline conditions. Local residents have not breathed in pollution from the Meredosia facility for the past two years, nor are they in any danger of the plant resuming operations. The DOE must evaluate the impacts of increasing pollution in the area from these current conditions, not conditions that occurred over five years ago.

In reliance on Ameren's application for an air permit,[41] the DEIS erroneously gives FutureGen credit for "contemporaneous emissions decreases" from shutdown of the existing boilers, even though they shutdown voluntarily two years ago and cannot resume operations. By comparing potential emissions to *historical* emissions from the facility, the DEIS finds that, "overall the net emissions of the Meredosia Energy Center would decrease in comparison to historical emissions rates."[42] The DOE should not rely on Ameren's biased analysis, which is not permissible under the Clean Air Act or NEPA.

As described in the DEIS, the facility will in fact increase pollution in the area by 292 tons per year (tpy) of sulfur dioxide (SO2), 1,482 tpy of nitrous oxide, 1,266 tpy of carbon monoxide, 105 tpy of particulate matter

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[41] Id. at p. 3.1-24.
[42] Id. at p. 3.1-23.

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less than 10 microns (PM10), 35 tpy of particulate matter less than 2.5 microns (PM2.5), and 30.3 tpy of volatile organic compounds (VOCs).[43] These are significant emissions that must be evaluated in the DEIS, and which will require a major source permit under the Clean Air Act. The DEIS must evaluate the full emissions from the facility from a zero emissions baseline. **11-07 *con't***

ii. Climate Change and Greenhouse Gases

The make-believe baseline also taints the DEIS' characterization of greenhouse gas emissions. By relying on the fiction that the old plant is emitting CO2, the DEIS wrongfully concludes that the project would have an overall beneficial cumulative impact on reducing CO2 emissions. As explained, the Meredosia Energy Center's operations were suspended at the end of 2011, at which point it ceased to emit any CO2.[44] Since the FutureGen 2.0 project will be an entirely new source of CO2 emissions, the DEIS must analyze its potential CO2 emissions compared to a zero emission baseline. **11-08**

Although FutureGen proposes to capture 90% of its CO2 emissions, it does not have an air permit or any other enforceable requirement to actually capture any percentage of the new plant's CO2 emissions. Without such enforceable requirements, the DEIS cannot assume any CO2 emissions will actually be captured. DOE must analyze the environmental and climate impact of the full amount of CO2 emissions from the Meredosia Energy Center. The DEIS must be redone to evaluate the true climate change impacts of this proposal.

b. Because FutureGen 2.0 Does Not have a Valid Clean Air Act Permit with Enforceable Conditions, DOE Must Evaluate the Full Emissions From the Project

The proposed FutureGen oxy-combustion boiler does not have Clean Air Act permit from the Illinois Environmental Protection Agency. Ameren submitted an application to the agency for a construction permit on February 6, 2012,[45] and an update to the application is needed because of changes to the project.[46] **11-09**

The DOE's analysis of FutureGen's air quality and climate change impacts improperly assumes that the facility will limit its emissions by including control equipment and through other operational measures. For example, the DEIS assumes FutureGen will capture and sequester 90% of its

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[43] Id. at p.3.1-19.
[44] Id. at p. S-7.
[45] Ameren Application for Construction for FutureGen 2.0 (Feb. 6, 2012).
[46] Email from Brad Frost, IEPA (Jun. 6, 2013); see DEIS, at p. 3.1 – 19.

Response

11-08 As discussed in the response to Comment 11-07, Section 3.2, Climate and Greenhouse Gases, of the Draft EIS analyzes the impacts of the net greenhouse gases emitted from this project's construction and operations both with and without consideration of historical emissions from the Meredosia Energy Center.

As described in the Cover Sheet and Sections 1.1 and 2.1 of the Draft EIS, the FutureGen 2.0 Project would include the capture and geologic storage of at least 90 percent of the CO_2 that would otherwise be emitted by the project. DOE's decision with respect to the proposed action of providing federal funding for the FutureGen 2.0 Project is based on the project as so described. Furthermore, the FutureGen 2.0 Project must ensure the capture and geologic storage of at least 90 percent of CO_2 for it to be fully compliant with the Power Purchase Agreement and the Illinois Clean Coal Portfolio Standard Law (20 ILCS Part 3855). Therefore, DOE maintains that the project, as analyzed in the Final EIS, would not proceed without the required CO_2 capture and geologic storage component.

11-09 Issues expressed in this comment have been addressed in the responses to Comments 11-07 and 11-08. Further, the FutureGen 2.0 Project would not operate without all relevant Clean Air Act permits.

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CO2 emissions. Without actual permits containing enforceable conditions requiring controls or otherwise limiting emissions, however, the DEIS must analyze the environmental impact of the full potential amount of emissions from the FutureGen project.

The DOE cannot limit the scope of its review based on permits that do not exist. As explained previously, Ameren's application for a Clean Air Act permit is significantly flawed because it takes credit for emissions reductions from the old plant that is not currently operating and cannot legally resume operations. **11-09** ***con't***

c. The DOE Failed to Adequately Address Potential Environmental Impacts of Long Term Carbon Storage

The DOE should evaluate the environmental impacts of large scale CO2 sequestration for potentially significant impacts to the environment, public health, and private property. Improper storage or long term monitoring could lead to health risks to nearby populations, harm flora and fauna and agriculture, create pressure changes causing ground heave, and even trigger seismic events. CO2 leakage can also lead to groundwater contamination by leaking into potable aquifers or causing saline intrusion. Accidental releases of CO2 will also impact climate change. The DOE does not sufficiently address these possibilities in the DEIS. **11-10**

d. The DOE Impermissibly Failed to Address Financial Assurance and Long-Term Monitoring Plans

The DEIS does not address a future monitoring or a financial assurance plan to insure the long-term stability of the CO2 sequestration. Though FutureGen will need both a monitoring and financial responsibility plan before obtaining a permit for the Class IV injection wells, that permit has not yet been issued. The lack of financial assurance and monitoring can lead to negative environmental impacts and therefore must be assessed in the DEIS.

The FutureGen 2.0 project proposes a demonstration period beginning in 2017 and ending in 2022, with active injection and monitoring, and commercial operations potentially continuing beyond this DOE-funded period.[47] The CO2 injection will operate for a total of 20 years, and the monitoring and verification process will continue for another 50 years afterwards.[48] **11-11**

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[47] DEIS, at p. S-20.

[48] Id. at p. S-20.

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Response

11-10 The Draft EIS addressed potential environmental impacts of long-term carbon storage in a number of sections. Section 3.4.3.2 of the Draft EIS describes the analysis and modeling that have been conducted for CO_2 injection and storage in the Mt. Simon Formation, the expected integrity of the primary and secondary confining formations, seismicity risks, and the monitoring and verification activities that would be required for compliance with the UIC Class VI permits for the injection wells. Section 3.5.3.2 of the Draft EIS describes the analysis and modeling that have been conducted relevant to the potential for leakage from the CO_2 storage formation into underground sources of drinking water. Section 3.17.3.2 addresses the potential risks for leakage of CO_2 from pipeline and CO_2 injection wells during operations. Section 3.17.3.3 addresses the potential risks for leakage of CO_2 from the CO_2 storage formation after injection, including after CO_2 injection has ceased.

11-11 The Draft EIS addressed long-term monitoring plans for CO_2 storage in Section 2.5.2.4. The Draft EIS describes the anticipated MVA program for the FutureGen 2.0 Project that would be required by the UIC regulations to obtain a Class VI permit for each well. Unavailable at the time the Draft EIS was published, the Alliance has since submitted its consolidated UIC permit application in March 2013 (updated May 2013), including the long-term monitoring and financial assurance requirements. The application has been posted by the USEPA at its UIC website for public access (http://www.epa.gov/r5water/uic/futuregen/index.htm). Based on the analysis and modeling conducted by the Alliance (see response to Comment 11-10), DOE concluded that the CO_2 storage effort would not cause significant impacts to the natural and human environment. DOE assumes that if UIC Class VI permits would not be approved the project would not be able to comply with other permit and project requirements and the FutureGen 2.0 Project would not proceed as planned; hence, concerns raised in this comment about risks and negative impacts in the absence of an MVA program and financial assurance plan would be moot.

The Final EIS has been revised to include a discussion of financial assurance in Section 2.5.2.4. The Alliance would be responsible for post-injection site care and monitoring. The Alliance would also be responsible for any emergency or remedial actions that might be necessary. The Alliance would establish a trust fund and would obtain insurance to ensure that sufficient funds are available to meet its responsibilities to protect underground sources of drinking water and public health and safety. The Alliance's proposed post-injection site care and monitoring and financial responsibility for emergency

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The DEIS does not address who will remain responsible for the project past the demonstration period. Instead, it relies on a financial responsibility plan that will eventually be developed under the Safe Drinking Water Act regulations.[49] Effective financial assurance mechanisms are necessary to ensure that closure and post-site care, such as monitoring, are conducted. Without an adequate financial assurance mechanism, the site is at risk of environmental contamination, adverse human health effects, and a danger of abandonment.

Similarly, the DEIS does not address a monitoring plan, which is necessary to ensure that the CO2 stays sequestered. There is no plan that ensures that the CO2 will stay sequestered during the planned 50-year monitoring period or beyond. Public scoping comments indicated local residents' fear of a potentially dangerous CO2 leak and the lack of adequate evacuation procedures. Yet, the DEIS fails to provide any sort of emergency procedures regarding a CO2 leak, instead stating that they will be determined by Alliance in the future.[50]

The DOE must analyze the full impacts of the project, including potential future impacts, and cannot rely on permits that do not currently exist. The DEIS must analyze the financial assurance of FutureGen and the future monitoring program.

11-11
con't

e. The DOE Does Not Assess Future Costs of the FutureGen 2.0 Project

The DEIS does not consider who will be responsible for covering possible escalating costs of FutureGen 2.0. This is particularly important because "advanced" coal technologies and carbon capture and sequestration projects have a history of exceeding expected costs. For example, the first FutureGen project was abandoned in 2010 due to increased expenses, from a beginning budget of $1.3 billion to $1.8 billion.[51] Mississippi Power Company's Kemper IGCC plant's costs have doubled throughout the course of the project.[52] Although the DOE contributed enough funds to help the Kemper project get started, most of Kemper's $4 billion dollar price tag will be paid by ratepayers in economically depressed, communities of color in Mississippi. The Edwardsport coal gasification plant in Indiana started with

11-12

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[49] Id. at p. S-23.

[50] Id. at p. S-23.

[51] Taxpayers for Common Sense, "Department of Energy FutureGen Initiative Fact Sheet," available at http://www.taxpayer.net/library/article/the-department-of-energy-futuregen-initiative

[52] Mississippi Bigger Pie Forum, "Mississippi Power's Kemper Coal Plant", available at http://www.biggerpieforum.org/topic/mississippi-powers-kemper-county-coal-plant

Response

or remedial actions are described in the Alliance's Supporting Documentation for its Class VI UIC permit applications submitted to USEPA and posted at the UIC website for public access.

11-12 The issues expressed in this comment pertaining to cost growth experienced by other projects and the potential for cost overruns on the FutureGen 2.0 Project are outside the scope of this EIS. As stated in the Final EIS Cover Sheet, DOE's decision with respect to the FutureGen 2.0 Project relates to the provision of approximately $1 billion in federal funding. This Final EIS is intended to support DOE's decision whether to provide that funding. No additional federal funding is anticipated.

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11-12 con't an estimated cost of $1.985 billion and ended up costing $3.5 billion total.[53] The increased costs for Edwardsport have resulted in extensive litigation over financial responsiblity. Like Kemper and Edwardsport, FutureGen has unknown total project costs and unproven technology, and poses a significant risk of cost overruns. The DEIS does not consider this risk, evaluate the potential for cost overruns or who will be responsible for covering the potential increases.

11-13 The DEIS also does not consider how this project will impact future electricity rates in Illinois. This issue was the subject of much controversy in the public scoping comments.[54] The state of Illinois has bound its utilities to purchase electricity from FutureGen 2.0 for 20 years, without any commitment regarding the rates that will be charged to customers.[55] Local ratepayers are rightfully concerned that the state has locked them into higher energy fees. DOE must consider the interests of Illinois ratepayers, who would ultimately have to bear the costs of implementing this new technology. The DOE should not be demonstrating new technology to the detriment of the local ratepayers. The DEIS is incomplete because it fails to address these concerns.

f. The DOE Failed to Adequately Address Environmental Justice Concerns and Socioeconomic Impacts of FutureGen 2.0

The DEIS ignores the socioeconomic impact of the high rates that local residents will be required to pay for energy from FutureGen 2.0. The DEIS should evaluate which ratepayers will be forced to pay for FutureGen, and how much their utility bills will increase as a result of paying for this demonstration project. When utility bills rise, low and limited-income families can suffer health problems because they are not able to pay for heat or air conditioning.[56] The DEIS should consider the potential for these impacts.

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[53] Indianapolis Star, "Duke Energy Customers Owe $2.5 Billion Plus for Edwardsport Plant," 12/27/2012, available at http://www.indystar.com/article/20121227/BUSINESS/121227022/Duke-Energy-customers-owe-2-5-billion-plus-Edwardsport-plant

[54] See DEIS, at p. 1-11.

[55] Illinois Commerce Committee Press Release, "Illinois Regulator Approves Futuregen 2.0 Power Purchases," available at http://www.bloomberg.com/article/2012-12-19/auxH8eXyQ6co.html

[56] *See* Health Impact Project, "Case Study: Low Income Energy Assistance Program" available at http://www.healthimpactproject.org/hia/us/massachusetts-low-income-energy-assistance-program ("The assessment found that many families in Massachusetts were struggling to pay for rapidly rising energy bills, and that low-income families were being forced to make difficult and sometimes dangerous choices between heat, food and paying for medical care.")

Response

11-13 As explained in response to Comment 10-01, the Illinois Commerce Commission approved a 20-year power purchase agreement for the FutureGen 2.0 Project. The Illinois Commerce Commission's Final Order implemented the power purchase agreement in a manner that did not preferentially burden any affected customer regardless of location or electricity supplier. As part of the approval process, the cost of the FutureGen 2.0 Project was independently evaluated against a cost benchmark designed to protect Illinois ratepayers. The costs were estimated to be less than the cost benchmark. Under the power purchase agreement, Ameren and Commonwealth Edison (an Exelon subsidiary) would enter into contracts with the Alliance to purchase the electricity generated by the FutureGen 2.0 Project. The average monthly bill impact for residential customers serviced by either Ameren or Commonwealth Edison is estimated to be less than $1.50 per month. Customers of rural electric cooperatives would see no impact to their monthly electric bills.

Commentor 11 - Andrea Issod, Sierra Club

11-14 The CO2 pipeline for FutureGen 2.0 will be constructed mainly under farmland. The effects of the pipeline's construction will be felt most heavily by those living in rural communities. The residents of the farming communities impacted by the pipeline are concerned about the possible risks of having the pipeline under their homes, along with other negative environmental impacts on the surrounding area. Another concern mentioned in the scoping comments was the possibility that coal companies would buy up properties for construction and force the families living there out of their homes. The DOE fails to address these effects in the DEIS. Instead, it states that there is no significant environmental justice issue, citing findings that the population nearby the FutureGen 2.0 project is slightly more affluent and slightly more white than the national average.[57] The DEIS, however, ignores the fact that the project is mostly built near members of rural farming communities. The DEIS should have addressed these concerns put forth by local farmers.

g. The DOE Failed to Consider Impacts Caused by Coal Mining

11-15 Coal mining is only addressed in a cursory manner in the DEIS. The DOE must consider all connected actions including the full spectrum of impacts from mining coal. No matter how clean the technology to burn the coal, there are still significant environmental and public health harms caused by digging it out of the earth in the first place. The addition of the new boiler to the Meredosia Energy Center will, by definition, require that additional coal be mined. The EIS should consider, among others, the following environmental impacts from coal mining:

- Hydrogeologic impacts to surface and ground water resources;
- Degradation and pollution to streams and wetlands;
- Impacts to wildlife, biodiversity, and forests;
- Impacts to prime farmland and other agricultural lands;
- Impacts on surrounding communities, including local residences;
- Impacts to cultural and historic resources; and
- Impacts of coal transport (e.g. diesel train or truck emissions, coal dust dispersal from trucks or trains, etc.)

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[57] DEIS, at p. 3.19-4 – 3.19-5.

Response

11-14 The potential impacts from the construction and operation of the CO_2 pipeline are addressed in the Draft EIS under all resource categories in Chapter 3 and particularly in Section 3.17.3.2 with respect to human health and safety impacts in the unlikely event of a pipeline leak. As described in response to Comment 2-08, the Alliance has entered into an Agricultural Impact Mitigation Agreement with the Illinois Department of Agriculture in consultation with the Illinois Farm Bureau. The agreement is required by the Illinois Carbon Dioxide Transportation and Sequestration Act (220 ILCS 75/20(b)(6)) and it applies specifically to the effects from construction and operation of a CO_2 pipeline. Under the agreement, the FutureGen 2.0 Project is committed to implementing important mitigation measures to protect farmland, including compensation for crop damages. As explained in response to the following comment (Comment 11-15), no new coal mines would be required to support the FutureGen 2.0 Project, and no project decisions to be made by DOE would affect coal mining. Potential future acquisitions of local properties by coal companies are not anticipated but are beyond the scope of this EIS.

11-15 In Section 1.6.2 of the Draft EIS, DOE stated its position on subjects considered to be beyond the scope of the EIS, which included the environmental and safety impacts of coal mining. The Draft EIS explains that no specific mine has been identified as a source of coal, no new mines would be developed specifically to support the project, no changes in mining techniques would be required to support the project, and no decisions to be made by DOE for the project would affect coal mining techniques. Coal is a commercial fuel commodity produced by a regulated industry, and the environmental impacts of coal mining are well known, well described, and the industry is accountable for them. As coal is an abundant global resource bought and sold as an international commodity, the FutureGen 2.0 Project would not change nationwide coal production and would not change the impacts of coal mining.

While DOE maintains that the effects of coal mining is outside the scope of this EIS, DOE described and analyzed the impacts of transportation and conveyance of coal for the FutureGen 2.0 Project on respective resources in Chapter 3 of the Draft EIS. These specifically included air emissions associated with truck traffic and conveyance of coal and process materials in Section 3.1.3.2, greenhouse gas emissions from truck transport in Section 3.2.3.2, traffic impacts from coal delivery and waste removal in Section 3.13.3.2, and noise impacts from truck transport in Section 3.14.3.2.

Commentor 11 - Andrea Issod, Sierra Club

V. Cumulative Impacts - The DEIS Does Not Recognize the Foreseeable Future Impact of Increasing Construction of New Coal Plants and Carbon Sequestration Projects

The purpose of this project, as outlined in the DEIS, is "to demonstrate the commercial feasibility of an advanced coal-based energy technology (oxy-combustion) that can serve as a cost-effective approach to implementing carbon capture at new and existing coal-fueled energy facilities."[58] If the project is successful, a foreseeable future effect is that it will stimulate development of new carbon capture based coal plants around the nation. DOE admits that without this project, the development of oxy-combustion repowered plants integrated with CO2 capture and storage would happen more slowly, but it fails to address in the DEIS the cumulative environmental impacts that increased development would bring.[59]

An EIS must consider the cumulative impacts of the proposed federal agency action together with past, present and reasonably foreseeable future actions, including all federal and non-federal activities.[60] It is entirely foreseeable that the success of this project would lead to construction and operation of new coal plants, more coal mining, more coal waste, and all the associated impacts of using more coal. The DEIS fails to address these additional cumulative environmental impacts. **11-16**

The environmental impacts of encouraging new coal plant development would be substantial. Coal burning produces hundreds of millions of tons of solid waste products annually, including fly ash, bottom ash, and flue-gas desulfurization sludge. Coal particulate pollution increases asthma events and can shorten people's lifespan. Mining the coal used in these plants has severe environmental effects such as eliminating existing vegetation, displacing or destroying wildlife and habitat, loss of natural aesthetics, degradation and depletion of natural water sources, producing greenhouse gas emissions, along with other deteriorating environmental effects. The overall impact that the continued use of coal as an energy source would have on the environment is quite considerable, and the DEIS's failure to address this cumulative impact is a major flaw in the analysis.

Furthermore, carbon capture sequestration technology is often used to for enhanced oil recovery. This process allows access to oil stores that would otherwise be inaccessible. By increasing the availability of oil and lowering the cost, carbon capture sequestration technology is helping to prolong the

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[58] Id. at p. S-3.

[59] Id. at p. 2-2.

[60] 40 C.F.R. § 1508.7.

Response

11-16 As stated under Climate and Greenhouse Gases in Table 4.3-3 of the Draft EIS, "the successful implementation of the project may lead to widespread acceptance and deployment of oxy-combustion technology with geologic storage of CO_2, thus fostering a beneficial long-term reduction in the rate of CO_2 emissions from power plants across the United States." Also, as stated under Air Quality in Table 4.1-1, "…electricity generated by this project may displace electricity generated by traditional coal-fired power plants that emit significantly higher levels of pollutants." DOE anticipates that, should carbon emissions be regulated from coal-fired power plants, the successful demonstration of oxy-combustion technology with CO_2 capture and storage in the FutureGen 2.0 Project could provide a cost-effective basis for the power industry to retrofit existing, outdated and inefficient pulverized coal-fueled generating facilities. DOE believes that over time, significant net benefits may be achieved through reductions in pollutant emissions and greenhouse gases by displacement of traditional pulverized coal plants.

Based on Energy Information Administration data and predictions, and without substantial legislative and regulatory changes, DOE assumes that a substantial proportion of national electric generating capacity will continue to depend on coal, and the demand for electricity will increase irrespective of electricity conservation measures. However, if carbon regulation should come to pass, DOE anticipates that the availability of a technology that can be used to retrofit existing pulverized coal power plants causing a reduction in pollutant emissions and greenhouse gases would result in a net beneficial cumulative impact. Based on Energy Information Administration predictions, DOE assumes that coal-based electricity generation from existing and, to a lesser extent, new coal-fueled power plants will continue into the foreseeable future. Thus, impacts from coal utilization would otherwise occur irrespective of the proposed action for the FutureGen 2.0 Project, and DOE believes that, if carbon emissions were to be regulated, successful deployment of oxy-combustion technology would displace older, less efficient and uncontrolled existing power plants.

Please note that the use of CO_2 for enhanced oil recovery is not anticipated as part of the Future 2.0 project and was therefore not analyzed in the Draft EIS.

Commentor 11 - Andrea Issod, Sierra Club

use of oil as an energy source. Oil combustion adds a significant amount of CO2 and other greenhouse gases to the atmosphere. This foreseeable impact must be addressed in the DEIS. **11-16 *con't***

<u>Conclusion</u>

Sierra Club urges DOE to take all the following comments into consideration and to redo its DEIS and make a revised future draft available for further public comment. Thank you for the opportunity to comment on the DEIS. Please keep us informed of developments in this process. **11-17**

Sincerely,

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Response

11-17 Thank you for your comments. DOE has considered and addressed all comments received on the Draft EIS in the publication of this Final EIS.

Commentor 12 - Elizabeth (Betty) Niemann

Further Comments on DOE/EIS-0460D
Draft Environmental Impact Statement for FutureGen 2.0
By
Elizabeth Niemann
Landowner

Introduction:

12-01

As a Morgan County landowner, my husband and I are very concerned about the FutureGen 2.0 project. The comments made in this document are my own and are of my own opinion if not actually stated. The opinions are implied as being my own. These comments were made after scanning or reading all 1242 pages of the FutureGen 2.0 DOE/EIS-0460D. FutureGen is a proposed Morgan County Illinois carbon dioxide sequestration demonstration project. The goal is the capture of carbon dioxide products from the coal fired generation of electricity converting the gas to a gas/liquid interface and then injecting it for underground storage. It is by definition a touchy feely program that is highly political.

Ethics:

This article from Penn State "Ethical Issues Entailed by Geologic Carbon Sequestration"[1] written after the 2007 meeting in Rio de Janeiro raises ethical questions about the geologic storage of CO2. To quote the article, "A proper ethical analysis of geologic carbon storage must begin with a description of known environmental, economic, and social impacts and risks of geologic storage." Even though this article was written in 2007, it also states that as technology progresses in this field, the ethical conclusions in the article may change. I feel that the Penn State article identifies the many ethic points, concerns, and issues which need to be addressed by FutureGen and NEPA when assessing the FutureGen project for the Final EIS. Not all of the ethic points in my opinion are included in the EIS-0460D. I do feel that there are ethical points identified in the article have not been followed by FutureGen.

12-02

Site Selection and Storage Risk Assessment Concerns:

I found this from the American Reinvestment and Recovery Act funding of DOE projects:

> "**Board of Trustees of the University of Illinois** (Champaign, IL) – An Evaluation of the Carbon Sequestration Potential of the Cambro-Ordovician Strata of the Illinois and Michigan Basins. The University of Illinois will evaluate the carbon storage potential of the Cambro-Ordovician Strata of the Illinois and Michigan Basins which encompass most of the states of Illinois, Indiana, Kentucky, and Michigan. A best practices manual for site characterization, to be developed during the project, will help reduce storage **risk** by documenting the uncertainties related to fracturing, injectivity, and geochemical interactions for these specific formations. DOE share: $4,803,000; Recipient share: $1,469,759; Duration: 36 months." [2]

This would seem to indicate there was no site selection criteria available for Carbon Capture and Storage at the time of the FutureGen 2.0 site selection competition in 2010 and that the competition of applicants by which the Morgan County site was not a valid selection method. I have felt all along that each applicant for FutureGen competition did not have proper geologic data from which to decide that their location would meet the specific site criteria. To me, even though FutureGen's RFP included criteria, the criteria were not geologically valid to insure a

Response

12-01 DOE has been at the forefront of scientific research into geologic storage of CO_2 for many years. DOE prepared the Draft EIS for the FutureGen 2.0 Project to address the full range of impacts on the natural and human environment in conformance with the CEQ NEPA regulations (40 CFR Parts 1500 to 1508).

12-02 Selection of the proposed storage site for FutureGen 2.0 was solely the responsibility of the Alliance, based on efforts completed to date by DOE as well as partners in the Department's Regional Carbon Sequestration Partnerships. DOE provided the Alliance minimum site suitability criteria that included elements related to adequate geologic data, suitability of the surface land, sufficiency for the accommodation of a CO_2 pipeline, as well as factors related to the regional communities. The Alliance included these criteria, among many others, in their open site competition leading up to site selection. The final site selection was the result of thorough evaluation of site offeror's proposals against the published site selection criteria, augmented with additional data acquired by the Alliance after initial site proposal screening and down-select to four very promising sites. Much of the site selection process, including the site selection criteria, is publically available on the FutureGen Industrial Alliance's website (www.futuregenalliance.org).

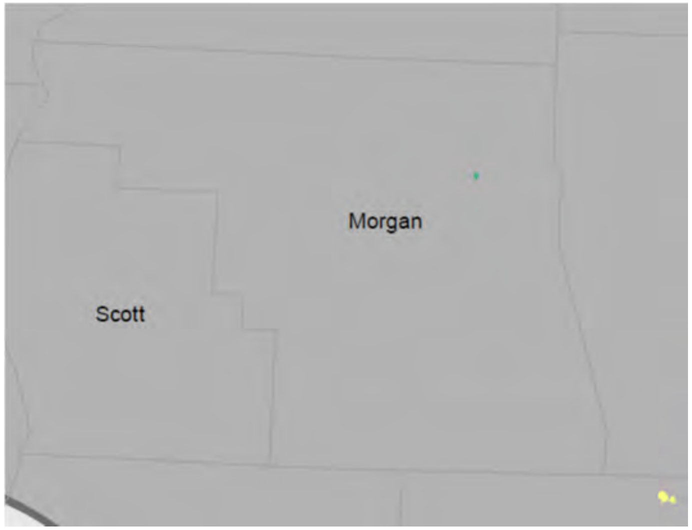
Commentor 12 - Elizabeth (Betty) Niemann

12-02 con't

successful project. Specific research resources for the FutureGen application limited to those on the FutureGen website and other pertinent resource information sources were banned to the applicants because of "conflict of interest".[3] To me, Site selection was made by the "money" criteria.[4]

12-03

The December 2005 map prepared by the Midwest Geologic Sequestration Consortium entitled "**CO2 Storage Potential for the Mt. Simon and St. Peter Sandstones in the Illinois Basin**" indicates areas of idea locations of CO2 storage. (Note: This map is no longer available on line.) County lines are also on the map and Morgan County is NOT one of the ideal areas for CO2 storage. I believe the green spot indicates 10-25 million tons of C02 potential. Trying to scale this MGSC map to Beacon Schneider puts the



FutureGen 2.0 Project is within 5 miles of this green dot in Section 15 N 9 West. (I attempted to scale green dot location and have it 7.44 miles south of the Morgan County northern county line and 5 miles west of the Morgan County eastern county line in sections 2,3,10, and 11 of township 15 N and range 9 West in Morgan County. Note: I am awaiting actual location from Sally Greensburg of the ISGS/MGSC.) Given that this map was printed in 2005, it seems that Morgan County area has a potential BUT only for 10 to 25 million tons of CO2 such that the initial 30 year project forecast exceeded the capacity of the storage area. A FutureGen 2.0 20

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Response

12-03 The 2005 Midwest Geological Sequestration Consortium map illustrates a regional conceptual model of the geology in the Illinois Basin based on geographic information system (GIS) data for the oil field boundaries and target formation characteristics. The map was intended for predictive purposes to aid in regional planning and not as a detailed characterization of the local geology or as a basis for eliminating potential geologic storage locations. The Mt. Simon formation is a well-described, deep saline formation that has been studied extensively for CO_2 storage, and the site selection process is designed to ensure that geologic storage is conducted safely and effectively (NETL 2013c; USEPA 2013a). The effective CO_2 storage capacity for the Morgan County geologic study area is based on the site-specific characteristics of the injection zone and anticipated injection characteristics during operation. Site-specific data was collected through the Alliance's geologic characterization efforts, including the completion of a stratigraphic well in the CO_2 storage study area. This data was used to characterize the injection zone and support site-specific modeling of the CO_2 plume, which was presented to the USEPA in the UIC permit applications.

Commentor 12 - Elizabeth (Betty) Niemann

12-03 *con't*

year project with an injection of 22 metric tons may exceed the storage capacity as well so the storage site should be characterized extensively.

12-04

This also seems to imply that there is carbon storage **risk** to FutureGen 2.0 project. Supposedly when there is "NO" risk so WHY is there a need for risk assessment? There is no real project risk assessment in the EIS-0460D that I could find. A cost analysis, risk assessment, and remediation plan should be the first things performed on a CCS project before any money, land acquisition, and permitting is started, in my opinion. (There is more discussion below.)

Given the construction of the Draft Environmental Impact Statement EIS-460D with its many sections, it is hard to obtain a true overall risk analysis of the FutureGen 2.0 project. Can environmental impact be equated with risk analysis? I think not. The summary of impact conclusions in each section is like looking at a jig saw puzzle with each section's conclusions a piece. Until the entire puzzle it put together, entire impact picture is not clear but this is not a risk analysis of the entire project itself.

Price and Oldenburg in their article "The consequences of failure should be considered in siting geologic carbon sequestration projects"[5]. The article contains charts from which to compare risks and costs and from these charts one can determine based upon risks and costs if the project should be rejected. I feel that at this point in time, since costs have not yet been determined, and risks are not identified, the FutureGen 2.0 project should be rejected.

12-05

Concerns over the FutureGen Alliance itself:

First, my husband and I believe the Alliance was formed by venture capitalists who saw a chance to get federal funding in the name of climate change and then in the name of job creation under the American Recovery and Reinvestment Act.

Second, the financial loss FutureGen took in Coles County. FutureGen had purchased 440 acres of land needed for the Mattoon project for about 3.5 million dollars. Since Coles Together pulled out of the CCS aspect of the project when the DOE pulled the funding for the power plant aspect, FutureGen was left holding the land. Rather than using the land as collateral on a loan, FutureGen sold the land for $700,000 or about 20 cents on the dollar taking a loss of 2.8 million dollars.[6] What kind of company would take this kind of loss when it is so desperate for money for its project in Morgan County, Illinois?

Third, the Alliance allowed its Certificate in Good Standing with the State of Illinois (under the Secretary of State) to be revoked on 13 July 2012. According to the Secretary of State of Illinois, when the status of a corporation is revoked, it is revoked for the following reason:

> **REVOCATION:** Failure to file an **Annual Report** and pay the **annual franchise tax**, and failure to file any other report or document required by statute will result in the revocation of the **Authority to Transact Business in Illinois**. This **revocation** may have severe consequences, including loss of the registration of the corporate

Response

12-04 As explained in response to Comment 12-01, DOE prepared the Draft EIS for the FutureGen 2.0 Project to address the full range of impacts on the natural and human environment in conformance with the guidelines for content and format contained in the CEQ NEPA regulations (40 CFR Parts 1500 to 1508). Concerns about project risks to the public are best reflected in the analysis of impacts to public health and safety in Section 3.17, Health and Human Safety, of the document. The Draft EIS cannot and does not claim that there are "no risks" from geologic CO_2 storage. As in the case of any risk assessment, the EIS can only identify potential risks, estimate their probabilities based on historical data, and evaluate the potential consequences of risks for the purpose of supporting decisions, which DOE maintains that the Draft EIS for the FutureGen 2.0 Project has done. The USEPA ultimately holds the regulatory authority to issue UIC Class VI permits for the proposed CO_2 injection wells and will base its permitting decision on the adequacy of information about the potential risks and consequences of the project.

12-05 In response to comments submitted during the scoping phase of the EIS, DOE explained its position on a life-cycle cost analysis in Section 1.6.2 of the Draft EIS as follows: "Among the purposes for DOE's involvement in the FutureGen 2.0 Project are the demonstration of the technologies involved, the identification of potential efficiencies, and the development of a reference base for the costs associated with an oxy-combustion facility integrated with CO_2 capture and storage. Thus, the life-cycle cost of the project relative to other technologies is not currently known with certainty, but it is not relevant in DOE's decision-making process for the proposed action."

In terms of cost-benefit analysis as part of the NEPA process, the CEQ NEPA regulations state: "For purposes of complying with the Act, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are important qualitative considerations." DOE has not completed a cost-benefit analysis for the FutureGen 2.0 Project because of the uncertainties involved in estimating the potential costs and benefits on a demonstration project for which a key purpose is to establish the reference base for those costs and benefits.

With respect to the Government Accountability Office (GAO) report cited in Comment 12-6 of this appendix and presumably the GAO report referenced here, the GAO findings are not relevant to FutureGen 2.0. The cited study was conducted in the context of the original FutureGen Project.

Commentor 12 - Elizabeth (Betty) Niemann

name with the Secretary of State, loss of the right to maintain lawsuits in Illinois, imposition of liens on corporate property, and possible personal liability of directors and officers.[7]

FutureGen's status with the State of Illinois was changed on 5 March 2013 to active. How many legal or transactions documents may have been impacted by the revocation from 13 July 2013 to 5 March 2013? For confirmation of the revocation information, a telephone credit card order may be placed by phoning the Illinois Secretary Of State Business/Not-for-Profit Corporations Division (217) 782-4104 or may write to:

Business/Not-for-Profit
Corporations
Corporations Division
501 S. Second St., 3rd Fl.
Springfield, IL 62756
217-782-6961
Hours: Mon.-Fri., 8 a.m.-4:30 p.m. Note: FutureGen Industrial Alliance is considered a Foreign Corporation in that it is incorporated in the State of Delaware and not the State of Illinois

What valid entity would allow a certificate of good standing allow to be revoked when dealing with a cost share project with the federal government.

Fourth, the makeup of the FutureGen Alliance is dwindling. Slowly since 2006 the Alliance has gone from 13 members to now just 5 members. Exelon stated in a letter to Richard Durbin on 18 February 2013[8] that the reason it pulled out from the alliance was for several reasons:

a. There were supposed to be 20 alliance members at an expenditure of 30 million dollars apiece to fund the project with a total of cost of the FutureGen project to be 1.6 billion dollars and that cost to consumers were in line with the anticipated market.
b. The original structure in 1. (above) was scrapped with few corporate contributions to customers funding 150 million dollars annually above anticipated markets for a 30 project year payout of 4.5 billion. *(Author's note: this makes the total funding for the project 5.5 billion dollars adding in the DOE's almost a billion. The Illinois Commerce Commission has only approved the Power Sourcing Agreement for 20 years, so if the life of the project is reduced to 20 years, the cost to consumers is then 3 billion plus the 1 billion for a total of 4 billion dollars.)*

Fifth: No "one" alliance member is actively participating in this project other than by investment or as members of the Alliance Board of Directors….

Sixth: FutureGen is an on/off on again type of project beginning in 2003. The project was pulled under President Bush's administration for cost overruns. This decision to pull the funding for the FutureGen's IGCC Mattoon project, I believe, has been vindicated by what has happened with a similar project of Duke Energy's Edwardsport, Indiana, CCS IGCC project. Initially Duke's project costs were estimated to be 1.985 billion dollars rose to over 3.5 billion which Duke

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12-05
con't

Response

Conversely, the Congressional Research Service (CRS) report cited in Comment 12-6 of this appendix and presumably the CRS report referenced here does have direct relevance to the FutureGen 2.0 project. The CRS report provides a chronicle of the history of the FutureGen Program from its beginning through February 2013. While focusing on the current status of the FutureGen 2.0 project, the CRS report presents the project in the broader context of challenges related to cost shared demonstrations of carbon capture and sequestration technologies. The issues related to project cost growth and other risks both within and outside the control of either DOE or the Alliance are commonplace for first-of-a-kind projects regardless of the industry, developer, or funding source. DOE acknowledges these issues as significant risks to FutureGen 2.0 but also sees meaningful public benefits upon completion of the project.

Commentor 12 - Elizabeth (Betty) Niemann

Energy's customers will have to pay all but 900 million which Duke itself will have to pay.[9] Now with the projected costs to Illinois consumers of 4 to 5.5 billion dollars, just how much more will consumers have pay? **12-05 *con't***

Seventh: Speaking of the money for FutureGen, one government agency and one independent research agency have both studied FutureGen and its costs. The Government Accounting Office (GAO) has made this conclusion on FutureGen, "*Before implementing significant changes to FutureGen or before obligating additional funds for such purposes, the Secretary of Energy should direct DOE staff to prepare a comprehensive analysis that compares the relative costs, benefits, and risks of a range of options that includes (1) the original FutureGen program, (2) incremental changes to the original program, and (3) the restructured FutureGen program.* "[10] The Congressional Research Service has made the following conclusion "*Nearly ten years and two restructuring efforts since FutureGen's inception, the project is still in its early development stages. Although the Alliance completed drilling a characterization well at the storage site in Morgan County, IL, and installed a service rig over the well for further geologic analysis, issues with the power plant itself have not yet been resolved. Among the remaining challenges are securing private sector funding to meet increasing costs, purchasing the Meredosia power plant from Ameren, obtaining permission from the DOE to retrofit the plant, performing the retrofit, and then meeting the goal of 90% capture of CO2.*"[11] Both of these reports are critical of the costs associated with the FutureGen project. **12-06**

Eighth: Timothy Carney, senior political columnist for the Washington Examiner had written an article about FutureGen being the "costliest" earmark in Washington.[12]
What will be the cost overruns for FutureGen? Remember, the projection is at already from 4 to 5.5 billion.

Ninth: My research for public comments for this EIS-0460D have also uncovered some discrepancies what FutureGen is saying about the project especially with respect to: **12-07**

a. Number of acres in the carbon storage or sequestration area:

Source	Number of Acres
FutureGen's 2010 Request for Site Proposal http://www.futuregenalliance.org/pdf/FGA_%20FINAL_RFP_FG_2_Amended_11102010.pdf Pages 12 and 13 39MMT Plume acreage	1000
Private letter from Trustee to Beneficiaries about FutureGen project dated 10 March 2011. Note: Initial Papers signed by Trustee to Commit Property for Carbon Storage 16 march 2011 long before other property owners signed after 1 May 2011.	2500
EIS-0460D May 2013 http://www.netl.doe.gov/publications/others/nepa/deis_apr.html	5300
Ken Humphrey's 18 April 2013 Presentation at West Virginia University http://uschinacleanenergy.wvu.edu/wp-content/uploads/2013/03/Session-4-0820-FutureGen-II-Update-Ken-Humphreys.pdf Page 13	Approx. 8000

Response

12-06 The response to Comment 2-13 explains DOE's position with respect to the topic addressed in this comment, which is beyond the scope of the EIS for the FutureGen 2.0 Project.

12-07 The information and analyses in the Final EIS have been updated based on the following data:

a. Based on site-specific data from the stratigraphic well and modeling conducted for the UIC permit applications to the USEPA, the underground CO_2 plume after 20 years would encompass approximately 4,000 acres. The total acreage of contiguous properties at the land surface above the subsurface CO_2 storage area would be 6,800 acres as described in Chapter 2 of the Final EIS, specifically Section 2.5.2. See also response to Comment 15-02 on this same topic.

b. The Alliance's proposed CO_2 injection well configuration would consist of a single site encompassing approximately 14 acres occupied by surface facilities for four horizontally drilled injection wells, plus monitoring wells and access roads. The site location and configuration are described in Chapter 2 of the Final EIS, specifically Sections 2.5.2.1 and 2.5.2.2.

c. The alignment of the Alliance's proposed southern route for the CO_2 pipeline has been refined and updated to include the route to the Alliance's proposed site for the CO_2 injection wells as described in Chapter 2 of the Final EIS.

d. The Alliance's proposed site for the CO_2 injection wells is described in Chapter 2 of the Final EIS, specifically in Sections 2.5.2.1 and 2.5.2.2.

e. The "rules" (or regulatory requirements) applicable to the FutureGen 2.0 Project remain unchanged. However, the information available for the project has been updated as necessary to reflect refinements in the project design. The Draft EIS acknowledged the evolving nature of the project design in a text box on page 2-2. The bounding parameters for critical features were established to enable a conservative analysis of potential impacts in the Draft EIS.

f. Issues pertaining to state funding are not relevant to the DOE decisions to be supported by the Final EIS.

g. The project impacts were evaluated based on a 20-year project duration as described consistently throughout the Draft EIS. That duration stands.

Commentor 12 - Elizabeth (Betty) Niemann	**Response**

In 2010, Jacksonville, Tuscola, City of Vandalia, and Christian County vied for the new location of the FutureGen project after Coles Together pulled out of the Mattoon project when the DOE pulled the funding for the Mattoon IGCC CCS Project. In this competition the Request for Site Proposal Dated 25 October 2010 and amended on 11 November 2010 by FutureGen indicated initially **1000 acres**. A letter, dated 10 March 2011, from the Farm Manager in the Trust Department of the bank who is the trustee committed 400 acres of Family Farm Trust Property [plus another 200 acres also held in the same trust (2nd beneficiary) for a total of 600 of 1000 acres} states **2500 acres** will be needed for carbon storage. It was noted at the time that a 1000 acre commitment was needed at the time to make the project a "go". This EIS-0460D indicates a CO2 Storage Study Area of **5300 acres**. In April of this year, Ken Humphries gave a presentation at West Virginia University that indicated a **Carbon Storage Area of 8000 acres.** I am quite certain that the farmers in this carbon storage area and Morgan County citizens are not aware of this increase in the number of acres in the storage area. (Note; to me this is a violation of one of the ethic points discussed under Ethics above) My question is what is the correct number of acres in the carbon storage area?

b. Number of injection wells in the carbon storage area:

Source	Number Injection Wells
FutureGen's 2010 Request for Site Proposal http://www.futuregenalliance.org/pdf/FGA_%20FINAL_RFP_FG_2_Amended_11102010.pdf Page 13 39MMT Plume acreage	1
Private letter from Trustee to Beneficiaries about FutureGen project dated 10 March 2011. Note: Initial Papers signed by Trustee to Commit Property for Carbon Storage 16 march 2011 long before other property owners signed after 1 May 2011.	1-2
EIS-0460D May 2013 http://www.netl.doe.gov/publications/others/nepa/deis_apr.html page 2-67	2
Ken Humphrey's 18 April 2013 Presentation at West Virginia University http://uschinacleanenergy.wvu.edu/wp-content/uploads/2013/03/Session-4-0820-FutureGen-II-Update-Ken-Humphreys.pdf Page 12 and EIS-460D May 2013 page G-36	4 With Horizontal Drilling

12-07
con't

Documentation I have from the 10 March 2011 letter indicates **1 or 2 injection wells**. The EIS-0460D indicates on page 2-68 (Table 2-12) there will be 2 injection wells and one injection pad. Ken Humphrey's 18 April 2013 Presentation at West Virginia University and EIS-460D May 2013 page G-36 both indicate **4 individual injection wells from the same injection pad** and that there will be horizontal injection. I am not certain that landowners are aware of this.

c. The EIS-0460D does not contain the routing of the CO2 pipeline which now has been identified in ICC docket 13-0252.[13]

Commentor 12 - Elizabeth (Betty) Niemann

d. Specific location of the injection well has not been officially announced in either the EIS-0460D or in ICC docket 13-0252. It is assumed it is at the end of the pipeline indicated on the property maps in this docket. The landowner of this specific property knew nothing about the well(s) location as of 30 May 2013. FutureGen filed for the UIC permit from the USEPA Region 5. There is no specific data posted on the website: http://www.epa.gov/region5/water/uic/futuregen/ and the map show on the website show a red dot at the end of Martin Road. Using Beacon Schneider for Morgan County, Illinois, the Martins' home (2808 Beilschmidt Road) is at the end of Martin Road so the map on the USEPA Region 5 website has the injection well head right on the homestead.

e. When the FutureGen project selected the Morgan County location, FutureGen indicated that they would not change the rules as they go along, but as you can see from my comments above, it appears to me that they have abandoned that train of thought and are changing the rules as FutureGen moves along on the project. The comment is made in the EIS-0460D that this is an evolving project.

f. Initially FutureGen said it would not be requesting funds from the State of Illinois, (Liability FAQ http://www.futuregenalliance.org/wp-content/uploads/2013/03/FutureGen-FAQ-Liability-Protection-060811.pdf Last Answer) but received an Energy grant (12-481006) of $850,000 under the Illinois Department of Commerce and Economic Opportunity's (DCEO) Coal Competitiveness Program which started on 1 June 2012 and goes to 13 May 2014 according to the IL DCEO Grant Tracker http://granttracker.ildceo.net/ProgramMaps.aspx?GrantNumber=12481006&CompanyLocationId=13868 .

g. Length of the project:

Source	Project Length in Years
FutureGen's 2010 Request for Site Proposal http://www.futuregenalliance.org/pdf/FGA_%20FINAL_RFP_FG_2_Amended_11102010.pdf Page 25 4.1.7	30
Illinois Commerce Commission Power Purchasing Agreement under dockets 12-0544 and 13-0034	20
EIS-0460D May 2013 http://www.netl.doe.gov/publications/others/nepa/deis_apr.html page 2-67	20
Ken Humphrey's April 2013 WV Presentation http://uschinacleanenergy.wvu.edu/wp-content/uploads/2013/03/Session-4-0820-FutureGen-II-Update-Ken-Humphreys.pdf Page 12	20

12-07 *con't*

h. Decommissioning (EIS-0460D Section 2.5.4 page 2-73) states, "The Alliance would conduct post-injection monitoring activities in accordance with the Post-Injection Site Care and Site Closure Plan approved by the UIC Program Director as discussed above under Injection Well Operations." The "Post-Injection Site Care and Site Closure Plan" is

12-08

Response

12-08 A Post-Injection Site Care and Site Closure Plan is a requirement of the UIC Class VI permit for injection wells and is included in the permit applications. In accordance with the permit, the Alliance would be responsible for post-injection site care and monitoring and would be responsible for any emergency or remedial actions that would be necessary. The Alliance submitted supporting documentation for the UIC permit applications to USEPA in March 2013 (updated May 2013). Section 9.0 (Financial Responsibility) of that documentation describes the Alliance's proposed CO_2 Storage Trust Fund and third party insurance policy. The documentation is posted for public access at the USEPA UIC website: http://www.epa.gov/r5water/uic/futuregen/index.htm

Therefore, the documentation has not been included in this Final EIS. The response to Comment 11-11 also addresses this subject.

Commentor 12 - Elizabeth (Betty) Niemann

12-08 con't

> not discussed anywhere else in the EIS-0460D. So just what is in this plan and does it include the site specific remediation plan and who is responsible for performing and paying for the remediation? (Please see remediation discussion below.) Since there are long term risks of leakage in the carbon storage area, who is responsible for the monitoring for leaks after the site is closed and if leakage occurs, who performs the remediation and WHO PAYS for the remediation?

12-09

Tenth: FutureGen tried to circumvent governmental authorizations with the Illinois Power Agency and Illinois Commerce Commission with regard to Prevention of Significant Deterioration Permit (From page 12: PSD request for variance on PSD (Air) Permit to IPA). (http://www.icc.illinois.gov/docket/files.aspx?no=11-0660&docId=172128 on 3 October 2011)

> "Finally. the FutureGen Alliance would recommend that the ICC modify the general specification for PSD (Air) Permit to the following: "Demonstrate that a PSD (Air) Permit, if required, has either been issued, or an application has been filed with the Illinois EPA"

The FutureGen Alliance believes this change is appropriate because it is possible that a clean coal project may not be required to obtain a PSD permit given the near-zero level S02, N02, and CO emissions generated by such a project." Can the Alliance/FutureGen be trusted to follow all the permitting requirements in the EIS-0460D when it already tried to circumvent the PSD Permit with the Bureau of the State of Illinois? On page 5-8 of Volume I of the EIS-0460D is a discussion of the Prevention of Significant Deterioration and the conclusion is "Due to the size of the project, it is not anticipated that a PSD permit would be required (Ameren 2012)." Also see Appendix 4 for another example of FutureGen's strategy.

12-10

Eleventh: What INDUSTRY certifications does FutureGen hold that will give some credence to FutureGen's ability to carry this project through besides the State of Illinois Certificate of Good Standing?

12-11

Concerns In the Name of Climate Change: -

Fact: CO2 takes up 0.035% of the gases that compose the Earth's atmosphere.[14]

Saadallah Al Fathi, former head of Energy Studies at the Opec Secretariat in Vienna, states in a special for the Gulf News that the first problem in CCS is that it will increase coal use in a coal fired power station just to compensate for the loss of energy due to the carbon capture process. He cites a 25-40 per cent energy penalty. Second, he cites that safe and permanent storage of CO2 cannot be guaranteed and even the "modest incident may undermine its use to mitigate climate change". He goes on to say that 2.5 GT (gigatons) must be stored by 2035 … and "CCS is a long way away before it can be relied upon for climate change or abatement. [15] (Author's Note: By the way this amounts to 875 gigagallons of supercritical CO2.)

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Response

12-09 The responses to Comments USEPA-03 and USEPA-04 address the subject of a PSD increment analysis. The FutureGen 2.0 Project must comply fully with the requirements of the Clean Air Act as implemented by the IEPA. The Alliance has been in consultations with IEPA, which has concurred with the Alliance's air construction permitting approach. The FutureGen 2.0 Project would not operate without all relevant Clean Air Act permits.

12-10 The issue expressed in this comment is beyond the scope of the EIS for the FutureGen 2.0 Project. However, the Alliance holds all of the certifications it needs to operate as a non-profit corporation and to operate within the state of Illinois. The Alliance's partners include the Babcock & Wilcox Company, a U.S.-based power engineering and equipment supply company that provides design, engineering, manufacturing, construction and operations services to nuclear, renewable, fossil power, industrial and government customers worldwide; and Air Liquide, the world's largest build, own, operate and maintain contract provider of industrial gases for manufacturing, health, power systems, and the environment. Utilizing these organizations and others, the Alliance would hire well-qualified engineering, procurement, and construction companies to construct the FutureGen 2.0 Project. Similar to other power plant development projects, the FutureGen 2.0 Project would be owned by the Alliance and operated, maintained, and managed by proven professionals in the field.

12-11 As with any power plant, a certain amount of energy is consumed by auxiliary equipment that is needed to operate the plant. The equipment and energy demand is dependent on a number of factors including the plant design and technologies being implemented, but often include pumps, fans, electric motors, pollution control equipment, and in the case of FutureGen 2.0, equipment related to air separation and CO_2 capture and compression. Energy efficiency and losses of FutureGen 2.0 are reflected in the EIS in Table 2-3, and estimated coal consumption is presented in Table 2-4. The auxiliary energy requirements would need to be provided through some means, either through internal generation or supplied to the plant from the power grid. If auxiliary power needs were to be satisfied by coal-based electricity generation, then associated coal use would increase accordingly.

DOE does not anticipate leakage of CO_2 from the pipeline, injection wells, or geological storage. The response to Comment 2-12 addresses concerns about potential leakage from the CO_2 storage reservoir by various pathways.

Commentor 12 - Elizabeth (Betty) Niemann

Along these same lines, on March 23, 2013 organizers created "Earth Hour" in the EU to "demonstrate one's desire to "do something" about global warming by turning off lights for one hour and reduce emissions. However, the United Kingdom's National Grid Operators found "that a small decline in electrical consumption does not translate to less energy being pumped into the grid and therefore not reduce emissions." The article went on to say that in reality, there would be an increase in emissions as people switched to candles and that "using two candles means you emit more CO2." The article went on to say that "because of rising energy prices from green subsidies" many households in Germany and the poor in the United Kingdom will become "fuel-poor" and not be able to afford electricity.[16]

The Houston Chronicle in its Earthweek article entitled "Greenhouse Quandary" on 16 June 2013 page A20, stated that according to the International Energy Agency the level of greenhouse gas (carbon dioxide - CO2) fell in the United States and Europe and that China's emissions were responsible for a 1.4 percent rise in emissions. That same article reported the Center for Climate and Energy Solutions that methane is 105 times more potent than CO2 as a greenhouse gas which is leaking into the atmosphere from efforts to extract natural gas. The leakage the report alludes to is from compressor stations and at well sites. IF there is leakage of methane or natural gas from well heads and compressor stations, what assurances do the citizens of Morgan County that CO2 will not leak from the well head, monitoring wells, or compressor stations along the pipeline?

12-11 *con't*

Instead of concentrating on the greenhouse gas of CO2, why is there also not a concerted effort to stem the release of methane into the atmosphere? If methane is 105 times more potent, then FutureGen is wasting federal, state, and taxpayer money, electric rate payer money, and potentially harming Illinois breadbasket farm land all in the name of climate change mitigation for little potent gas of CO2 that only takes up 0.0035% of the atmosphere.

By the way, NOAA debunked the 400 ppm CO2 May reading at the Mauna Loa Station.[17]

Concerns on FutureGen's Contribution to Climate Change/Draft EIS Findings:

FutureGen 2.0 touts that this will be a "near zero emission" power plant. The definition of emission is "something given out" and a thesaurus states the following as alternatives of emission: release, production, discharge, emanation, giving out, and giving off.

12-12

In my opinion, capturing the CO2 during power generation by the **production** of supercritical CO2 is not "zero emission". The supercritical CO2 must be dealt with and FutureGen intends to store it in the Mt. Simon layer below Illinois prime farmland thereby it is removed from the power plant and discharged to the land. Hence, this is not "zero emission". If the CO2 were to be recycled through the plant with the oxygen being removed from the carbon, and then the carbon re-burned in the removed oxygen, this would meet the definition of "near zero emission".

Response

The issue pertaining to the release of methane gas to the atmosphere resulting from natural gas extraction is not related to the FutureGen 2.0 Project and is outside the scope of this EIS as defined by the purpose and need in Chapter 1 of the Draft EIS. The response to Comment 2-06 and Section 3.2, Climate and Greenhouse Gases, in the Draft EIS address the contribution of CO_2 to global climate change.

12-12 In the context of this EIS, as based on an objective stated in the President's FutureGen Initiative, the term "near-zero emission" relates solely to pollutant emissions being released to the atmosphere.

In regard to the comment about the FutureGen 2.0 Project's contribution to climate change, as discussed on page 3.2-14 of the Draft EIS, "Current scientific methods do not enable an evaluation of the relationship of reductions or increases in GHG emissions from a specific source to a particular change in either local or global climate. Therefore, the potential contribution or removal of anthropogenic GHGs attributable to this project, and its impact on global climate change, is discussed within the context of cumulative impacts. Section 4.3, Potential Cumulative Impacts, presents a discussion of the potential cumulative impacts related to GHG emissions in this context." The response to Comment 2-06 addresses the same subject.

Commentor 12 - Elizabeth (Betty) Niemann

Putting aside all the political reasons for FutureGen, the primary reason for the FutureGen 2.0 project was/is to demonstrate a way to mitigate, in the name of climate change, the amount of CO2 released to the atmosphere during the burning of coal for electric power generation or in other words, reduce the amount of CO2 released to the atmosphere. The unit of "parts per million" is used when talking about CO2 in the atmosphere. When talking about carbon sequestration "metric tons" are used. For a true impact of FutureGen's CO2 mitigation from the atmosphere, the number of metric tons of CO2 sequestered into the ground has to be converted to parts per million. I calculated what the parts per million would be for 1 metric ton of CO2 sequestered. This calculates out to be 0.00047 parts per million removed from the atmosphere per one (1) million metric tons per year. Therefore, the annual impact of CO2 mitigation by FutureGen 2.0 for 1.1 metric tons is 0.0005 parts per million to the air environment. (Appendix 1) This amount is so small that the **impact is so negligible that it is almost nonexistent**. The draft EIS even states there will be no appreciable reduction in global CO2 if this project goes forward. [18]

Now, look at the 0.0005 parts per million as it pertains to 1.1 metric tons of supercritical CO2. FutureGen 2.0 reports that 1.1 million metric tons of CO2 will be captured, injected into, and stored in the Mt. Simon layer of Northeastern Morgan County per year. To understand the quantity of CO2 better, I calculated the number of gallons per metric ton of CO2 using Praxair's MSDS for liquefied CO2[19] from the Edwardsport IGCC CCS project. My calculations resulted in approximately 350 gallons of supercritical CO2 per metric ton. Scott MacDonald, Archer Daniel Midland's sequestration project manager, confirmed my calculation in March 2012. **12-12 *con't***

Possible Geologic Impact of 385 million gallons of supercritical CO2 per year:

As I said at the public hearing, the 1.1 million metric tons of CO2 sequestered in Morgan County will approximately be 385,000,000 (385 million) gallons per year injected under Morgan County's prime farmland. **This, I do believe, will have a major impact to the land environment**. I would like to add that the Gulf Oil spill that happened in April of 2011 was an estimated spill of only 210 million gallons of oil. In one year, FutureGen is to inject 1.83 times as much supercritical CO2 into the Mt. Simon layer under Morgan County.

The EIS 460D document makes the following statements: *"Other planned monitoring may include 10 to 15 permanent surface monitoring stations for measuring injection related ground surface deformation by interferometric sysnthetic aperature radar, gravity surveys, tilt meters, and differential positioning systems…Surface changes for CO2 storage would be measured in millimeters and, if present, would not be visible to the human eye."* [20] In other words, FutureGen 2.0 will be using InSAR[21] [22] [23]- *interferometric sysnthetic aperature radar* as part of its MVA. There is no discussion of the impact this might have on tile and drainage systems or what happens if there is a development of sink holes/subsidence. There is also no discussion on the mitigation compensation of such changes of surface deformation to individual landowners during the life of the project or after the project ends. **12-13**

Response

12-13 Please see the responses to Comments 2-07, 2-09, 2-11, and 2-12, which address the same subjects. The use of satellite technology to measure surface displacement would have no impact to drainage or the land surface. Sinkholes would be very unlikely in Morgan County, because the shallowest bedrock is shale and sandstone, not shallow limestone, which is one of the primary indicators for sinkhole formation. As stated in the response to Comment 2-12, the dissolved CO_2 and brine phase would be denser than the native formation brine, so would sink within the injection zone. The discussion of the displacement of the formation brine as a result of injection is located in Section 3.4.3.2 in the Draft EIS, under the subheading "CO_2 Migration."

Commentor 12 - Elizabeth (Betty) Niemann

There have been studies in the geology of the CO2 Storage Area and these are NOT discussed in great detail in the Geology section of the EIS 460D document. The findings of these studies may have an impact on the CO2 storage area which may or may not be transferred through the layers to the surface.

To reiterate my oral comments, Faye Liu's et al research on *Coupled Reactive Flow and Transport Modeling of CO2 Sequestration in the Mt. Simon sandstone formation, Midwest U.S.A. (2011)* [24]which discusses long term risk assessment of the acidic plume:

a. Acid plume forms from the interaction between brine and the supercritical CO2 (CO2 dissolution) in the storage layer and could persist for a long time even after the complete dissolution of CO2. Replenishment of the upstream ground water flow (brine movement) through the storage sandstone facilitates the spread of the CO2 plume and promotes and replenishes the geomechanical reactions.

b. "The acidic brine will continuously migrate and react with minerals in the storage formation, dissolving and precipitating minerals and altering porosity and permeability."[25]

c. "Our simulations indicate the **prolonged existence** of an acidic brine plume, which suggests long term risk assessment should transfer from the primary risk of (buoyant) CO2 leakage to secondary risk of acidic plume leakage after all the CO2 is dissolved."[26]

d. "The biggest risk associated with this acid plume is the long term effects on geological features (primarily caprocks) and abandon wells…"[27] "Leakage of the acidic brine through damaged caprocks, and/or corroded rock-cement and casing cement interfaces, pre-existing or abandoned wells, can cause contamination of the adjacent drinking water aquifers and potential releases at land surface."[28] This last concern is also stressed by Dr. Sally Benson (see remediation below) in that the acid plume as it migrates upwards into a potable aquifer may cause the release of heavy metals into the drinking water thereby contaminating the drinking water.

The pressures that the supercritical CO2 must be pumped into subsurface reservoirs are substantial and the added fluid must displace ambient fluid as the (CO2) propagates throughout the reservoir. [29]

12-13 *con't*

One such study is the study concerning the reactivity of the Eau Claire and Mt. Simon interface. For instance *"CO2–brine–caprock reaction would lead to modification of the pore geometry and effective permeability" and "Recent hydrological modeling of pressure build-up and cap rock permeability indicates that, moderate brine migration through the caprock can be beneficial in terms of relief of pressure build-up in the reservoir and geomechanical stresses to the sealing caprock (Zhou et al., 2008; Benson and Chabora, 2009; Zhou and Birkholzer, 2011). However, the geochemical consequences of the brine migration through cap rock have not been explored."* [30] This could mean that the CO2 can leach upwards through the cap rock and over time to the surface. In my opinion, there is not just enough information known with the Eau Claire/Mt. Simon interface in the Illinois Basin to provide a true picture for safe storage of CO2. Another study on CO2 storage which finds there are considerable uncertainties in modeling of the CO2 over time. [31] This is discussed by Mike Bickle and Niko Kampman. [32]

12-14

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Response

12-14 Please see the responses to Comments 2-09, 2-11 and 2-12, which address the same subjects. The Eau Claire Formation has been identified as an excellent primary seal for CO_2 sequestration because of its thickness (over 400 feet), lateral continuity, low permeability and porosity (Griffith et al. 2011; O'Connor and Rush 2005), and low potential for reactivity with the CO_2 plume at the injection site's pressures and temperatures (Liu et al. 2012). There is also a secondary confining zone (Franconia Dolomite) between the Eau Claire and the lowest underground source for drinking water (USDW), which provides an additional impermeable layer at the CO_2 injection site.

Commentor 12 - Elizabeth (Betty) Niemann

In addition, the Lawrence Berkley National Laboratory has performed studies on CO2 storage areas even to the extent that it may be necessary to drill wells to remove brine in saline aquifers to keep the CO2 plume within the storage area. [33] If this happens, then where does the brine go, how it is treated as it cannot be used for drinking and agriculture? **12-15**

In the EIS-0460D, there was little discussion of the CO2 storage area when it came to calculating the capacity of the storage area. From above:

Source	Number of Acres
FutureGen's 2010 Request for Site Proposal http://www.futuregenalliance.org/pdf/FGA_%20FINAL_RFP_FG_2_Amended_11102010.pdf Page 13 39MMT Plume acreage	1000
Private letter from Trustee to Beneficiaries about FutureGen project dated 10 March 2011. Note: Initial Papers signed by Trustee to Commit Property for Carbon Storage 16 march 2011 long before other property owners signed after 1 May 2011.	2500
EIS-0460D May 2013 http://www.netl.doe.gov/publications/others/nepa/deis_apr.html	5300
Ken Humphrey's April 2013 WV Presentation http://uschinacleanenergy.wvu.edu/wp-content/uploads/2013/03/Session-4-0820-FutureGen-II-Update-Ken-Humphreys.pdf Page 13	Approx. 8000

In 2010 Jacksonville, Tuscola, City of Vandalia, and Christian County vied for the new location of the FutureGen project after Coles Together pulled out of the Mattoon project when the DOE pulled the funding, the Request for Site Proposal Dated 25 October 2010 and amended on 11 November 2010 by FutureGen indicated initially **1000 acres**. Morgan County residents were first told that 1000 acres would be needed so when landowners first committed to the storage area by signing options, they were under the impression that the storage area was to be 1000 acres. A letter, dated 10 March 2011, from the Trustee who committed 400 acres of one Family Farm Trust Property plus another 200 acres also held in the same trust document to a 2nd beneficiary for a total of 600 of 1000 acres states **2500 acres** will be needed for carbon storage. Reading the EIS 460D, the storage area has not yet be identified and yet the EIS 460D discusses a 5300 acre study area for the storage area. FutureGen, when the announcing the geological results, did nothing to dispel the 1000 acre for the storage acre size. Hence, there are probably people who still think of the storage area as 1000 acres until they read the draft EIS 460D. In April of this year, Ken Humphries gave a presentation at West Virginia University that indicated a **Carbon Storage Area of 8000 acres.** I am quite certain that the farmers in this carbon storage area and Morgan County citizens are not aware of this increase in the number of acres in the storage area. My question is what is the correct number of acres in the carbon storage area? **12-16**

It is very important that the storage area be correctly assessed as to size and storage capacity. [34] [35]With the Mt, Simon sandstone layer not as deep in Morgan County as it was in Coles

Response

12-15 There are no plans to extract brine from the Mt. Simon Formation as part of the injection operating procedures and no expectation of any need to do so. Brine extraction is a way to prevent excessive pressurization as a result of injection; see Section 3.4.3.2, under subheading "Induced Seismicity," in the Draft EIS for a discussion of pressure propagation as a result of injection. The study performed by the Lawrence Berkley National Laboratory on a full-scale, industrial-sized deployment in the Illinois Basin was based on modeling an annual injection rate of 5.5 million tons (5 million metric tons) CO_2 per year at 20 injection sites for 50 years. In comparison, the FutureGen 2.0 Project would inject up to 1.2 million (1.1 million metric tons) per year over 20 years, for a total of 24 million tons (22 million metric tons). Section 4.3.4.3 of the Draft EIS presents an analysis of the other carbon sequestration projects that are planned or operating in the Illinois Basin and the low potential for cumulative impacts. The geologic conditions outlined in Section 3.4.2.1 were used by Zhou et al. (2010) to determine that the Illinois Basin offers favorable conditions for large-scale carbon sequestration when the researchers analyzed the results of the large-scale, industrial-sized deployment in the Illinois Basin model.

12-16 Since completing the Draft EIS, additional data has been developed related to the actual subsurface conditions at the Morgan County storage site and the Final EIS has been completed in the context of all presently available data. As stated in response to Comment 12-07, the underground CO_2 plume after 20 years would encompass approximately 4,000 acres. The total acreage of contiguous properties at the land surface above the subsurface CO_2 storage area would be 6,800 acres, as updated and described in Chapter 2 of the Final EIS, specifically Section 2.5.2. See also response to Comment 15-02 on this same topic. The analyses in the Draft EIS of potential impacts on underground sources of drinking water and on public health and safety remain applicable. Refinements have been included in the Final EIS where appropriate.

Commentor 12 - Elizabeth (Betty) Niemann

County (Mattoon), the 1000 acre estimate for size should be reevaluated. Applicants and the public should have been informed during the application process if the RFP 1000 acres were not going to be adequate and the public should have been informed in my opinion **12-16 *con't***

I have also used British Geological Survey publication of Andy Chadwick's chart 3 Site Screening, Ranking and Selection from page 25 of the "Best Practice for the Storage of CO2 in Saline Aquifers"[36] to compare the FutureGen data with the Positive Indicators just to see if the injection and storage site meets the Best Practice Criteria.

Reservoir Properties	Positive Indicators	Cautionary Indicators	FutureGen 2.0	Within Acceptable Limits
Depth	>1000m < 2500 m	<800 m >2500 m	1315 m	Yes
Thickness (net)	>50 m	< 20 m	156	Yes
Injection Interval			7	?
Porosity	>20%	<10%	11-12.5 %* 20%**	No Just barely.
Permeability	>500 mD	<200 mD	10 -350 mD*	No
Salinity	>100 g per liter	<30 g per liter	47.5	Under Positive and slightly above Cautionary
Stratigraphy	Uniform	Complex lateral variation and complex connectivity of reservoir facies		Not Uniform

* Page 3.17-30 **Appendix G

The FutureGen data (in same measurement terms) has a depth of 1315m, reservoir thickness of 156m, porosity varies within the EIS-0460D is 20.42%, and the permeability is horizontal 3.10E+02 and the vertical permeability is 1.55E+02. Grain density is 2.65 and Compressibility is 3.7E-10. I am just a housewife with a chemistry and biology (hence scientific) background trying to understand injecting supercritical CO2 into the Mt Simon layer of sandstone. FutureGen's injection interval is only 7 meters thick which is under the Best Practice reservoir thickness. This bothers me very much as there seems from the EIS data that there the Mt.Simon layer is not uniform but has 17 different layers so to speak. I find the FutureGen's salinity not within the perameters of the Best Practice criteria at 47.5 grams per liter. However it does seem t be within the requirements of the USEPA. **12-17**

The discussion on page 3.4-8 of the Mt. Simon Formation (Injection Zone), to me, is a text book cut and paste discussion that contains nonspecific information to the FutureGen project. Words like "This suggests that the formation exhibits characteristics, such as sufficient permeability and porosity, which make it suitable for long-term gas storage." are most unsettling and not reassuring as this statement makes an assumptions and not Morgan County site specific conclusions. I also wish to point out that it seems that most data has been extrapolated from the gas storage wells and field in Illinois for this project. Gas has different **12-18**

Response

12-17 DOE acknowledges that there are a number of research organizations and scientific experts that are developing Best Practices for geologic storage site selection, the referenced British Geological Survey's (BGS) site screening document being one of several. However, the BGS document (and others) can best be viewed as early guidance in a developing scientific field and does not represent expert consensus on storage site pre-requisites. The USEPA and NETL have both produced site selection documents that address the regulatory requirements that need to be met for underground sequestration and the best methods for the site selection in the U.S (USEPA 2013a; NETL 2013c). Section 3.4.3.2 of the Draft EIS describes the baseline characteristics for the proposed action that were used in the site selection process, and how site selection was used to minimize the potential for impacts from injection. The combined thickness of the proposed injection zone, which includes the Mt. Simon Formation and the Elmhurst member is 656 feet (172 meters) thick, while the proposed injection interval (the location of the horizontal well's injection laterals) would be a small portion of the overall injection zone. The heterogeneous layers within the Mt. Simon Formation would help to reduce the upward movement of the plume by dispersing the CO_2 laterally and increasing residual trapping by providing more surface area to interact with the brine (Berger et al. 2009). The Mt. Simon Formation total dissolved solids concentration, measured in the stratigraphic well, is approximately 47,000 milligrams per liter, which is higher than the USEPA's regulatory maximum of 10,000 milligrams per liter (USEPA 2013a). Please see the response to Comment 15-08, which discusses the use of the injection horizon in the plume modeling.

12-18 The discussion of the Mt. Simon Formation in section 3.4.2.1 of the Draft EIS is intended to describe the regional geologic setting based on scientific studies and descriptions of well cores throughout the Illinois Basin. The site-specific geologic information, which is based on results from the stratigraphic well that was drilled within the CO_2 storage study area, is presented in Section 3.4.2.4. This section provides a more detailed description of the Eau Claire and Mt. Simon Formations, their measured permeabilities and porosities, and the results of two-dimensional seismic studies of the confining and injection zones. Further technical and geologic details are also presented in the Appendix G, Geological Report.

Commentor 12 - Elizabeth (Betty) Niemann

properties than semi-liquid carbon dioxide. You cannot just "plug and play the data" and say they are the same. **12-18 *con't***

I also wish to point out that the farmers in Morgan County in the area of the natural gas storage deposit in the St. Peter Sandstone Formation are experiencing leakage. So If the CO2 does migrate upwards into the St. Peter Formation, there is great potential for leakage into the atmosphere. **12-19**

It really seems to me that the Morgan County Carbon Storage Area has not been properly mapped and characterized and that a lot of the assumptions made for the site have been made from literature research or general descriptions about the Mt. Simon Formation that are not site specific.

President Obama has said that one event does not make a trend. One characterization well, with core samples from wells outside the carbon storage area does not make a good characterization of the geologic formation of the Morgan County Injection site.

By the way, I found it unscientific for FutureGen to select Morgan County as its carbon storage site without drilling characterization wells in the other two areas. It seems to me that cost has driven FutureGen to take the path of least expense.

The EIS 460D overlaid the oil and gas well maps from the ISGS but did not include any water wells in the overlay. ALL of these are potential sources for CO2 leaks from the storage area. **12-20**

Concerns about Storage Leakage and CO2 Leakage Remediation

First and foremost, before any leakage can be determined, a baseline study must be carried out. Page 2.66 discusses the baseline study. It does not mention the length of the study. The Midwest Geological Sequestration Consortium conducted an approximate 2 year baseline study prior to starting the injection process. What is the length of the baseline study that FutureGen will conduct?

As above, there is the potential for leakage through wells. In Volume I, Page 3.4-13 is Figure 3.4-4 Oil, Gas, and Gas Storage Wells in the Underground Injection Control Survey Area. This figure does not represent all ground penetrations by wells.

There is this map from the ISGS: **12-21**

Response

12-19 The only natural gas storage field in Morgan County is the Waverly Storage Field, which is operated by the Panhandle Eastern Pipeline Company. It is located more than 16 miles away from the proposed CO_2 injection site. The FutureGen 2.0 Project would include a monitoring well in the St. Peter Formation to ensure that CO_2 has not migrated into it. The injection zone in the Mt. Simon Formation is separated by a primary confining layer (Eau Claire Formation), which is 400 feet thick, a secondary confining layer, which is 244 feet thick, and another 1,100 feet of rock before the base of the St. Peter Formation is reached. The many injection well BMPs and monitoring activities that would be used during construction and operation of the injection wells would ensure that CO_2 does not reach the St. Peter Formation or the land surface.

12-20 DOE stated its position regarding the geologic suitability of the Mt. Simon Formation in Morgan County for CO_2 storage in response to Comment 11-10. The stratigraphic well was drilled in close proximity to the proposed location of the injection wells and thus data from that well can be used to adequately characterize the site-specific geology and hydrogeology of the injection site. Further, the data from the stratigraphic well was consistent with existing regional data, providing additional scientific validity. The Alliance has also performed a two-dimensional seismic survey through the CO_2 storage study area, and used the results to demonstrate that the stratigraphic layers identified in the stratigraphic well were laterally continuous. Finally, the Alliance would also collect subsurface data during the construction of the injection wells, but before CO_2 injection begins. This data would be provided to USEPA as part of the UIC permit process to confirm the integrity of the site before operations may begin.

As described in Section 3.5.2.4 of the Draft EIS, only 5 of the 24 documented groundwater wells that occur within the 25-square mile UIC survey area were drilled to depths greater than 100 feet and only one of these was drilled to a depth greater than 400 feet. That single well was drilled to a depth of 1,056 feet, which is more than 2,000 feet above the upper surface of the Eau Claire Formation (the primary caprock overlaying the Mt. Simon Formation). Section 3.4.3.2 addresses the potential for migration of CO_2 through oil and gas wells under the subheading "CO_2 Migration." The deepest oil and gas well within the UIC survey area is drilled to a depth of 1,530 feet. None of the groundwater or oil and gas wells located within the UIC survey area penetrate the St. Peter Formation or the deeper confining zones; therefore, it is very unlikely that CO_2 would migrate up through existing well bores or abandoned wells, because it would

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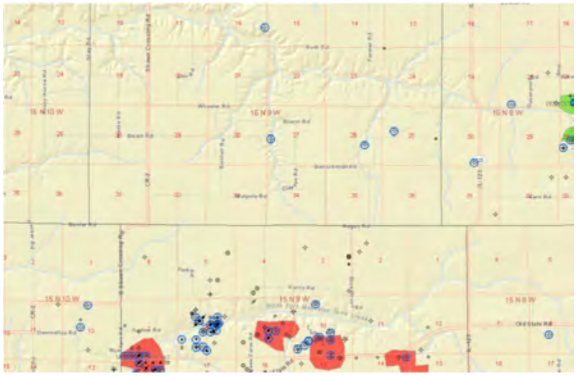

From the Illinois State Geological Survey Prairie Research Institute there are many more wells indicated than shown in Figure 3.4-4. The red areas indicate gas fields south of the CO2 Storage Area. Each well may indicate a potential source for CO2 leakage. These are identified in the EIS.

Water Wells from the ISGS[37] :

12-21
con't

Response

first have to penetrate the primary and secondary confining zones to reach the shallower wells above.

12-21 The Alliance initiated the baseline geological characterization study within the CO_2 storage study area in 2011, which would continue until injection is initiated in 2016; therefore, the study would last for approximately 5 years. Once injection starts, monitoring would continue in accordance with the MVA program as reviewed and approved by the USEPA under the UIC permitting process. Further details on the MVA program are presented in Section 3.4, Geology, of the Final EIS (under the subheading “Monitoring and Verification”) and in the UIC permit applications (as posted publically at the USEPA UIC website: http://www.epa.gov/r5water/uic/futuregen/index.htm).

The data represented in Figure 3.4-4 of the Draft EIS are based on data exported from the Illinois State Geological Survey Oil and Gas Resources Internet Map Services and only include data for wells located within the UIC survey area. The UIC survey area is a 5- by 5-mile square area that was outlined to ensure that all wells that could exist within the maximum CO_2 plume boundary would not intersect the Mt. Simon Formation. The only well within this area that penetrates the Eau Claire and Mt. Simon Formations is the stratigraphic well that was drilled by the Alliance in 2011, and was specifically constructed to be resistant to the acidity of the CO_2 plume. The red field in the Illinois State Geological Survey Oil and Gas Resources map is the Prentice field, which is described on page 3.4-9 of the Draft EIS. It contains 25 oil and gas wells, at depths up to 350 feet bgs. There are no oil or gas fields within the UIC survey area; therefore, they are not present in Figure 3.4-4.

Section 3.5, Groundwater, of the Final EIS addresses the groundwater wells and major sand and gravel aquifers within the UIC survey area. Figure 3.5-1 identifies the locations of shallow groundwater aquifers for the FutureGen 2.0 Project, and Figure 3.5-2 presents the shallow groundwater wells within the UIC survey area. The injection wells have been designed in accordance with the design standards specified by the Class VI injection well regulations as documented in the UIC permit applications. By using CO_2-resistant cement at the base of the wells, and selecting a site that has no known vertical pathways for CO_2 migration (e.g., deep wells, faults), the potential for impacts to the shallow USDWs from CO_2 injection would be negligible.

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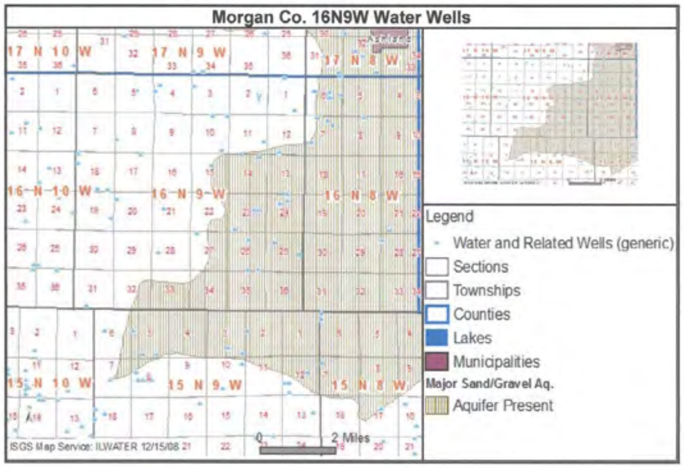

12-21 *con't*

Note the Carbon Storage Area (Primarily 16N 9W Section 25) has a major sand and gravel aquifer beneath the surface which, if the CO2 migrates upwards, has a potential for large potable water contamination.

12-22

Mike Bickle and Niko Kampman from the University of Cambridge in the United Kingdom state in their article, "Lessons in carbon storage from geological analogues" that "…we can constrain the nature and rates of the processes governing the fate of CO2 in geological storage reservoirs. Interpreting these observations fully, requires understanding the hydrology of the settings, invariably complex where multiphase flows are involved."[38] Given this, will FutureGen have on staff qualified person or person(s) on site to understand the injection process? If not, then the project should be scrubbed.

What is really missing from the EIS-0460D is the remediation plan in case of leakage. The remediation plan is alluded to in the USEPA UIC permitting application reference on page 2-67. Dr. Sally Benson[39] from Stanford University, Benson Laboratory, recommends that when an injection site is selected, the remediation plan should be part of the site selection and determined first - before any construction and injection takes place. In her work along with Ariel Esposito, *"Evaluation and development of options for remediation of CO2 leakage into groundwater aquifers from geologic carbon storage", she* states "There are many good reasons to have confidence in the long-term security of carbon dioxide (CO2) storage in properly selected and operated

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Response

12-22 The issues expressed in this comment have been addressed in response to Comments 11-10, 11-11, 12-08, and 12-20. DOE maintains that the Draft EIS has addressed these issues appropriately.

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projects. However, the possibility remains that the CO2 leaks out of the formation, for example, up an abandoned well, into an overlying groundwater aquifer. As large scale demonstration projects of carbon capture and storage (CCS) come closer to development in the US, the need for contingency planning to formulate groundwater remediation scenarios in case of a possible leakage event from a geologic storage site is very important. Leakage of CO2 into groundwater aquifers may degrade valuable groundwater resources, may pose a risk to human health if hazardous trace metals dissolve into ground-water, and may interfere with agricultural activities. "[40] I have spoken to her and she feels this is very important in the success of Carbon Storage. Ken Humphries' in many presentations indicates that CO2 storage is safe but in my research for this commentary, I found Dr. Benson's paper and also her presentation to the contrary. If CO2 storage is completely safe, then why is there a need for a remediation plan? To me the risk to ground water contamination in an agricultural injection site setting is unsettling to say the least.

Along with the remediation plan comes costs. These remediation costs must be paid by someone, entity, or alliance. What happens long after FutureGen has completed the project especially when well casings deteriorate due to the acid plume? Who will be in place to activate the remediation plan and from whence shall the money come? Ken Humphries has said that companies or alliances don't last and states do. So in light of his remark, will the State of Illinois have to remediate a leak? Will the State of Illinois have people in place for a rapid response? Better yet, will the State of Illinois have the monetary resources available for a rapid response? These are all the questions that will need to be answered and told to the landowners. The carbon storage landowners are "ground zero" for CO2 damage and not the "strong community" supporters residing in the city of Jacksonville.

12-22
con't

CO2 Pipeline Concerns

As of the writing of this Draft EIS, actual pipeline routing and details were not available to the authors of this paper. Again conjecture using basic data was used for conclusions as to the discussion and the impacts of the pipeline.

I have many concerns and questions over the pipeline. There is a good risk analysis on CO2 pipeline prepared for HECA Project Site, Kern, California,[41] which discusses mitigation measures for CO2 pipeline safety. FutureGen has not indicated any of these measures to be undertaken and a risk assessment only discusses a leak or rupture.

Other possible pipeline scenarios include the breakdown of the pump and a multiphase flow (supercritical liquid CO2 and gaseous CO2) happens in the pipeline which may lead to pump failure.

A piece of good information on CO2 pipelines is "A Policy, Legal, and Regulatory Evaluation of the Feasibility of a National Pipeline Infrastructure for the Transport and Storage of Carbon Dioxide"[42] which states, "*CO2 pipelines are similar in many respects in design and operation to natural gas pipelines; however, because the CO2 is normally transported as a supercritical fluid,32 there are a number of significant differences. To maintain the product in its supercritical state, it is transported at pressures that range from 1,200 to 2,700 psi.33 These pressures are higher than the operating pressures used in most natural gas pipelines, which typically range from 200 to 1,500 psi.34 Booster stations along the pipeline route maintain the*

12-23

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Response

12-23 As stated in response to Comment 12-07, the Final EIS has addressed the updated alignment of the Alliance's proposed southern route for the CO_2 pipeline, including the route to the Alliance's proposed site for the CO_2 injection wells. The updated pipeline route and details are contained in Appendix C of the Final EIS. The Final EIS has been updated in Section 2.5.1.2 to state that the pipeline would be constructed of carbon steel that conforms to the American Petroleum Institute (API) Specification 5L, Specification for Line Pipe. The pipeline design and construction, as described in Chapter 2 of the Draft EIS, would comply with all applicable regulations for pipeline safety. DOE maintains that the Draft EIS has described the risks associated with CO_2 leaks from pipeline failures and accidents and their potential impacts on respective environmental resources appropriately throughout Chapter 3 of the Draft EIS. Potential impacts on public health and safety from pipeline releases are specifically analyzed in Section 3.17, Health and Human Safety. Under the terms of the pipeline ROW agreement to be obtained by the Alliance, the ROW can only be used for a CO_2 pipeline. No other substance could be transported in the Alliance's CO_2 pipeline.

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necessary pipeline pressure for CO2 pipelines.35 Because the supercritical CO2 behaves as a liquid in the pipeline, pumps, rather than compressors, are used at CO2 pipeline booster stations.36 The increased pressure in CO2 pipelines is typically accommodated with thicker-walled pipe than that used for natural gas transportation.37"

…The pipelines are constructed of ***carbon steel****.* I find on page 2-43 of the EIS 460D that the actual pipe makeup is not decided and specific pipe material is not described.

According to the EPA regulations on CO2 sequestration, the tubing or pipeline is only expected to last 20 to 25 five years. Pipeline maintenance is not discussed in the Draft EIS 460 that I could find.

The Illinois Project Lincoln on CO2 Pipelines provides very good discussion in its Appendix concerning CO2 pipeline in Illinois. [43] In its discussion, it states, "*The elimination of water allows a CO2 pipeline to be made from the same carbon steel as natural gas or oil pipeline while substantially mitigating the risk of corrosion….Where water cannot be eliminated, CO2 pipelines are constructed of stainless steel or carbon steel pipe lined with polyethylene pipe (a liner) to create a barrier between the water/CO2 mix."* Now, if the CO2 pipeline in the FutureGen 2.0 project is made of carbon steel, then there is no guarantee to the right of way grantor that the pipeline will be used for another substance after the project is completed. Pipeline decommissioning is not discussed in the EIS 460D.

12-23 *con't*

These are questions that should be answered before any informed decision is to be made:

1. What CO2 pipeline safety mitigation steps will be performed by routinely FutureGen? Does FutureGen actually have a plan?
2. Who determines the damage compensation to landowners along the pipeline should there be a pipeline failure.
3. What is the line pack of the pipeline and how long will it take to purge the line in the event of a failure.
4. Should a mainline block valve close automatically, what criteria does FutureGen have to disengage the valve?
5. Is there valve redundancy?
6. What is the turnover of CO2 in the pipeline per day?
7. What are the pounds of pressure of CO2 in the pipeline?
8. Can the pipeline pumps handle a multiphase (gas and supercritical CO2) event should the pressure drop in the pipeline? Are there pump redundancies?
9. Will FutureGen carry pipeline liability insurance?
10. Will there be and how many vent valves will there be in the length of the pipeline?
11. When negotiating with landowners about vent valves on their property, will FutureGen inform them of the noise hazard?
12. How many by-passes will be in the pipeline to handle pig launches and retrieval?
13. What type of maintaining system will be used..e.e Cygret Studio.
14. There should be at least one server and there should be a redundancy of the server incase the server has loss of power or malfunctions.

12-24

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Response

12-24 NEPA does not intend the EIS to be a detailed design document or a comprehensive implementation plan. DOE considers the information provided in Chapter 2 of the Draft EIS about project features and conditions to be appropriate for conformance with the intent of NEPA regarding informed decision-making.

The specific data requested in this comment pertain to aspects of the detailed design that are beyond the scope of an EIS to provide. Nevertheless, DOE provides the following responses, prepared by the Alliance to the specific questions about the pipeline:

1. Section 2.5.1 of the Draft EIS summarizes safety features that would be included in the design and operation of the pipeline based on the Alliance's Conceptual Design Report. The Alliance would develop and implement a safety plan before the pipeline and injection well site become operational. DOE has reviewed these safety features and has not identified a need for further mitigation measures to protect human health and safety (see Section 4.2.1).

2. A damage claim would most likely be settled between the parties (or their insurers). A landowner that suffered damages as a result of a pipeline failure could bring a court action to determine liability, although it is expected that any damage claim would be settled without court judgment.

3. The CO_2 content of the entire pipeline is approximately 2,980 tons (2,700 metric tons) of CO_2 (based on the current design). The mass of CO_2 between any two mainline block (isolation) valves along the pipeline would be one third of this amount. It is not expected that the pipeline would need to be vented. In the event of necessary maintenance, a segment of the pipeline could be isolated and blown down. This would be a slow process done in a deliberate manner that would take from hours to days to complete.

4. The Alliance would develop operating procedures as part of the final design, which cannot begin until DOE issues its Record of Decision. It is expected that review and approval would be required to re-open a mainline block valve after an automatic shutdown has occurred.

5. The mainline block valves would be single valves.

6. As much as 1.2 million tons (1.1 million metric tons) of CO_2 would pass through the pipeline per year or 66.9 million standard cubic feet per day (flow rate at standard temperature and pressure). With the current design, this would equate to approximately 1.3 pipeline volume turnovers per day.

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15. How many people are to be employed in pipeline control?
16. When the FutureGen project is over, what will happen to the pipe, the pipeline and the right of way granted to FutureGen? This is not really discussed in the EIS.
17. How will small leaks with minimal pressure drop be detected?
18. EIS did not know the diameter of the pipe so when will this determination be made?
19. There are some specifics in the literature that was given to the landowners, but does FutureGen really know how to run a power plant, a pipeline, and a injection well? As I asked before: What INDUSTRY certifications does FutureGen hold that will give some credence to FutureGen's ability to carry this project through?
20. Supposedly there will be no H2S in the supercritical CO2 stream through the pipeline but if there is a plant malfunction, will there be the H2S in the supercritical CO2? Will the concentration of H2S be enough to categorize the supercritical CO2 as sour? If so, the Illinois Lincoln Project recommends that the self imposed buffer zone between the pipeline and public or private occupied building be at least 1500 feet. [44]

12-24
con't

Also note: on page 2.45 of the EIS 460D that the CO2 pipeline would be buried at least 4 feet underground. I believe the Agricultural Impact Mitigation Agreement (AIMA) calls for a burial of not less than 5 feet in agricultural areas due to tiling and field drainage, this may be changed due to individual AIMAs with each landowners impacted by the pipeline route. However, normally pipe is buried 8-10 feet below the surface in 2013 high pressure installations. Five feet is too close to the surface and raises the probability of damage in future earth moving actions on the farms etc. This should be considered in budgeting etc.

12-25

FutureGen 2.0 filed a request for CO2 pipeline certification with the Illinois Commerce Commission on 29 March 2013 Docket No. 13-0252.[45] Along with that, FutureGen had to file on 18 April 2013 complete information that they attempted to withhold in the initial filing which concerned holding back information on the landowners impacted by the pipeline as required by the state. This supposedly "confidential" information has created what Sheamus McGraw called "the end of country"[46] from his book of the same title. This lack of openness and transparency has caused farmers who were friends to cease being friends.

12-26

Section 4.5 of the EIS-460D discusses Irreversible and Irretrievable Commitments. In this section it states "After this time and upon future decommissioning, proposed project components could be removed and the surface lands again made available to be re-used for another purpose." on page 4.5-1. Apparently the EIS preparer(s) is/are not familiar with Easement Law. Once an easement for a pipeline is granted and recorded in the land office, it is forever. Once the pipeline is decommissioned, the pipe can be removed, but FutureGen will hold title to those easements and can sell them to whomever for whatever use. Therefore, the irreversible easements are actually irretrievable. Some landowners assumed that if they signed options or granted easements and the FutureGen project fell through, they would get their land back. That is just not so. So the statement quoted above is misleading.

12-27

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Response

7. The CO_2 pressure at the energy center metering station is expected to be 2,100 pounds per square inch pressure (psig). The CO_2 pressure at the CO_2 injection site metering station is expected to be 1,874 psig.

8. The design team is aware of potential issues with multiphase flow. The preliminary design for the pipeline had included an intermediate pumping station as a contingency. Subsequent analyses have shown that an intermediate pumping station would not be necessary.

9. As explained in response to Comment 12-08, the Alliance would carry liability insurance as required by the UIC permit.

10. There would be a CO_2 blowdown system at the pipeline entrance on the energy center site. There would be a small venting system at the injection well site to vent CO_2 during infrequent pigging operations or maintenance. The mainline block valves would have bypass arrangements with the capability to manually vent the system. This would require the removal of blind flanges and installation of vent piping; venting is not anticipated except in the unlikely event that a segment of the pipeline needed to be slowly vented under planned and controlled conditions to conduct pipeline repairs.

11. There would be no routine venting of CO_2 along the pipeline. CO_2 could be vented at the energy center site. There would be pressure safety (relief) valves between the isolation valves on the injection well site metering stations. These would not vent CO_2 except in the case of an unanticipated upset condition. The Alliance would inform affected landowners of all potential effects, including noise.

12. There would be a pig launcher at the Meredosia Energy Center and a pig receiver at the CO_2 injection well site. There would be no intermediate pig launching/receiving stations along the pipeline.

13. The pipeline maintenance procedures would be developed during the final design stage of the project, which cannot begin until after DOE issues its Record of Decision.

14. The control system would have redundant servers and redundant uninterruptible power supplies to protect the system both from a loss of power and server failure.

15. Approximately 10 to 15 people would be employed to manage and operate the CO_2 pipeline and storage facility as discussed under Surface Facilities Operation in Section 2.5.2.2 of the Draft EIS.

16. The easements to be purchased by the Alliance would grant the right to "construct, maintain, operate, inspect, repair, and remove a single pipeline not to exceed 12 inches in diameter for the purpose of transporting carbon dioxide." The easement may not be used for

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What standards are being followed for design and construction? This is high pressure line pipe requiring special fittings, valves, welding procedures etc. for a safe installation. The delivery of these items is very long. Where is the basic project overall schedule and basic budget estimate.

Equipment Comments:

Where is the basic equipment list for this project??
Where are the supporting calculations for equipment sizing?? Discussion on this area of the project is missing??
A 710 BHP motor driver for the injection pumps is not logical. There are 700, 750, 800 BHP etc. sized standard motors but a 710 BHP motor would be a very expensive and unique item. It appears that the true motor size is 850 BHP or so for each injection pump to maintain the required pressure of 1200 psi minimum at the given required injection rates. The motor should be sized larger so it will run cooler, and able to respond to its variable speed drive requirements without bogging down.
If pressure drops below 1200 psi you will have a state of multi-phase flow. This is dangerous to equipment and can cause catastrophic equipment failure at these pressures. False instrument readings will occur and bad things happen. Has anyone considered this in the evaluation??? **12-28**

Meredosia Energy Center:

Only six (6) hours of UPS power in an emergency for instrumentation. Per code a 24-hour backup UPS is required on all critical instrumentation. Then there is an emergency generator that is sized for 150% of normal load and a seven (7) day run time.
Section 3.15 needs revision. It should reflect power calculations and a true load study for the project.
Who will pay for the new required substation, transmission lines, 4160 VAC or 13.8 KV motor supply? The local population should not have to pay for these project infrastructure upgrades. This is not mentioned in the documentation. IEEE and API guidelines are never mentioned and they have major cost effects.
The loads on the roads will easily be 100 tons for the deep drilling equipment. Just the draw-works for the rig will run +90 tons before adding in the special truck. Who is going to pay for this???
Initial water for drilling and fracturing the well laterals should be considered. It could be as high as half a million gallon. The local supply and disposal of the fluids is a logics issue not mentioned.
By the way, what is the overall effect on the new boilers etc. thermal plant performance efficiency? The current plant HHV net efficiency is about 21.5%. What is the new value factoring in carbon capture and sequestration? The efficiency will go down because there is more load. How far down did it go? Are there any mass and heat calculations on overall energy efficiencies of the project for review?? **12-29**

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Response

any other purpose. Under Illinois law, once a pipeline easement is abandoned, as by cessation of use and removal of the pipeline, the easement terminates.

17. The CO_2 pipeline design would include a leak detection/ Computational Pipeline Monitoring and modeling system that meets or exceeds American Petroleum Institute Standard 1130 (API 1130). In addition, aerial patrols would be conducted on a routine basis to detect even small leaks.

18. The Alliance determined during preliminary design that a nominal 12-inch diameter pipeline would be sufficient for the volume of CO_2 to be transported and permanently stored. The final diameter for the main CO_2 pipeline would be established during the hydraulic analysis performed as part of the Pipeline Front-End Engineering Design. It is possible that the final pipe diameter would be less than 12 inches.

19. The subject of this question has been addressed in response to Comment 12-10.

20. Current analysis indicates that there would be no H_2S in the CO_2 stream because of the oxidizing nature of the oxy-combustion process. However, for purposes of analysis, the Alliance used the accepted CO_2 pipeline standard of less than 20 ppm H_2S by weight. Even if the oxy-combustion process resulted in the production of H_2S, if the level of H_2S were found to exceed the acceptable operating level, as detected at the energy center inlet metering station, the isolation valve into the pipeline would be closed.

12-25 As stated in Section 2.5.1.3 of the Draft EIS, the CO_2 pipeline would be constructed in conformance with applicable regulations in 49 CFR Part 195. The pipeline depth (4 feet) would exceed the minimum depth requirements of the regulations. The depth on agricultural lands (5 feet) would be in accordance with Illinois Department of Agriculture Pipeline Construction Standards and Policies and the Agricultural Impact Mitigation Agreement entered into by the Alliance.

12-26 The issue raised in this comment is viewed to be outside the scope of the NEPA process. However, DOE acknowledges the need for compliance with governing law as well as transparency. DOE understands this situation to be one where the Alliance requested that personal information of affected landowners (names and addresses) be maintained as confidential in a non-public document. In that regard DOE is strongly supportive of protection of Personally Identifiable Information such as that identified by the Alliance. A publicly releasable document was also submitted for the record at the same time, fully disclosing the pipeline route and

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Funding FutureGen 2.0

12-30 There is no cost analysis on cost versus benefit in this Draft EIS. The Government Accounting Office thought there should be one on FutureGen's reorganization but it was not done and … "*DOE added that it had stopped those negotiations because it believed that the Alliance would not be able to financially partner with DOE.*" [47] I feel because GAO feels that the DOE has no assurance that the restructured FutureGen is the best option to advance CCS. I believe that before the DOE makes a decision on FutureGen 2.0, it should sit down with the Alliance and perform a comprehensive analysis of costs, benefits, and risks, and that the DOE should share the analysis with Morgan County citizens before anymore citizens commit to this project. US taxpayers and Illinois rate payers are stakeholders in this venture and are owed this accountability.

This project was supposed to be a 1.3 billion dollar project. Then it became 1.65 billion, and now since the development of FutureGen's Power Sourcing Agreement, the cost to has escalated to somewhere from 4 billion to 5.5 billion depending upon the length of the project as stated above according to Exelon's letter to Senator Richard Durbin (see above)

12-31 What is really upsetting is the amount of money that has already been spent on this project.

For example, Illinois expenditures for Lobbying are:

2008	St. of Illinois FutureGen	Cassidy and Associates 6 Reports	180,000.00	S.1751 and H.R. 2641 Energy and Water Appropriations Bills Funding for FutureGen Commercial Demonstration Project	
2007	St. of Illinois	Cassidy and Associates	160,000.00	S.1751 and H.R. 2641 Energy and Water Appropriations Bills Funding for FutureGen Commercial Demonstration Project	Thomas, Dennis
		TOTAL	**$340,000.00**		

Then, it spent another $1,320.000 in 2009 on Illinois Grants in its Coal Competitiveness Program to bring FutureGen to Mattoon. (See Footnote 4 and Appendix 2). Starting in 2011, Illinois spent $45,500 on Coal Competitiveness grants to four cities vying for FutureGen when Mattoon did not want the CO2 storage under Coles County land. Jacksonville Regional Economic Development Corporation received the largest grant of $18,000 against Tuscola and the City of Vandalia each receiving $10,000. Christian County Economic Development Corporation for Taylorville only received $7,500. I believe that Jacksonville's bid of $18,000 sweetened the pot of FutureGen to bring FutureGen to Morgan County.

Response

affected parcels. Upon notification by the Administrative Law Judge (that information such as landowner's names and addresses is not typically viewed to be confidential under the docketed proceedings, the Alliance made motion to the Administrative Law Judge to make the information viewed by the Alliance as confidential available to the public. As such, DOE does not view the Alliance's efforts as an attempt to hold back pertinent information related to requested action.

12-27 In the context of the NEPA regulations (40 CFR 1502.16), the Draft EIS considered that the surface lands would be irreversibly committed for use throughout the 20-year operational life of the project. If at the end of the project the Alliance were to have no further use of facilities, project components could be removed and the surface lands again made available to be re-used for another purpose. DOE stands by the accuracy of this statement about the physical reversibility of land uses irrespective of the comment about easement law that relates to the legal status of a right-of-way. The response to Question 16 in Comment 12-24 also addresses pipeline easements.

12-28 As explained in the response to Comment 12-10, the Alliance has assembled a highly qualified team for the design and operation of FutureGen 2.0. This team includes all the necessary technical disciplines and professionals needed for this effort, including professional engineers, geologists, and various industry experts, who would be responsible to ensure conformance with accepted engineering standards and regulatory requirements. Presently the Alliance has completed preliminary engineering and design activities sufficient to support the NEPA process. As design work progresses additional process engineering and modeling would further specify equipment needs. Final equipment specifications for all aspects of the project would not be fully defined until the detailed design phase, which is presently planned to be initiated immediately following a favorable ROD. As this project would be the first of its kind, many components would not be commercial "off the shelf" equipment and as a result would be specially designed for this specific application.

12-29 As explained in the response to Comment 12-28, the Alliance has assembled a highly qualified team for the design and operation of FutureGen 2.0. This team includes all the necessary technical disciplines and professionals needed for this effort, including professional engineers, geologists, and various industry experts, who would be responsible to ensure conformance with accepted engineering standards and regulatory requirements. The specific data requested in this comment pertain to aspects of the detailed

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Illinois has spent a total of $2,555,500 on FutureGen.

FutureGen also spent quite a bit of money on Lobbying. See Appendix 3 for this amount.
This FutureGen 2.0 Project was funded in 2010 by the DOE through the American Reinvestment and Recovery Act with the guise of "Job Creation". This table summarizes the jobs requirements according to the EIS-0460D:

FutureGen Aspect	Construction	Permanent Operational Jobs	Total
Meredosia Power Plant	425	115	540
Pipeline	300	None given for Monitoring	300
Storage Site (Includes wells)	55	21	76
Educational Center	None Given	22	22
Totals	780	158	**938**

When Morgan County was first announced by FutureGen, the headlines in the Jacksonville Journal Courier ran to thousands of jobs would be created. Well, 938 is not even one thousand. Perhaps the construction of the Educational Center could push the numbers over one thousand but there are enough empty buildings in Jacksonville that could be repurposed as an educational center…and who is going to pay for the facility? Will FutureGen rent or purchase?

IN SUMMARY:
It seems that to produce 938 jobs, the spending of $1 billion by the DOE, who knows how much FutureGen is paying PLUS the $3 billion according to the Exelon letter, that a minimum of $4 billion dollars for 938 jobs is outrageous. **12-31 con't**

FutureGen's Training and Educational Center

By virtue that the FutureGen Alliance is a not-for-profit entity registered in the State of Delaware, it must provide a training or educational center. *"Contributing Alliance members under the 501(c)(3) structure would not receive any repayment of their contributions from project revenues or a facility sale. Such funds must be directed back to research and development."*[48] Initially, this training or educational center was to be at the injection site.

To me, since the injection site is far from any urban area, it makes no practical sense to have the training center in the middle of a farm and take precious farmland out of productive service. **12-32**

In addition, there are already seven CO2 sequestration centers the United States with even two in Illinois. Why does there need to be a third. This is redundant and a waste of taxpayer and rate payer money. The newest is in Decatur, Illinois.[49] These centers are:

University of Illinois (Champaign, IL)

DOE/EIS-0460D Additional Comments Page **22** of **26**

Response

design that are beyond the scope of an EIS to provide.

With respect to the weight of drilling rigs, all vehicles associated with the transportation of material and equipment to and from the site would comply fully with Illinois Department of Transportation (IDOT) and the Federal Highway Administration (FHWA) weight and permitting regulations. Most trucks delivering equipment and supplies, including drilling equipment, would be less than 80,000 pounds gross vehicle weight with standard axle spacing; therefore, they would not be considered overweight by criteria outlined in either IDOT or FHWA regulations (625 ILCS 5 Chapter 15, Article 1; 23 CFR Part 658.17). However, depending on the exact nature or the delivery, some trucks may require an overweight permit, a non-divisible load permit, or both.

The estimated water demands for drilling the injection wells are described and analyzed with respect to the capacity of local utilities under the subheading "Water Usage" in Section 3.15, Utilities. The disposal of fluids from the drilling of injection wells is described and analyzed under the subheading "Wastewater" in the same section.

12-30 The response to Comment 2-13 explains DOE's position on the need for a cost-benefit analysis. The response to Comment 11-12 explains DOE's decision to be supported by the Final EIS with respect to funding for the FutureGen 2.0 Project.

12-31 As comparable to Comment 11-12, the issues expressed in this comment are beyond the scope of the EIS for the FutureGen 2.0 Project. The cost estimate for the project is $1.78 billion, with DOE's financial responsibility capped at $1.05 billion. The Draft EIS described the potential impacts on the local economy and employment from construction for the FutureGen 2.0 Project in Section 3.18.3.1 and for operations in Section 3.18.3.2. DOE believes that this analysis outlines the potential effects on primary and secondary employment in Morgan County appropriately and fairly.

12-32 As described in Section 2.5.3 of the Draft EIS, the visitor, research, and training facilities would be located on as many as two suitable sites in the vicinity of Jacksonville, IL. The Final EIS has been updated to explain that the Alliance currently plans for these functions to be housed in a single facility located in Jacksonville.

Commentor 12 - Elizabeth (Betty) Niemann

Environmental Outreach and Stewardship (EOS) Alliance (Seattle, WA)
New Mexico Institute of Mining and Technology (Socorro, NM)
Petroleum Technology Transfer Council (PTTC) (Tulsa, OK)
Southern States Energy Board (SSEB) (Norcross, GA)
University of Texas at Austin (Austin, TX)
University of Wyoming (Laramie, WY)
CO2 Capture and Storage Project, Education and Training Center (Decatur, IL)

The more training centers there are, the less exclusivity they have. Jacksonville, Illinois, is in the middle of the state without adequate air transportation to get to it. Both Champaign and Decatur have regional airports. Springfield, Illinois is the closest airport to Jacksonville and the FutureGen project, but Decatur is also the same distance from Springfield. The Meredosia Power Center is further away still. FutureGen is running way behind in offering this training research center. It would be better off funding one of the other two already located in Illinois.

I do believe that one of its selling points when coming to Morgan County is the promise of money to Illinois College. So the question is, where is the training center going to be?

12-32 *con't*

Concerns and comments on Socioeconomic Impacts:

Cultural: The Illinois Department of Agriculture has a Farm Recognition Program within the state which honors those farms that have been in a family for 100 years and also for 150 years.[50] There are over 9200 centennial farms in the state and over 600 sesquicentennial farms. There are 12 centennial farms in Morgan County registered with the Illinois Department of Agriculture. Two farms in the carbon storage area are eligible. The heirs of the Beilschmidt Family Farm where the characterization well was drilled are awaiting transfer of the land to them by the Trustee before submitting the Centennial Farm Application. Page F-90 in Appendix F of Volume II of the EIS-460D shows a picture of the 1894 Plat book taken of Section 25 of Township 16N 9W which shows the owner as Henry W. Beilschmidt in the North East corner of the section with a farm of 156 acres. Also on that same map is a James H Martin who maybe an ancestor of the Martin's who are assumed to beat the end of the pipeline according to ICC docket 13-0252. If this is the case, then Martin farm is also eligible for Centennial Farm certification. The Martin's should be asked if they are descendents and IF they are going to seek Centennial Certification.

While these farms are not certified yet, this type of certification places the farm in a unique historical perspective. This certification is not part of the National Register of Historic Places. However, it is a part of Illinois history which the Illinois Department of Agriculture is trying to preserve.

12-33

Economic: The State of Illinois legislators have fallen all over themselves to bring the FutureGen project to Illinois. They have passed laws without really knowing the risks of this project to push the FutureGen agenda. With one law mandating that the Attorney General represent FutureGen in any legal action that may be filed against FutureGen, FutureGen has

12-34

DOE/EIS-0460D Additional Comments Page **23** of **26**

Response

12-33 Based on the analysis of impacts on prime farmlands in Section 3.3, Physiography and Soils, and on land use in Section 3.10, Land Use, of the Draft EIS, DOE concluded that the effects of the CO_2 pipeline and geologic storage components at the land surface would be limited to the right-of-way requirements for the pipeline and the permanent site(s) for the injection well facilities and associated access roads. As none of these activities would alter the lands ability to support agricultural land use or displace any current farm owners and with DOE's understanding of the Illinois Department of Agriculture's Bureau of Marketing efforts to honor Illinois' rich agricultural heritage, DOE believes that the project would not affect properties eligible for either the Centennial Farms Program or the Sesquicentennial Farms Program.

12-34 The issues expressed in this comment have been addressed in response to Comments 10-01 and 11-13.

Commentor 12 - Elizabeth (Betty) Niemann

been elevated to the same level in the state as a department or bureau. What company or corporation do you know has this level of protection in any state?

FutureGen has announced that the Illinois Commerce Commission (ICC) approved the Illinois Power Agency's Power Procurement Plan which includes FutureGen's Power Purchase Agreement (PPA). This approval is under the ICC's docket number 12-0544. However, what FutureGen has not really indicated that under docket 12-0544 there is a law suit filed contesting the ICC's power to approve the FutureGen PPA. There was so much discussion that the PPA was moved to a new docket number 13-0034 such that the terms could be worked out.
So far as if this writing, FutureGen's PPA is not totally approved by the ICC. All of this information can be found on the ICC website under the docket numbers given.[51] There is a long discussion about the inclusion of the PPA in the Power Procurement Plan. Again, FutureGen pushed for its inclusion. I could go on, but I won't. The documents are there to follow.

If this PPA is finally approved, then the economic impact to the citizens and rate payers of Illinois need to be addressed in the EIS. As of this writing, the PPA does not have all the costs associated with the project from which the FutureGen can recover its project costs as specified in the PPA. The utilities that sign the PPA will then pass the costs on to the Illinois consumer and federal tax payer.

I do not believe that passing the cost to the rate and taxpayers was the intent of the demonstration project when it began. The reason, as stated above, that Exelon pulled out of the alliance was that consumers were going to be stuck paying the bill. In my opinion, FutureGen is getting a free ride to build this project at federal taxpayers' expense with cost sharing funding from the DOE plus increase electrical rates to Illinois consumers to pay for the cost of the project. Then, FutureGen gets to license its knowledge and sell licenses to the world without reimbursing those who paid for the free ride.

12-34 ***con't***

Report:

In conclusion, looking at the alternatives, plants retrofitted with natural gas as fuel, run cleaner, burn more efficiently, provide less harm to the atmosphere, and not require a disruption to Illinois farmland with a pipeline and sequestration. It has already been documented that with the switch to natural gas, the CO2 emissions have gone down appreciably. With natural gas, power plants can produce electricity cheaper, use less natural resources, is more energy efficient, produces less CO2 emissions thereby producing cheaper electricity for the rate payer requiring less amount of the cap which can be made available for other power projects.

Furthermore, why sequester the CO2 when there are several States looking for CO2 to be used in Enhanced Oil Recovery. FutureGen could sell the CO2 to these states to offset construction and operating costs rather than sequester it.

Page 4.4.1 of Volume 1 of the EIS-0460D states "Although the Alliance may still elect to construct and operate the project in the absence of DOE cost-shared funding, for the purposes

12-35

Response

12-35 As explained in response to Comment 11-03, alternatives involving different fuel blends, renewable energy sources, and energy conservation improvements would not support the specific objectives of the President's FutureGen Initiative and were therefore not analyzed in the Draft EIS.

Commentor 12 - Elizabeth (Betty) Niemann

Response

12-35 con't

of the analysis in the EIS, DOE assumed that the no action alternative is equivalent to a no-build alternative."

It is my hope that Alliance does not elect to continue. The most of the farmers impacted by the pipeline and some of the carbon storage area farmers of Morgan County will be happy. FutureGen has not voluntarily announced or made public the 45 landowners in the carbon storage area. This will continue the "end of country".

I have more comments but in the interest of time, I will not include them at this time.

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[1] http://rockblogs.psu.edu/climate/2008/06/ethical-issues-entailed-by-geologic-carbon-sequestration.html
[2] http://energy.gov/fe/site-characterization-promising-geologic-formations-co2-storage
[3] FutureGen 2.0 Request for Site Proposal, Amended 10 November 2013.
[4] http://granttracker.ildceo.net/ Illinois Department of Commerce and Economic Opportunity. Search for Jacksonville Economic Regional Development Corp (Grant 11-483007), Tuscola Economic Dev. Corp (Grant 11-483005), City of Vandalia (Grant 11-483004), and Christian County Economic Dev. Corp (Grant 11-483006).
[5] http://www.sciencedirect.com/science/article/pii/S1750583609000255
[6] http://www.sj-r.com/top-stories/x1672346677/Original-site-for-FutureGen-project-sold-to-development-group
[7] http://www.cyberdriveillinois.com/publications/pdf_publications/c216.pdf
[8] http://www.eenews.net/assets/2013/03/01/document_daily_04.pdf
[9] http://www.indystar.com/article/20121227/BUSINESS/121227022/Duke-Energy-customers-owe-2-5-billion-plus-Edwardsport-plant
[10] Page 32 http://www.gao.gov/new.items/d09248.pdf
[11] Page 10 http://www.fas.org/sgp/crs/misc/R43028.pdf
[12] http://washingtonexaminer.com/article/37838
[13] http://www.icc.illinois.gov/docket/casedetails.aspx?no=13-0252 and http://www.icc.illinois.gov/docket/files.aspx?no=13-0252&docId=195955
[14] http://en.wikipedia.org/wiki/Atmosphere_of_Earth
[15] http://gulfnews.com/business/opinion/carbon-capture-and-storage-the-devil-lies-in-the-details-1.1138063
[16] http://gulfnews.com/business/opinion/carbon-capture-and-storage-the-devil-lies-in-the-details-1.1138063
[17] http://articles.latimes.com/2013/may/13/science/la-sci-sn-carbon-dioxide-400-20130513
[18] page 4.3-25 of Chapter 1, 460 EISD *(These reductions in [CO2] emissions alone would not appreciably reduce global concentrations of GHG emissions.)*
[19] http://www.afpnj.com/msds/co2/Praxair_Carbon_Dioxide_Liquid_2010_10_15.pdf
[20] Page 2-66 of Chapter 1, 460 EISD
[21] Quantifying the success of onshore carbon capture and storage from surface deformation measurement and geo-mechanical modeling by N. Gourmelen (1), A. Shepherd (2), D. Angus (3), Q. Fisher (3), D. Lesnic (4), and A. Gouldson (5)
[22] http://www.escholarship.org/uc/item/2bd7g4bt
[23] http://www.rs-pore2field.com/Fichiers/Oral/ExtendedAbstract_Gourmelen%20Angus_InSAR.pdf
[24] Liu, Faye *CO2–brine–caprock interaction: Reactivity experiments on Eau Claire shale and a review of relevant literature* page 155
[25] Ibid page 164
[26] Liu, Faye *Coupled Reactive Flow and Transport Modeling of CO2 Sequestration in the Mt. Simon sandstone formation, Midwest U.S.A.* Abstract
[27] Ibid page 304

Commentor 12 - Elizabeth (Betty) Niemann

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[28] Ibid page 304

[29] Fluid dynamics and surface deformation of carbon sequestration by Herbert Hubbert.

[30] CO2–brine–caprock interaction: Reactivity experiments on Eau Claire shale and a review of relevant literature by Faye Liu[a,*], Peng Lu[a], Craig Griffith[b], Sheila W. Hedges[b], Yee Soong[b], Helge Hellevang[c], Chen Zhu[a]

[31] http://link.springer.com/article/10.1007/s10596-009-9146-x#

[32] Lessons in carbon storage for geologic analogues. Mike Bickle and Niko Kampman Geology April 2013.

[33] http://esd.lbl.gov/research/programs/gcs/projects/storage_resources/co2storage.html

[34] Effects of reduction in porosity and permeability with depth on storage capacity and injectivity in deep saline aquifers: A case study from the Mt. Simon Sandstone aquifer by Cristian Medina, John Rupp, and David Barnes

[35] http://www.netl.doe.gov/technologies/carbon_seq/refshelf/atlasIII/2010AtlasIII_AppendixB.pdf

[36] Chadwick, Andy et al, Best Practice for the Storage of CO2 in Saline Aquifers, British Geologic Survey; Website: www.bgs.ac.uk

[37] http://www.isgs.illinois.edu/maps-data-pub/wwdb/wwdb.shtml

[38] Bickle and Kampman, Geology, April 2013; v.41; no. 4; p 525-526 " Lessons in carbon storage fro geological analogues ' p 526.

[39] http://www.netl.doe.gov/publications/proceedings/11/carbon_dioxide_storage_and_utilization/upload/NETLRemediation2011_Benson.pdf

[40] http://www.sciencedirect.com/science/article/pii/S1750583611002301

[41] http://www.energy.ca.gov/sitingcases/hydrogen_energy/documents/08-AFC-8/applicant/revised_afc/Volume_II/Appendix%20E.pdf

[42] A Policy, Legal, and Regulatory Evaluation of the Feasibility of a National Pipeline Infrastructure for the Transport and Storage of Carbon Dioxide" By Kevin Bliss, Esq., Interstate Oil and Gas Compact Commission, Washington, D.C. et al.

[43] Pages 56-61 or Appendix A11-A16 http://www.ildceo.net/NR/rdonlyres/4FE157DB-C1F7-4F2B-B46B-5F718A08E881/0/IllinoisCO2PipelineReport20090715.pdf

[44] Page 62 or A 17 http://www.ildceo.net/NR/rdonlyres/4FE157DB-C1F7-4F2B-B46B-5F718A08E881/0/IllinoisCO2PipelineReport20090715.pdf

[45] http://www.icc.illinois.gov/docket/Documents.aspx?no=13-0252

[46] McGraw, Sheamus; The End of Country, Random House June 28,2011; **ISBN-10:** 1400068533

[47] Page 32 http://www.gao.gov/new.items/d09248.pdf

[48] http://www.gpo.gov/fdsys/pkg/CHRG-110shrg48846/html/CHRG-110shrg48846.htm

[49] http://energy.gov/articles/co2-capture-and-storage-project-education-and-training-center-launched-decatur-illinois

[50] http://www.agr.state.il.us/marketing/centfarms/

[51] http://www.icc.illinois.gov/ Docket 12-0544 and 13-0034

Response

Commentor 12 - Elizabeth (Betty) Niemann

DOE/EIS-0460D FutureGen 2.0 Commentary Appendix
By Elizabeth Niemann

Appendix 1:

Calculation of CO2 to parts per million:

Each 2.12 billion metric tons of net carbon (GtC) retained in the atmosphere adds 1 parts per million (ppm) by volume to the concentration of CO2 in the atmosphere.

From http://docs.nrdc.org/nuclear/files/nuc_05040201a_244.pdf

Equation:

Given 1.0 million metric tons = .0011 billion metric tons

$$\frac{0.0010 \text{ billion metric tons CO2}}{2.12 \text{ billion metric tons CO2}} = X/1\text{ppm}$$

Solving the equation:

$$1 \text{ ppm} \times \frac{0.0011 \text{ billion metric tons CO2}}{2.12 \text{ billion metric tons CO2}} = X = 0.00047\text{ppm reduction in atmospheric CO2 for one year by sequestration}$$

FutureGen 2.0's sequestration is projected to reduce the amount of CO2 by 1.1 million metric tons of CO2 per year for 30 years or a total of 39 million metric tons if the project's estimates are correct.

Therefore: 1.1 metric tons stored per year x 0.00047 = 0.0005 ppm per year or 0.0015 ppm for 30 years or 0.001 ppm for 20 years as the project now is slated for.

It hardly seems worth it.

Response

Commentor 12 - Elizabeth (Betty) Niemann

Response

Appendix 2: Illinois Expenses for FutureGen

Grant No.	Category	Class	Opportunity	Organization	City			Start date
09-483002	Energy	Coal	Coal Competitiveness Program	FutureGen Industrial Alliance	Mattoon	252,000		9/1/2008
09-483019	Energy	Coal	Coal Competitiveness Program	FutureGen Industrial Alliance	Mattoon	612,000		11/1/2008
09-483020	Energy	Coal	Coal Competitiveness Program	FutureGen Industrial Alliance	Mattoon	456,000		4/1/2009
12-481006	Energy	Coal	Coal Competitiveness Program	FutureGen Industrial Alliance	Jacksonville	850,000		6/1/2012
					Total		2,170,000	
11-483007	Energy	Coal	Coal Competitiveness Program	Jacksonville Regional Economic Development Corp	Jacksonville	18,000		8/1/2010
11-483005	Energy	Coal	Coal Competitiveness Program	Tuscola Economic Dev. Corp	Tuscola	10,000		7/1/2010
11-483004	Energy	Coal	Coal Competitiveness Program	City of Vandalia	Vandalia	10,000		7/1/2010
11-483006	Energy	Coal	Coal Competitiveness Program	Christian Co. Economic Development Corp	Taylorville	7,500		7/1/2010
					Total		677,050	
				IL Coal Competitiveness Grants	**Grant Total**		**2,847,050**	
				State of Illinois Lobbying Expenditures			340,000	
					Total		**3,187,050**	

Commentor 12 - Elizabeth (Betty) Niemann

Response

Appendix 3: Lobbying Expenses – FutureGen on Federal Level and Illinois on Federal Level

	Lobbying Expenses					
Year	Organization	Lobbying Firm	Amount	Lobbyists		
2012	FutureGen Alliance	Carver, Susan (Misc Energy)	60,000.00	Carver, Susan		
2011	FutureGen Alliance	Carver, Susan	160,000.00	Carver, Susan		
		Gephardt Group	200,000.00	Daniels, Sharon	Gephardt, Richard A	
2010	FutureGen Alliance	Carver, Susan	160,000.00	Carver, Susan		
		Gephardt Group	240,000.00	Daniels, Sharon	Gephardt, Richard A	O'Donnell, Thomas J
2009	FutureGen Alliance	Carver, Susan	160,000.00	Carver, Susan		
		Gephardt Group	200,000.00	Daniels, Sharon	Gephardt, Richard A	O'Donnell, Thomas J
2008	FutureGen Alliance	Carver, Susan	160,000.00	Carver, Susan		
		Gephardt Group	180,000.00	Daniels, Sharon	Gephardt, Richard A	O'Donnell, Thomas J
		Gephardt Group Gov't Affairs	5,000.00	Daniels, Sharon	O'Donnell, Thomas J	O'Donnell, Thomas J
2007	FutureGen Alliance	Carver, Susan	60,000.00	Carver, Susan		
		Gephardt Group	30,000.00	Daniels, Sharon	Gephardt, Richard A	O'Donnell, Thomas J
				& Messner, Micheal		
			1,615,000.00			
2008	State of Illinois FutureGen	Cassidy and Associates 6 Reports	180,000.00	S.1751 and H.R. 2641 Energy and Water Appropriations Bills Funding for FutureGen Commercial Demonstration Project		
2007	State of Illinois FutureGen	Cassidy and Associates	160,000.00	S.1751 and H.R. 2641 Energy and Water Appropriations Bills Funding for FutureGen Commercial Demonstration Project	Thomas, Dennis	
		Total Illinois Lobbying Exp.	**340,000.00**			
		Total Lobbying For FutureGen	**1,955,000.00**			

DOE/EIS-0460D Commentary Appendix Page **3** of **9**

Commentor 12 - Elizabeth (Betty) Niemann	Response

Appendix 4:

This information is based upon Illinois Power AAgency and Illinois Commerce Commission documents and the links are included in the body of this document. This information is given as an example of the strategy FutureGen uses to push Illinois laws written to push the FutureGen agenda. The references and documents associated with the links speak for themselves. They are a matter of public record.

FutureGen Strategy

Power Procurement Plan Approval

2011: Laying the ground work:
The argument for FutureGen's inclusion in the 2012 IPA Power Procurement Plan:

The recommendations in the IPA 2012 Illinois Power Agency's Power Procurement Plan were not to include FutureGen's Power Sourcing Agreement its Procurement Plan.

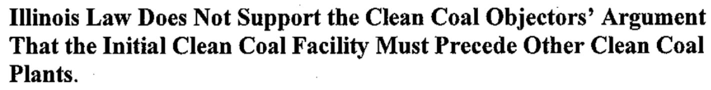
http://www.icc.illinois.gov/docket/files.aspx?no=11-0660&docId=171964 28 September 2011 with no mention of FutureGen or Clean Coal.

Then the following dialog occurred:

This argument by FutureGen is for FutureGen's inclusion in the Procurement Plan.
http://www.icc.illinois.gov/docket/files.aspx?no=11-0660&docId=172128 on 3 October 2011

Page 4 from above:
"Accordingly, because the IPA Act expressly authorizes the IPA to include a clean coal component to the Plan, and because at least one qualifying clean coal project FutureGen 2.0 - has expressed interest in participating in a clean coal procurement, the FutureGen Alliance strongly supports the IP A' s decision to include a clean coal procurement in the Plan."

Response:
http://www.icc.illinois.gov/docket/files.aspx?no=11-0660&docId=172761 Dated 18 October 2011



Illinois Law Does Not Support the Clean Coal Objectors' Argument That the Initial Clean Coal Facility Must Precede Other Clean Coal Plants.

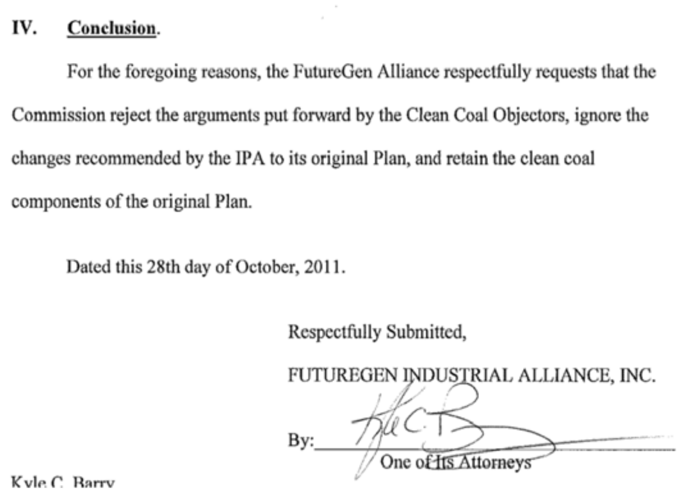
Reply:

DOE/EIS-0460D Commentary Appendix Page **4** of **9**

Commentor 12 - Elizabeth (Betty) Niemann

Response

http://www.icc.illinois.gov/docket/files.aspx?no=11-0660&docId=173299 28 October 2011



IV. **Conclusion**.

For the foregoing reasons, the FutureGen Alliance respectfully requests that the Commission reject the arguments put forward by the Clean Coal Objectors, ignore the changes recommended by the IPA to its original Plan, and retain the clean coal components of the original Plan.

Dated this 28th day of October, 2011.

Respectfully Submitted,

FUTUREGEN INDUSTRIAL ALLIANCE, INC.

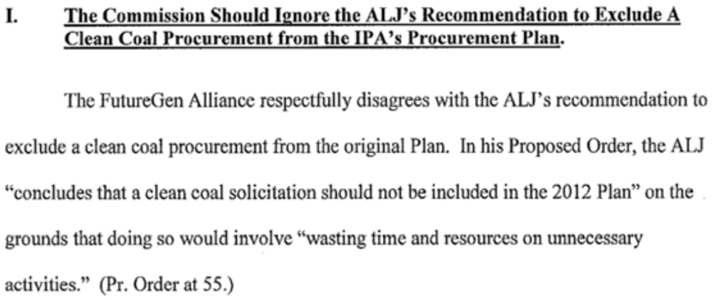
By: Kyle C. B
One of Its Attorneys

Kyle C. Barry

And http://www.resausa.org/sites/default/files/documents/filings/IL/11-0660_RESA_Reply_to_Responses_to_Objections.pdf 28 October 2011

Brief on Exception:
http://www.icc.illinois.gov/docket/files.aspx?no=11-0660&docId=174453 Dated 01 December 2011 –

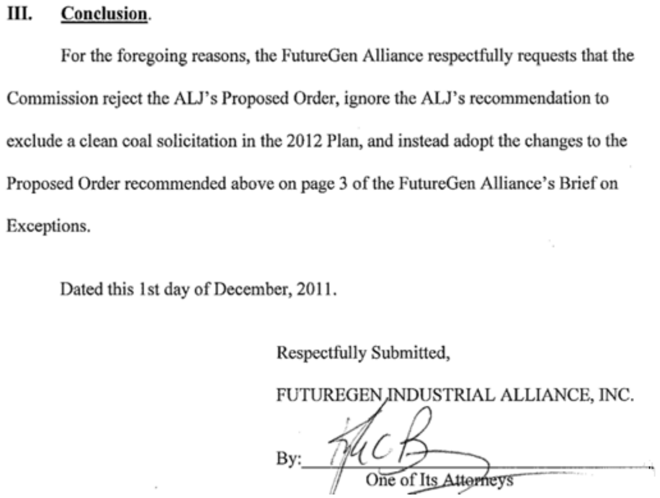
Commentor 12 - Elizabeth (Betty) Niemann



I. The Commission Should Ignore the ALJ's Recommendation to Exclude A Clean Coal Procurement from the IPA's Procurement Plan.

The FutureGen Alliance respectfully disagrees with the ALJ's recommendation to exclude a clean coal procurement from the original Plan. In his Proposed Order, the ALJ "concludes that a clean coal solicitation should not be included in the 2012 Plan" on the grounds that doing so would involve "wasting time and resources on unnecessary activities." (Pr. Order at 55.)

And



III. Conclusion.

For the foregoing reasons, the FutureGen Alliance respectfully requests that the Commission reject the ALJ's Proposed Order, ignore the ALJ's recommendation to exclude a clean coal solicitation in the 2012 Plan, and instead adopt the changes to the Proposed Order recommended above on page 3 of the FutureGen Alliance's Brief on Exceptions.

Dated this 1st day of December, 2011.

Respectfully Submitted,

FUTUREGEN INDUSTRIAL ALLIANCE, INC.

By:________________________
One of Its Attorneys

2012:
Following the non-inclusion of FutureGen's Power Sourcing Agreement for the 2013 Power Procurement Plan, the Illinois Power Agency's 2013 Power Procurement Plan did include FutureGen's Power Sourcing Agreement.

DOE/EIS-0460D Commentary Appendix Page **6** of **9**

Response

Commentor 12 - Elizabeth (Betty) Niemann

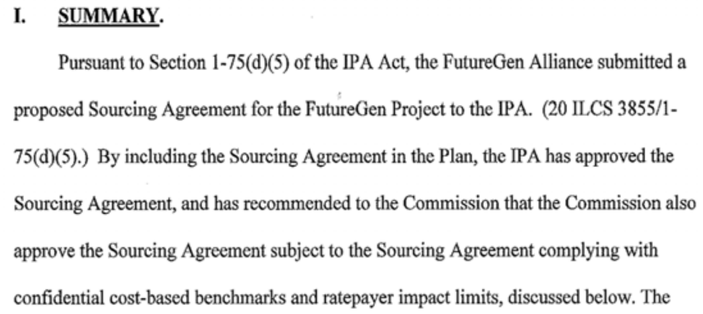
http://www2.illinois.gov/ppb/Documents/120509a.IPA.Barry.PDF 6 April 2012

From the IPA 2013 Power Procurement Plan filed with the ICC on 28 September 2012
http://www.icc.illinois.gov/docket/files.aspx?no=12-0544&docId=187958

"While there is little in terms of the purchase of traditional products, including renewable resource purchases, being recommended in this Plan, the Illinois Power Agency proposes the following Plan components in addition to the procurement action plan in the above table and requests the following Commission action: ...
4. Approve the sourcing agreement between the FutureGen Alliance and the utilities and the ARES pursuant to Section 1-75(d)(5) of the Illinois Power Agency Act, as described and discussed in Section 7.5 of this Plan, subject to any modifications made by the Commission; ..."
from page 4 and 5 and also on page 50 and 51.

Follows this dialog from FutureGen:

Objections and Response Part I by FutureGen:
http://www.icc.illinois.gov/docket/files.aspx?no=12-0544&docId=188073 03 October 2012
From page 2



I. SUMMARY.

Pursuant to Section 1-75(d)(5) of the IPA Act, the FutureGen Alliance submitted a proposed Sourcing Agreement for the FutureGen Project to the IPA. (20 ILCS 3855/1-75(d)(5).) By including the Sourcing Agreement in the Plan, the IPA has approved the Sourcing Agreement, and has recommended to the Commission that the Commission also approve the Sourcing Agreement subject to the Sourcing Agreement complying with confidential cost-based benchmarks and ratepayer impact limits, discussed below. The

And from Page 20:

IX. THE SOURCING AGREEMENT SATISFIES THE REQUIREMENTS OF THE IPA ACT AND THE PUA, AND THE COMMISSION SHOULD ACCEPT THE IPA'S RECOMMENDATION TO APPROVE IT.

IF as stated above from page 2, "By including the Sourcing Agreement in the Plan, the IPA has approved the Sourcing Agreement, and has recommended to t he Commission that the Commission ALSO approve the Agreement..." and also from **12-36**

DOE/EIS-0460D Commentary Appendix Page **7** of **9**

Response

12-36 The issues raised in this comment are not within the scope of the EIS for the FutureGen 2.0 Project and not relevant to DOE's decisions with respect to the proposed action. The power purchase agreement is discussed in response to Comments 10-01 and 11-13.

Commentor 12 - Elizabeth (Betty) Niemann		**Response**

page 20, this same logic is used that because there is approval from the IPA and if the ICC, then, in my opinion, FutureGen may use this same logic to for other Governemntal Authorization waivers.

CONCERN

For example, FutureGen could argue that the ICC, by its approval of the FutureGen Sourcing Agreement (also referred to as FutureGen's Power Purchase Agreement) which includes paragraph 3 of the Sourcing Agreement 3. Conditions Precedent, allows for waivers of the Governmental Authorizations. Thus FutureGen could also use this approval with the Government Authorities listed in Exhibit 3.1.(a)(i) to say that the ICC approved waiver process of authorizations under Paragraph 3. Conditions Precedent and that FutureGen need not secure these authorizations.

For example FutureGen has already tried to circumvent governmental authorizations.

From page 12: PSD request for variance on PSD (Air) Permit to IPA.
http://www.icc.illinois.gov/docket/files.aspx?no=11-0660&docId=172128 on 3 October 2011

"Finally. the FutureGen Alliance would recommend that the ICC modify the general specification for PSD (Air) Permit to the following:
"Demonstrate that a PSD (Air) Permit, if reguired, has either been issued, or an application has been filed with the Illinois EPA"
The FutureGen Alliance believes this change is appropriate because it is possible that a clean coal project may not be required to obtain a PSD permit given the near-zero level S02, N02, and CO emissions generated by such a project."

I believe it is not within the jurisdiction or power for the IPA and/or the ICC to make such a determination on a permit. Permits should be issued by the appropriate Governmental Authority. Just indicating they applied for the permit is not the same as having one issued. Even though Public Act 97-0618 states that the State of Illinois shall issue…all necessary and appropriate permits…these permits must follow State and Federal laws about the procedures for obtaining a permit.

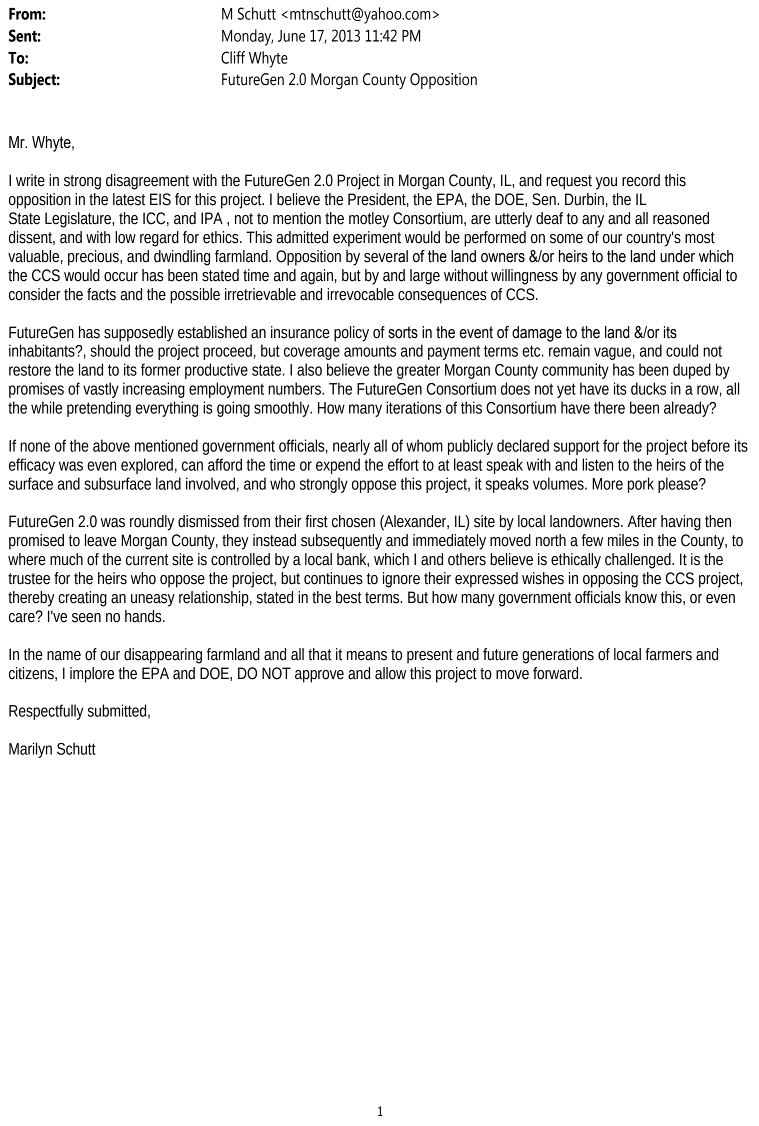
12-36
con't

FYI:
Under Illinois Law: http://www.ilga.gov/legislation/publicacts/97/097-0618.htm

DOE/EIS-0460D Commentary Appendix Page **8** of **9**

Commentor 12 - Elizabeth (Betty) Niemann	Response
Section 40. Permitting. The State of Illinois shall issue to the Operator all necessary and appropriate permits consistent with State and federal law and corresponding regulations. The State of Illinois must allow the Operator to combine applications when appropriate, and the State of Illinois must otherwise streamline the application process for timely permit issuance. DOE/EIS-0460D Commentary Appendix Page **9** of **9**	

Commentor 13 - Marilyn Schutt



From: M Schutt <mtnschutt@yahoo.com>
Sent: Monday, June 17, 2013 11:42 PM
To: Cliff Whyte
Subject: FutureGen 2.0 Morgan County Opposition

Mr. Whyte,

I write in strong disagreement with the FutureGen 2.0 Project in Morgan County, IL, and request you record this opposition in the latest EIS for this project. I believe the President, the EPA, the DOE, Sen. Durbin, the IL State Legislature, the ICC, and IPA , not to mention the motley Consortium, are utterly deaf to any and all reasoned dissent, and with low regard for ethics. This admitted experiment would be performed on some of our country's most valuable, precious, and dwindling farmland. Opposition by several of the land owners &/or heirs to the land under which the CCS would occur has been stated time and again, but by and large without willingness by any government official to consider the facts and the possible irretrievable and irrevocable consequences of CCS.

FutureGen has supposedly established an insurance policy of sorts in the event of damage to the land &/or its inhabitants?, should the project proceed, but coverage amounts and payment terms etc. remain vague, and could not restore the land to its former productive state. I also believe the greater Morgan County community has been duped by promises of vastly increasing employment numbers. The FutureGen Consortium does not yet have its ducks in a row, all the while pretending everything is going smoothly. How many iterations of this Consortium have there been already?

If none of the above mentioned government officials, nearly all of whom publicly declared support for the project before its efficacy was even explored, can afford the time or expend the effort to at least speak with and listen to the heirs of the surface and subsurface land involved, and who strongly oppose this project, it speaks volumes. More pork please?

FutureGen 2.0 was roundly dismissed from their first chosen (Alexander, IL) site by local landowners. After having then promised to leave Morgan County, they instead subsequently and immediately moved north a few miles in the County, to where much of the current site is controlled by a local bank, which I and others believe is ethically challenged. It is the trustee for the heirs who oppose the project, but continues to ignore their expressed wishes in opposing the CCS project, thereby creating an uneasy relationship, stated in the best terms. But how many government officials know this, or even care? I've seen no hands.

In the name of our disappearing farmland and all that it means to present and future generations of local farmers and citizens, I implore the EPA and DOE, DO NOT approve and allow this project to move forward.

Respectfully submitted,

Marilyn Schutt

1

13-01

Response

13-01 Thank you for your comment. In accordance with your request, DOE has included your comment here stating your opposition to the project. With respect to your question about an insurance policy to pay for potential damages, as explained in response to Comment 12-08, the Alliance would be responsible for any emergency or remedial actions that would be necessary in accordance with the Post-Injection Site Care and Site Closure Plan, which is a requirement of the UIC Class VI permit for the injection wells. Section 9.0 (Financial Responsibility) of documentation submitted for the permit applications describes the Alliance's proposed CO_2 Storage Trust Fund and third party insurance policy.

Commentor 14 - Jeffrey Niemann

Further Comments on DOE/EIS-0460D
Draft Environmental Impact Statement for FutureGen 2.0
By
Jeffrey Niemann

An Inconvenient Truth: Global Warming is Not Real

New data shows that in fact the Earth has not warmed at all over the last 15 years. In fact the Daily Mail reports that the Met Office and the University of East Anglia Climatic Research Unit, after taking data from nearly 30,000 stations around the world, have found that the earth stopped warming in 1997.

The Sun is the main driver of climate change. Carbon Dioxide has nominal impact on temperature.

Carbon dioxide is plant food. CO2 emissions increase crop yields and the forest's productivity. There are no harmful effects. If CO2 has been proven not to be a Greenhouse Gas associated with global warming, then why is there a 1.3 to 4 billion expenditure on carbon storage in Morgan County. Likewise, ask why Canada has committed billions of dollars for carbon dioxide (CO2) emissions reduction to fight a problem that doesn't exist. CO2 emissions have only a tiny effect on temperature, but strongly enhance plant growth.

Introduction

As a Morgan County landowner, my wife and I are very concerned about the FutureGen 2.0 project. The following are quotes taken from a number of respected Climate professors and researches primarily from Canada and the United Kingdom.

Six Things Everyone Should Know about Climate Change (from Friends of Science Website):

While Friends of Science does not do any original scientific research, it does extensive literature research and draws on the worldwide body of work by scientists in all fields relating to global climate change.

1. The earth is cooling.
2. The Sun causes climate change.
3. Al Gore was wrong about CO2.
4. Violent weather isn't getting worse.
5. It's been hotter.
6. Climate computer models are proven wrong.

1. The Earth is Cooling:

14-01

Page **1** of **9**

Response

14-01 On September 27, 2013 the White House Office of Science and Technology Policy (OSTP) issued a statement that the United States has joined other member nations of the Intergovernmental Panel on Climate Change (IPCC) in approving the Fifth IPCC Working Group Report on the Physical Science Basis of Climate Change. In that statement, OSTP Director John P. Holdren acknowledged that the report "reflects a further strengthening of the already robust scientific consensus that the Earth's climate is changing in ways not explainable by natural variability and that the primary cause is emission of heat-trapping substances by human activities."

Consistent with DOE's mission to assure America's security and prosperity through energy and environmental technology solutions, DOE's Office of Fossil Energy is committed to developing a portfolio of technologies that can capture and permanently store GHGs through ongoing research, development and demonstration projects. The FutureGen 2.0 Project is one of several large-scale demonstration projects that are intended to demonstrate the technical feasibility as well as provide accurate cost and performance data of carbon emission reducing technologies. The outcome of these efforts would provide technically viable and cost competitive options that would allow continued use of the nation's plentiful and secure coal resources while greatly reducing CO_2 emissions associated with today's current coal utilization technologies.

Commentor 14 - Jeffrey Niemann	Response
The temperature changes of the lower troposphere from the surface up to about 8 km as determined from the average of two analyses of satellite data. The UAH analysis is from the University of Alabama in Huntsville and the RSS analysis is from Remote Sensing Systems. The two analyses use different methods to adjust for factors such as orbital decay and inter-satellite difference. From January 2002 indicates a small declining trend. Surface temperature data is contaminated by the effects of urban development. The Sun's activity, which was increasing through most of the 20th century, has recently become quiet, causing a change of trend. The magnetic flux from the Sun reached a peak in 1991. The high magnetic flux reduces cloud cover and causes warming. Since then the Sun has become quiet, however it continues to cause warming for about a decade after its peak intensity due to the huge heat capacity of the oceans. So we expect the warming to peak at about 2002. The CO2 concentration in the atmosphere, as measured at Mauna Loa, Hawaii, is a ripple effect in that the CO2 curve is due to the seasonal changes in biomass. There is a far greater land area in the northern hemisphere than the south that is affected by seasons. During the Northern hemisphere summer there is a large uptake of CO2 from plants growing causing a drop in the atmospheric CO2 concentration. Cool periods in 1984 and 1992 were caused by the El Chichon and Pinatubo volcanic eruptions. The temperature spikes in 1998 and 2010 were cause by strong El Ninos, which are unrelated to global warming. **2. The Sun Causes Climate Change** There is a correlation between the solar irradiance and the Northern Hemisphere temperatures since 1600. The temperatures to 1850 were derived from proxy records. The temperature curve , shown on the Friends of Science webpage, is from surface temperature records from 1850 to 1980, and from satellite lower troposphere records from 1980. The surface temperature record is contaminated by the effects of urban development. Black soot aerosols have contributed to a portion of the recent warming. Two solar irradiance proxy reconstructions are shown on the Friends of Science webpage. Note the table also shows low solar activity periods occurring during the Maunder Minimum (1645–1715, the Little Ice Age) and during the Dalton Minimum (1795–1825). **3. Al Gore was Wrong about Carbon Dioxide** Al Gore presented graphs in the movie "An Inconvenient Truth" showing carbon dioxide (CO_2) and temperature change from Antarctic Vostok ice core records as evidence that CO_2 causes climate change. **14-01** ***con't*** Page **2** of **9**	

Commentor 14 - Jeffrey Niemann

But he got cause and effect reversed! The record actually shows that the CO_2 increase lagged the warming by about 800 years. Temperature increases cause the oceans to expel CO_2, increasing the CO_2 content of the atmosphere.

The ice core data proves that CO_2 is not a primary climate driver.

4. Violent Weather Isn't Getting Worse

Climate alarmists claim the global warming may increase severe weather events.

There is absolutely no evidence of increasing severe storm events in the real world data. The Accumulated Cyclone Energy (ACE) is the 2-year running sum of the combination of hurricanes' intensity and longevity.

Global hurricane activity declined to mid-2012 to levels not seen since 1978. During the past 40 years, Global and Northern Hemisphere ACE undergoes significant variability but exhibits no significant statistical trend. The global 2013-02 ACE was 62% of the 1998-01 ACE.

5. It's Been Hotter

Earth's climate has been hotter in the past. Millions of years ago, alligators lived in the Arctic, and palm trees grew in Alberta. Since the last ice age, temperatures were warmer during the Holocene Optimum when the great pyramids were built in Egypt, during the Roman Empire expansion and during the Medieval Warm Period.

Climate always changes without any help from man.

6. Climate Computer Models Are Proven Wrong

Global warming hysteria is based on climate computer models that don't work. If outgoing radiation from the atmosphere is reduced to less than the incoming radiation from the Sun, heat energy will accumulate in the climate system causing rising temperatures. The models assume CO_2 emissions will cause water vapour, the strongest greenhouse gas, to increase in the upper atmosphere, trapping the radiation. They also assume clouds will trap more radiation. But satellite and weather balloon data shows just the opposite of the climate model predictions.

Earth Radiation Budget Experiment Satellite (ERBE) observed that more outgoing radiation escapes to space as temperatures rise, rather than being trapped as the UN computer modellers believe. CO_2 emissions do not trap much heat and do not cause significant global warming.

14-01
con't

Page **3** of **9**

Response

Commentor 14 - Jeffrey Niemann

Response

The predicted hot-spot is entirely absent from the observational record. This shows that most of the global temperature change cannot be attributed to increasing CO_2 concentrations.

The models fail because they assume both water vapour and clouds strongly increase the CO_2 induced temperature changes, whereas recent research shows both water vapour and clouds greatly reduce the temperature changes.

The climate models exhibit wildly different trends, with the deep ocean cooling just as often as warming. The Levitus actual observations were made to a depth of 700 m. Most of the models produce too much warming in the layer to 700 m. Many models produce unexpected ocean cooling below 100 m while the surface warms. None of the models even remotely match the Levitus observations.

In conclusion, the flowing is a list of the 10 myths of global warming. Please look at each and the associated facts of each to gain a better understanding of CO2 and global warming:

TEN MYTHS of Global Warming

MYTH 1: Global temperatures are rising at a rapid, unprecedented rate.

FACT: Accurate satellite, balloon and mountain top observations made over the last three decades have not shown any significant change in the long term rate of increase in global temperatures. Average ground station readings do show a mild warming of 0.6 to 0.8Cover the last 100 years, which is well within the natural variations recorded in the last millennium. The ground station network suffers from an uneven distribution across the globe; the stations are preferentially located in growing urban and industrial areas ("heat islands"), which show substantially higher readings than adjacent rural areas ("land use effects").

There has been no catastrophic warming recorded.

MYTH 2: The "hockey stick" graph proves that the earth has experienced a steady, very gradual temperature increase for 1000 years, then recently began a sudden increase.

FACT: Significant changes in climate have continually occurred throughout geologic time. For instance, the Medieval Warm Period, from around 1000 to1200 AD (when the Vikings farmed on Greenland) was followed by a period known as the Little Ice Age. Since the end of the 17th Century the "average global temperature" has been rising at the low steady rate mentioned above; although from 1940 – 1970 temperatures actually dropped, leading to a Global Cooling scare.

14-01
con't

Page **4** of **9**

Commentor 14 - Jeffrey Niemann	Response
The "hockey stick", a poster boy of both the UN's IPCC and Canada's Environment Department, ignores historical recorded climatic swings, and has now also been proven to be flawed and statistically unreliable as well. It is a computer construct and a faulty one at that. *MYTH 3: Human produced carbon dioxide has increased over the last 100 years, adding to the Greenhouse effect, thus warming the earth.* FACT: Carbon dioxide levels have indeed changed for various reasons, human and otherwise, just as they have throughout geologic time. Since the beginning of the industrial revolution, the CO_2 content of the atmosphere has increased. The RATE of growth during this period has also increased from about 0.2% per year to the present rate of about 0.4% per year,which growth rate has now been constant for the past 25 years. However, there is no proof that CO_2 is the main driver of global warming. As measured in ice cores dated over many thousands of years, CO_2 levels move up and down AFTER the temperature has done so, and thus are the RESULT OF, NOT THE CAUSE of warming. Geological field work in recent sediments confirms this causal relationship. There is solid evidence that, as temperatures move up and down naturally and cyclically through solar radiation, orbital and galactic influences, the warming surface layers of the earth's oceans expel more CO_2 as a result. *MYTH 4: CO2* is *the most common greenhouse gas.* FACT: Greenhouse gases form about 3 % of the atmosphere by volume. They consist of varying amounts, (about 97%) of water vapor and clouds, with the remainder being gases like CO_2, CH_4, Ozone and N_2O, of which carbon dioxide is the largest amount. Hence, CO_2 constitutes about 0.037% of the atmosphere. While the minor gases are more effective as "greenhouse agents" than water vapor and clouds, the latter are overwhelming the effect by their sheer volume and – in the end – are thought to be responsible for 60% of the "Greenhouse effect". Those attributing climate change to CO_2 rarely mention this important fact. *MYTH 5: Computer models verify that CO2 increases will cause significant global warming.* FACT: Computer models can be made to "verify" anything by changing some of the 5 million input parameters or any of a multitude of negative and positive feedbacks in the program used.. They do not "prove" anything. Also, computer models predicting global warming are incapable of properly including the effects of the sun, cosmic rays and the clouds. The sun is a major cause of temperature variation on the earth surface as its received radiation changes all the time, This happens largely in cyclical fashion. The number and the lengths in time of sunspots can be correlated very closely with average temperatures on earth, e.g. the Little Ice Age and the Medieval Warm Period. Varying intensity of solar heat radiation affects the surface temperature of the oceans and the currents. Warmer ocean water expels gases, some of which are CO2. Solar **14-01** ***con't*** Page **5** of **9**	

Commentor 14 - Jeffrey Niemann		Response

radiation interferes with the cosmic ray flux, thus influencing the amount ionized nuclei which control cloud cover.

<u>MYTH 6</u>: The UN proved that man–made CO2 causes global warming.

FACT: In a 1996 report by the UN on global warming, two statements were deleted from the final draft. Here they are:
1) “None of the studies cited above has shown clear evidence that we can attribute the observed climate changes to increases in greenhouse gases.”
2) “No study to date has positively attributed all or part of the climate change to man–made causes”

To the present day there is still no scientific proof that man-made CO2 causes significant global warming.

<u>MYTH 7</u>: CO2 is a pollutant.

FACT: This is absolutely not true. Nitrogen forms 80% of our atmosphere. We could not live in 100% nitrogen either. Carbon dioxide is no more a pollutant than nitrogen is. CO2 is essential to life on earth. It is necessary for plant growth since increased CO2 intake as a result of increased atmospheric concentration causes many trees and other plants to grow more vigorously. Unfortunately, the Canadian Government has included CO2 with a number of truly toxic and noxious substances listed by the Environmental Protection Act, only as their means to politically control it.

14-01
con’t

<u>MYTH 8</u>: Global warming will cause more storms and other weather extremes.

FACT: There is no scientific or statistical evidence whatsoever that supports such claims on a global scale. Regional variations may occur. Growing insurance and infrastructure repair costs, particularly in coastal areas, are sometimes claimed to be the result of increasing frequency and severity of storms, whereas in reality they are a function of increasing population density, escalating development value, and ever more media reporting.

<u>MYTH 9</u>: Receding glaciers and the calving of ice shelves are proof of global warming.

FACT: Glaciers have been receding and growing cyclically for hundreds of years. Recent glacier melting is a consequence of coming out of the very cool period of the Little Ice Age. Ice shelves have been breaking off for centuries. Scientists know of at least 33 periods of glaciers growing and then retreating. It’s normal. Besides, glacier's health is dependent as much on precipitation as on temperature.

Commentor 14 - Jeffrey Niemann

14-01 *con't*

<u>MYTH 10</u>: The earth's poles are warming; polar ice caps are breaking up and melting and the sea level rising.

FACT: The earth is variable. The western Arctic may be getting somewhat warmer, due to unrelated cyclic events in the Pacific Ocean, but the Eastern Arctic and Greenland are getting colder. The small Palmer Peninsula of Antarctica is getting warmer, while the main Antarctic continent is actually cooling. Ice thicknesses are increasing both on Greenland and in Antarctica.

Sea level monitoring in the Pacific (Tuvalu) and Indian Oceans (Maldives) has shown no sign of any sea level rise.

<u>Source</u>: Friends of Science website.

14-02

Is Carbon Capture a Scam?

The Kyoto Protocol is a political solution to a non-existent problem without scientific justification. Dr. Timothy Ball, a former climatology professor.

The Alberta Surface Rights group has this to say about Carbon Capture (http://www.albertasurfacerights.com/articles/?id=1479):

(a) It has never worked on any kind of commercial scale.
(b) It was incredibly expensive and would require massive amounts of government money.
(c) It was necessary to steal private property.
(d) Safe sequestration and liability issues would last for hundreds, if not thousands of years.
(e) No reputable company would want to be involved.

And this:

(a) The spinmasters went to work! Alberta was cutting edge….way ahead of all the world! Innovation, expertise, best regulator in the world, etc., etc…………in other words a whole bunch of BS! *This sounds a lot like the spin that the FutureGen 2.0 project when FutureGen was first announced in Morgan County …that it is the cutting edge….first in the world, one of its kind.*
(b) Down play the real costs. Hide the truth. Create an initial fund of $2 billion and pretend that was the total cost instead of the $30 billion plus! *Just how much is the FutureGen 2.0 project finally going to cost.*
(c) Pass Bill 24. Outright steal the property and spin it as in "the public interest"…….like theft is a public interest! *CO2 Pipeline now has eminent domain rights thanks to the Illinois State Legislature.*
(d) Create a truly bizarre concoction on liability issues. Pretend that the government would always be in charge of monitoring and maintaining the sequestered C02 through an industry fund (totally inadequate). Don't trumpet the short falls very much, down play

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Response

14-02 Issues expressed in this comment have been addressed in the response to Comment 14-01.

Commentor 14 - Jeffrey Niemann

the cap on liability! *Can the State of Illinois, as a backup which is how FutureGen views the liability on the project, pay for liability and remediation?*

(e) Find some "no-names" to create a company to reap the government money. Let those same inexperienced people build a C02 trunkline (again with government money) because no reputable pipeline company was interested. *What can I say, this comment says it all.*

14-02 ***con't***

Consensus is the business of politics. If it's concensus, it isn't science. If it's science, it isn't consensus. Period. Michael Crichton.

Addendum of further Comments:

During the Public Scoping meeting in June of 2011, I indicated that the number of new jobs and influx into Morgan County would not be as publicized in the media. The current numbers from the EIS-460D is 780 for construction and 158 permanent operational jobs for the entire project.

It must be emphasized that construction workers must be transient workers hired for a shor period of time. For example, the iron worker will only be on site for the raising of the structure and vessels. Once that is completed, these people will no longer be needed nor counted. Furthermore, they most likely will come from areas outside of Morgan County. While the numbers seem to be large, they will be a lot less but spread out over the entire project. Therefore the impact on the local economy will minimal at best.

Based upon my own experience , I have felt that the operation of such a small plant (injection well) will most likely consist of one board man, one inside operator, and two to three inside operators per 4 shifts to give 24/7 coverage. Along with that I have no further knowledge of the staffing of the Meredosia Energy Center.

Regarding training and laboratory services, there should not be a need to staff support people for all three project disciplines, the Meredosia Energy Center, the pipeline, or the injection well.

Prior to startup, experienced operators will be brought in to work with the design engineers to commission the Meredosia Energy Center. As experienced operators are brought in, it will not be necessary to set up a curriculum to train operators. Likewise, onsite testing will be simple tests that can be performed by the outside operators. Anymore detailed testing should be performed at a certified laboratory or the experienced ADM plant in Decatur.

As far as people coming to see the plant, there will be nothing to see of interest as this is a closed system and the possibility of a CO2 incident will keep non-production personnel at a distance. Therefore there will be no need to increase the community infrastructure of hotels, restaurants, and buses to the Meredosia Energy Center or the injection well head.

14-03

Response

14-03 The Draft EIS described the construction workforce for the oxy-combustion facility at the Meredosia Energy Center in Section 2.4.3.3 and the operational workforce for the facility in Section 2.4.4.1. The workforce requirements for construction of the CO_2 pipeline are described in Section 2.5.1.3, and for construction of the CO_2 storage surface facilities in Section 2.5.2.2. The operational workforce requirements for both the pipeline and CO_2 injection wells are described in Section 2.5.2.2. The Draft EIS described the potential impacts on the local economy and employment from construction for the FutureGen 2.0 Project in Section 3.18.3.1 and for operations in Section 3.18.3.2. DOE believes that this analysis outlines the potential effects on primary and secondary employment in Morgan County appropriately and fairly.

Commentor 14 - Jeffrey Niemann

Other plants utilizing the oxy-combustion process already online or will be commissioned prior to the Morgan County facility. **14-03 *con't***

I had a friend review the entire EIS-0460D. On the construction of the Meredosia Energy Center, he first noted that there were no calculations to show justification of material purchases for the project. Taking what little information that was provided in the EIS, he concluded that the compressors are undersized such that in an emergency they would not be able to prevent a gas/liquid multiphase mix in the pipeline. This will damage and destroy the compressor as well as valves, pumps, and instrumentation. With the loss of instrumentation, the operators will be unable to react in a proper time interval to save any of the equipment. A Worse case scenario will result in a large discharge of CO2 in the plant area. **14-04**

I personally saw a fire pump where I formerly worked that was improperly started that resulted in a liquid/gas multiphase tearing itself apart in a matter of minutes. The fire pump had to be completely rebuilt at considerable cost. At the Meredosia Energy Center, it further appears that the backup generator is not sufficient enough to carry a loss of power to the control room. The backup generator for the injection well control room should also be re-evaluated to insure that it can handle the instrumentation load in a loss of power.

In summary, there is no valid reason for this project to go forward for the flowing reasons: **14-05**

1. It is unjustified in light of the current research on global warming.
2. It is not needed, not cost effective or energy efficient with its large energy penalty in power generation.
3. Has a great potential to cause permanent damage to farmland.
4. Will not give the community the promised economic impacts.
5. Will cause a rise in consumer electrical rates to the entire customer base in Illinois and place a burden on low income families.

Response

14-04 Issues expressed in this comment have been addressed in the response to Comment 12-28.

14-05 Thank you for your comment.

Commentor 15 - Elizabeth (Betty) Niemann

Third Set of Comments on
FutureGen 2.0 DOE/EIS-0460
By
Elizabeth (Betty) Niemann

By the way, an announcement about the 21 May 2013 meeting was published in the Springfield Journal Register. (http://www.sj-r.com/breaking/x1338686880/FutureGen-2-0-meeting-Tuesday-in-Jacksonville#axzz2XFclve67) The meeting was called a "public information" meeting. In my opinion, this was a turn off as so much has been published about the FutureGen project, why would people go to another public information meeting? Nowhere in the announcement did it say that the FutureGen DOE meeting was a public hearing and that people could make comments. Therefore, I feel that residents in eastern Morgan County and residents of Sangamon County were denied the privilege of having the opportunity to speak at the meeting. Who initiated the announcement? Was this a way to eliminate those who may have spoken out against the project? **15-01**

When I submitted my written comments on 17 June 2013, I indicated that there was some missing data for confirmation of my statements those in the written comments. This paper includes that data and some additional comments based upon recent happenings in the State of Illinois.

I would also like to say again that these are my comments, opinions and questions. Why is this EIS-0460 so riddled with lots of inconsistencies? In my opinion, if these documents were a research paper for a college paper, the grade would have been an "F". How can the Department of Energy make a valid decision on whether or not the FutureGen project can be funded if there are inconsistencies, data omissions and invalid conclusions?

Page S-24 of the Summary shows the figure S-15 Monitoring Well Net Work Conceptual Layout. This figure also appears on page 2-69 in Volume 1. This layout contains 2 injection wells. In my earlier additional written comments, I indicated that the EIS showed 4 wells from one injection site. **With this figure, will there be 8 injection wells, 4 each on two injection pads?** I do not think the public is aware of the possible 8 wells. **15-02**

The conceptual injection well layout does not transfer to the carbon storage area depicted on page 3.5-7 showing Figure 3.5-2: Shallow Ground Wells in the Underground Injection Control Survey or on Page G-2 of Volume II of the EIS-0460D, Figure 1: NEPA Study Area for the CO2 Storage Area.

By the way, why is the acreage is this indicated NEPA Study Area identified as the Carbon Storage Area only 4982.96 acres instead of the 5300 acres as discussed in the EIS-0460D? Where are the remaining 317.04 acres?

During the public hearing on 21 May 2013, Ken Humphreys stated that there were 45 committed landowners within the carbon storage area. I can identify a total of 39 landowners **15-03**

Response

15-01 DOE published appropriate notices in the Springfield State Journal Register and the Jacksonville Journal-Courier, which announced the "Public Hearing" for the FutureGen 2.0 Draft EIS on Sundays, May 5, 12, and 19; and Wednesdays, May 8 and 15; as well as in the Illinois Farm Week, on Mondays May 6, 13, and 20. The "announcement" noted in this comment was a news article published by the newspaper staff which did not originate from DOE, nor did DOE otherwise participate in its publication.

15-02 As explained in Section 2.5.2.2 of the Draft EIS, the Alliance considered two alternative scenarios for the injection well surface facilities: a dual-site scenario with a single vertically drilled well at each site or a single-site scenario with four horizontally drilled wells at one site. Figures 2-22 and 2-23 in the Draft EIS show the conceptual site layouts for the primary and secondary injection well sites, respectively, in the dual-site scenario. The conceptual site layout for the single-site scenario would include all four wells at the single site with no secondary site required (see Figure 2-21). Only one of the two scenarios would be selected by the Alliance. As further explained in Section 2.5.2.3 of the Draft EIS, the Alliance prefers the single-site scenario including four horizontal wells that would produce a subsurface CO_2 plume as described and illustrated under subheading "Injection Wells" in the Final EIS. The Final EIS has been updated with more recent data to reflect the Alliance's proposed single-site injection well approach.

Section 2.5.2 of the Draft EIS and the introduction to Chapter 3, under the subheading "Injection Well Siting Options," explain that the Alliance had not selected the exact locations of the injection well site(s) within the borders of the CO_2 storage study area when the Draft EIS was published. Therefore, the site(s) could not be illustrated on Figure 3.5-2 of the Draft EIS. The Final EIS has been updated to show the location of the proposed single injection well site on the revised version of this figure.

As explained in Section 2.5.2.3 of the Draft EIS, the subsurface extent of the modeled CO_2 plume would reach an estimated 4,000 acres after 20 years of injection. The Alliance conservatively estimated that the subsurface CO_2 plume could occupy approximately 4,000 acres in its UIC permit applications. The land area estimate of 5,300 acres stated in Section 2.5.2 of the Draft EIS was based on the ownership of surface land parcels potentially affected within the CO_2 storage study area. The Alliance has expanded the surface land extent for the CO_2 storage study area to 6,800 acres as explained in Section 2.5.2 of the Final EIS to ensure that all properties affected by the need for subsurface pore space are encompassed. Note, however,

Commentor 15 - Elizabeth (Betty) Niemann

15-03 con't

of record within the carbon storage area within the NEPA Study Area of which 38 have committed by enthusiasm or by the pressure of inevitability. Can and will there be a landowners poll to see which were pressured or felt that they had to sign because it was inevitable that the project was going to happen since two big (by number of acres) landowners had committed to the project? The outlined NEPA carbon storage area constitutes a total of 88 parcels of land, two of which have not committed to the project. Why is FutureGen not forthcoming in releasing the landowners who have committed? Is this because FutureGen has created "the end of county" or because they really do not have all 45 landowners committed? Why is FutureGen afraid to release the names of the committed landowners? FutureGen does not freely volunteer information. To me, they are really guarded in what they publish.

15-04

Also, since the public comment deadline of 17 June 2013 has passed, Governor Quinn of Illinois has passed SB1715 which is now Public Act 98-0022 on Hydraulic Fracking. (http://www.ilga.gov/legislation/publicacts/98/PDF/098-0022.pdf) Contained within the 123 pages of the bill are restrictions on horizontal drilling permitting. **Since this is a new bill, will the FutureGen Alliance have to comply with any of the provisions of the new bill for the FutureGen project**? **If Yes, which ones?** Yes, I know that carbon sequestration is not fracking. The FutureGen project will be performing horizontal drilling into the injection interval of Mt. Simon layer 11.

15-05

In addition to the above new law, Tenaska Inc. pulled the plug on the Taylorville Energy Center (http://www.sj-r.com/breaking/x1292456584/Developer-pulls-plug-on-Taylorville-Energy-Center#axzz2X9gnGyiG) and (http://www.chicagobusiness.com/article/20130621/NEWS11/130629932/its-official-tenaska-coal-plant-is-kaput). This Taylorville project was to cost an estimated S3.5 billion. As stated in my written submitted comments, Exelon Corp. in its letter to Senator Durbin on why it pulled out of the FutureGen Alliance estimated that with FutureGen's power purchase agreement, the consumers of Illinois would be paying $150 million per year and for the life of the project, the consumers would be paying S3 billion PLUS the $1 million equals about $4 billion for the costs to the DOE (federal taxpayer) plus the Illinois rate players. There is another estimated cost of $65 million from FutureGen bringing the total to and estimated $4.65 billion. ARE these cost estimates valid estimations of project costs for FutureGen?

Are there other potential carbon storage projects within the United States or world that have been cancelled or tabled? Was the cancelling due to rising costs and/or lack of support? Can the reasons for the cancelled projects be applied to FutureGen to assess reasons for not continuing with the project?

Tenaska was looking for a 30 year power purchase agreement with the state requiring customers and competitive power suppliers paying the costs. With the Illinois Rivers Project tapping into the rate cap along with FutureGen and other energy related projects throughout Illinois, the impact to the Illinois energy consumer would be at the max. Again why wasn't the economic impact of increased power rates to Illinois power consumers especially those in Morgan County addressed in the EIS?

Response

that the surface acreage requirements relate to the anticipated extent of the subsurface CO_2 plume to be contained with the Mt. Simon Formation and confined by the Eau Claire Formation more than 3,900 feet below the land surface. Surface land requirements would be limited to the site for the injection well facilities and access road as discussed in Chapter 2.

15-03 As stated at the end of Section 2.5.2.1 in the Draft EIS, "The Alliance is currently entering into agreements with property owners regarding the use of and appropriate compensation for surface land and subsurface pore space." DOE is not an active participant in this process

15-04 CO_2 injection into geologic formations for the purpose of geologic storage is not the same process as hydraulic fracturing for natural gas production and would not be subject to the legislation discussed in this comment. There are no plans to use hydraulic fracturing at any time during well construction, including horizontal wells, and no efforts are intended to use hydraulic fracturing to increase the permeability within the Mt. Simon Formation.

15-05 DOE's decision with respect to the proposed action is whether or not to provide $1 billion in funding under the American Recovery and Reinvestment Act for the implementation of the FutureGen 2.0 Project as stated in the Cover Sheet, the Summary, and Sections 1.3 and 2.1 of the Draft EIS.

The responses to Comments 11-12 and 12-31 address the subject of project costs.

With respect to the comment relating to other CO_2 storage projects, DOE tracks the public status of Carbon Capture and Sequestration projects through the National Carbon Sequestration Database and Geographic Information System database, which can be accessed at http://www.natcarbviewer.com/.

The responses to Comments 10-01 and 11-13 address the subject of monthly costs to ratepayers.

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By the way, in Volume II of the EIS-0460D, when it came to the Protected Species Survey, FutureGen had Patrick Engineering who contracted to Specialized Ecological Services in Greenville, Illinois, to perform the survey. Why didn't FutureGen contract with Specialized Ecological Services directly?

It states: *"A survey for protected species and their critical habitat was conducted using best professional practice. Both the US Fish and Wildlife Service and Illinois Department of Natural Resources, Division of Ecosystems and Environment were contacted for a list of potential protected species. Based on this list, the flora and fauna of the proposed impact area were surveyed."*

Patrick Engineering is an engineering firm whose expertise is in engineering not in plant and animal life, let alone, protected or endangered species. Furthermore, in Volume II, FutureGen, itself, stated the impact conclusions (i.e. …therefore FutureGen concludes there will be little or no impact….) and not Specialized Ecological Services. Therefore, this is not a valid survey. It is also not valid because it only looked for those upon the list, who knows, they might have missed a endangered or protected species new to the area. Why not have the US Fish and Wildlife and the Illinois Department of Natural Resources perform a second and more valid survey since both are familiar with the flora and fauna of Morgan County? Why didn't Volume II include the Specialized Ecological Services actual report in Appendix E. Just getting a list and having someone check off the protected species is not a valid survey. By the way, shouldn't surveys be made at several times during the year to rule out migratory impacts, temperature effects on invertebrates, and hibernation of mammal in the area of reviews? Will these evaluations meet the new ASTM E1527-13 Environment Assessment standard? If not, why not? If there are deficiencies in these evaluations or assessments not conforming to this new standard, should the assessments and surveys be redone or at least the deficiencies completed? **15-06**

Today, Sally Greensburg, of the Illinois State Geological Survey, returned my telephone call about a 2005 map on Illinois Saline Reservoirs for Potential CO2 Storage that was from the Midwest Geological Sequestration Consortium website in 2011. (Note: the map is no longer on the website and I made reference to it in my written comments submitted on the 17 June 2013.) When looking at the map on the computer screen, it appeared that there were no sites indicated for potential CO2 storage in Morgan County, Illinois. Upon on close examination and magnification of the map, there seemed to be a green dot indicating the Carbon Storage Potential Site in North East Morgan County, Illinois. I called Sally Greensburg to confirm exact the location of this site. Sally indicated to me that the spot on the map in Morgan County was taken from well data in Morgan County. (By the way, why was this well not used in the carbon storage area characterization as well? Instead, a well in Pike County was used which is over 30 miles away with a geologic structure of a river between the carbon storage site and the Pike County Well.) **15-07**

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Response

15-06 The Alliance directed its engineering contractor, Patrick Engineering, to support the efforts needed for compliance with the Endangered Species Act during project planning and to subcontract with a specialized biological survey firm as appropriate to achieve this objective. It is not uncommon and often customary for a project proponent to have its principal engineering contractor handle regulatory requirements through such subcontracting arrangements. Because design engineering firms are not typically specialized in such studies, they routinely subcontract to firms qualified in the area of expertise. Federal agencies, including the USFWS for Endangered Species Act compliance, often rely on the studies and documentation completed by qualified firms to support an agency determination whether a proposed action may affect protected species. DOE, as the agency preparing the EIS, has the responsibility to coordinate with the USFWS for compliance with the Endangered Species Act, and DOE bears responsibility for the oversight of surveys and assessments conducted by specialized firms in support of this coordination. DOE included the appropriate supporting information for compliance with the Endangered Species Act in Appendix E to the Draft EIS, which has been updated as appropriate in the Final EIS. As indicated by the comments on the Draft EIS submitted by the USDOI (the parent department for the USFWS), and DOE's responses to those comments, the coordination between the agencies for compliance with the Endangered Species Act would continue during the FutureGen 2.0 Project.

15-07 Please see the response to Comment 12-03, which addresses the same subject. Section 3.4.2.1 of the Draft EIS is intended as an overview of the regional geologic setting. The site-specific information for the Mt. Simon Formation is described in Section 3.4.2.4 of the Draft EIS based on data from the stratigraphic well located within the CO_2 storage study area. For the UIC permit applications, the Alliance reviewed the available information from previously drilled wells in Illinois, including the Archer Daniels Midland carbon capture and sequestration wells.

The Alliance performed a two dimensional seismic survey through the CO_2 storage study area in January 2011, as described in Section 3.4.2.4 of the Draft EIS. The results of the seismic survey along with the data collected from the stratigraphic well indicate that the conditions at the selected injection well site are favorable for the injection and storage of CO_2. Images and more detailed results from the seismic study were provided in the UIC permit applications (posted at the USEPA UIC website: http://www.epa.gov/region5/water/uic/futuregen/).

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15-07 *con't*

Along with that, I asked Sally if there was seismic date to indicate such potential geologic Carbon Storage Site in Morgan County and she replied no. The map then does not validate Morgan County as a potential geologic Carbon Storage Site nor has any Illinois State Geological Survey been made to that effect. She did indicate that FutureGen had done a seismic study. She did not know the results of the seismic study. Therefore, what are the results of the seismic study? Do the results indicate that the proposed FutureGen Carbon Storage Area site is an excellent site for carbon storage or not? There should be an independent analysis of the geological and seismic data and the results given to the NEPA process and not FutureGen.

15-08

I still have the same concerns and questions that I had in my written comments about the injection interval that Sally Greensburg was not able to answer them as she was not at her desk. The injection interval (Mt. Simon Layer 11) as indicated in the Table 7, pages 26 and 27 of Volume II of the EIS-0460D has a porosity of just over 20% and the permeabilities are higher than the other layers above or below layer 11. Yet the compressibility and grain density are like all the other layers in the Mt. Simon layer. If the compressibility and the grain density are the same for all Mt. Simon layers, and only the porosity and permeabilities are different, could these numbers be incorrect? I would call this a statistical anomaly. Given the importance of success of this project why not have independent geologists further re-evaluate Mt. Simon layer 11 to see if it is a statistical anomaly or the data in Table 7 for Layer 11 in the Mt. Simon layer is accurate?

If the injection interval is only 7 meters thick with the stated porosity and permeabilities in Table 7, then when the supercritical CO2 is in fact injected into the injection interval will the CO2 find it difficult to spread into the above and below layers? Given the buoyancy of the CO2, most likely the CO2 will spread upwards before it spreads downward. Could this be why the number of acres in the carbon storage area has increased?

Is the Mt. Simon Layer and its injection interval of Mt. Simon Layer 11 capable of receiving 385 million gallons of supercritical CO2 per year for 20/30 years?

15-09

Illinois River Project and FutureGen 2.0 Project At Odds with Each Other.

One of the impact studies concerned the Illinois Rivers Project by Ameren Transmission Company. Landowners in the Carbon Storage Area are up in arms over this project as the 340Kv transmission line was going to traverse some of the same landowners impacted by the carbon storage area and FutureGen's pipeline (northern route). Starting in the summer of 2012, FutureGen announced in press releases it was contacting pipeline owners but not until March of 2013 did any landowners impacted by the pipeline receive any information on the pipeline from FutureGen. One landowner I know received letters on the same day from both Ameren on the Illinois Rivers Project and on FutureGen's pipeline indicating that his land had been selected by both projects.

Ameren's filing with the Illinois Commerce Commission was on 7 November 2012 and is docket number 12-0598. http://www.icc.illinois.gov/docket/casedetails.aspx?no=12-0598 By clicking

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Response

15-08 Sections 6.1 and 6.2 of Appendix G in the Final EIS, which include Table 7, present the values and assumptions that were made to construct the injection model of the subsurface CO_2 plume, as illustrated in Figure 2-26, "Predicted Areal Extent of CO_2 Plume" in Chapter 2 of the Final EIS. The model consists of stacked hydrogeologic layers from the base of the Mt. Simon Formation upward through the Franconia Dolomite Formation. Most of the hydrogeologic properties illustrated in Table 7 for these model layers were determined from the geophysical well logs and side-well cores taken from the stratigraphic well. The values for compressibility were estimated based on the results of other published studies conducted on the geological formations that were modeled. The values presented in Table 7 are consistent with other studies of the Illinois Basin and within the range of other geological sequestration projects (DOE 2008c; O'Connor and Rush 2005; Zhou et al. 2010; Griffith et al. 2011).

Sedimentary bedrock is often not uniform in the vertical direction, especially where deposits were laid by moving water, so each formation was split into layers having similar lithology and physical characteristics. However, grain density values have less vertical variability than porosity and permeability. The injection zone comprises the Mt. Simon Formation, which was subdivided into 17 model layers, and the Elmhurst member, which was subdivided into 7 model layers. The confining zone (Lombard and Proviso members of the Eau Claire Formation) was subdivided into a total of 19 layers. Additional formations above the Eau Claire were also subdivided and included in the model.

The differences of the hydrogeologic property values in Table 7 are based on how each property was measured. Formation properties that can only be calculated in the laboratory from cores will have fewer data points than properties that can be measured in the field using continuous measuring techniques (e.g., wireline sampling). The porosity and horizontal permeability measurements were taken from wireline surveys of the stratigraphic well and calibrated with laboratory measurements of side wall cores and core plugs from selected portions of the Mt. Simon Formation. The vertical permeability was measured from matching core plugs and using lithology-specific data from larger studies to apply to the known lithology changes. The grain density values were measured in the laboratory from side wall cores taken from the stratigraphic well and averaged for each formation. Two values were provided for the Proviso member of the Eau Claire because it has a slightly different lithology between the upper and lower portions of the member.

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on the Documents on the webpage, a complete listing of documents comes up with links to click to see the document. FutureGen, despite 3 public informational meetings held in Jacksonville as well as other places, was not aware of the Illinois River Project and the routing of the transmission line. When made aware of the impact of the Illinois River Project on the carbon storage area, on 21 November 2012 , FutureGen filed to Intervene in this case and the Administrative Law Judge approved the intervention on 3 December 2012. On 28 December 2012, FutureGen then filed *"Identification of Alternative Route, in which the Alliance objected to ATXI's Primary Route, and instead stated a preference for ATXI's Alternate Route."* Landowners formed a loose knit organization called the Morgan and Sangamon County Landowners and Tenant Farmers or MSCLTF to fight the transmission line and filed as an intervener on 30 November 2012. http://www.icc.illinois.gov/docket/files.aspx?no=12-0598&docId=190585 Note: two names on the list of members, the Beilschmidt Trust and Bob Talkemeyer have since been removed as their names were included in error. The Motion to remove the names was made on 10 December 2012 http://www.icc.illinois.gov/docket/files.aspx?no=12-0598&docId=190962 and granting of motion by the Administrative Law Judge on 20 December 2012. The FutureGen Alliance filed its Application for Certification to Construct and Operate a Carbon Dioxide Pipeline with the Commission on 29 March 2013 and is Illinois Commerce Commission Docket No. 13-0252. http://www.icc.illinois.gov/docket/Documents.aspx?no=13-0252 The Alliance's Application is pending. A summary of the actions of FutureGen and the MSCLTF can be found on the latest filing by FutureGen on 10 June 2013 in the Reply to Brief. http://www.icc.illinois.gov/docket/files.aspx?no=12-0598&docId=199315 All of this can be traced through the documents for docket 12-0598. Using the dates referenced in the document, the rest of the documents can be located on the document page. I want to know if FutureGen and the MSCLTF, the carbon storage area and pipeline landowners impacted by the transmission line, made some sort of hand shake agreement (because of the stipulation filings) NOT to oppose FutureGen. I believe this is why at the public hearing, there was only one person speaking in opposition of the FutureGen project. Is this activity a manipulation of those opposing the FutureGen project not to speak out by FutureGen? Is this FutureGen's way of implying community support since there was limited opposition at the meeting FutureGen's spin on this was that their "outreach" program must be working? Did FutureGen purposely use the same routing as Ameren's 340 Kv transmission line since FutureGen filed its petition with the Illinois Commerce Commission 4 months after Ameren's petition for its transmission line. FutureGen kept its route a secret until it filed its petition with the ICC when it had to reveal the route and identify landowners. Is this a ploy to manipulate opposing landowners in to "joining against a common enemy" so to speak in order for them not to speak out against FutureGen? Could the pipeline and transmission routing also be something a simple as looking at the land forms and finding the most direct and expedient Third Set of Comments FutureGen 2.0 DOE/EIS-0460D Page **5** of **6**	**15-09** ***con't***		The injection interval in Table 7 represents the vertical position within the subsurface where the Alliance intends to inject CO_2. The model layer (MtSimon11) represents the formation characteristics of the rock that would immediately surround the perforated portion of the horizontal injection wells. Although CO_2 would be injected into the injection interval, the injected CO_2 would not be constrained to this interval. The injected CO_2 would spread within the larger injection zone, which is comprised of the entire Mt. Simon Formation and the Elmhurst Member of the Eau Claire Formation (see Figure 3.4-2). The plume model predicts that the plume would extend outward from the injection wells and gradually flow into the surrounding layers within the injection zone. The USEPA is evaluating the UIC permit applications for completeness and accuracy, including the modeling parameters. The response to Comment 15-02 explains the difference between the modeled acreage of the subsurface CO_2 plume and the acreage of surface land ownership affected by subsurface pore space rights. The responses to Comments 12-03 and 12-15 address the concerns about the CO_2 storage capacity of the Mt. Simon Formation in Morgan County.
		15-09	DOE and the Alliance have been aware of the proposed Illinois Rivers Transmission Project by Ameren Transmission Company, and the Draft EIS Section 4.3, Potential Cumulative Impacts, addressed potential cumulative impacts of this transmission project in combination with the FutureGen 2.0 Project. With respect to the specific issues raised in this comment, the Alliance maintains that it has no agreement with any organization or any individual to the effect that the Alliance would oppose the location of Ameren's proposed Illinois Rivers Transmission Line Project in exchange for landowner support. As appropriate, the Alliance keeps the legal representative of Morgan and Sangamon County Landowners and Tenant Farmers (MSCLTF) and interested landowners informed of some Alliance activities related to the transmission line. The Alliance also appropriately keeps Ameren informed of some Alliance activities related to the transmission line. The Alliance's negotiations with Ameren are independent from MSCLTF's negotiations with Ameren, and the stipulations follow a common legal format. The Alliance is opposed to the location of one segment of the transmission line, because the electromagnetic field from the transmission line may interfere with some of the highly sensitive environmental monitoring technologies the Alliance would use for

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route? Discussion of the total impact of the Illinois Rivers Project on FutureGen 2.0 was glossed over in the EIS-0460D. **15-09 *con't***

This EIS-0460D is an evaluation of not only the suitability of a site for a project, but given processes of the project, it is also an evaluation of FutureGen as to its ability, given its completion of data or lack thereof, of taking the project to completion and with the least amount of environmental impact. Those who wrote this EIS, to me, were not drilling engineers, or reservoir engineers, nor had any equipment engineering in assessing what is needed for the project. In my opinion, the more in depth I read, the more I am convinced that the FutureGen Alliance does not have the scientific methodology for Carbon Storage, nor does it have expertise on a commercial scale in operating any kind of power generating unit, pipeline construction and control, and commercial scale underground injection given its inconsistencies in project details. Does FutureGen really know how to operate any kind of power generating unit on a commercial scale; how to construct and operate a pipeline; and most important of all, perform commercial scale underground injection? If the answer is no, then the DOE should cease funding this project and the project should not continue with funding from Illinois consumers with increased electric rates. **15-10**

Response

the CO_2 pipeline and storage facilities, and there is potential for construction of the two projects to interfere with each other. The pipeline must, of necessity, link the energy center to the injection well sites. The transmission line would pass from the energy center east across Morgan County and coincidently would cross the CO_2 storage study area. The transmission line was sited after, not before, the Alliance selected its storage study area. While the Alliance is part of the Illinois Commerce Commission proceedings and is opposing a segment of the Ameren transmission line, the Alliance has worked collaboratively with Ameren to resolve multiple conflicts between the transmission line and pipeline (some near the injection well sites as part of Illinois Commerce Commission proceedings and some near the energy center prior to the start of the proceedings).

The Alliance announced its CO_2 pipeline route in a manner consistent with federal law, as specified in the Uniform Relocation Act. The Alliance identified its proposed pipeline route based on constructability, minimizing impacts on landowners, access to rights-of-way, and the desire to avoid, to the extent possible, sensitive environmental resources such as wetlands, cultural resources, forest land, and threatened or endangered species and their habitats.

15-10 As explained in the response to Comment 12-28, the Alliance has assembled a highly qualified team for the FutureGen 2.0 Project. This team includes all the necessary technical disciplines and professionals needed for this effort, including professional engineers, geologists, and various industry experts, who would be responsible to ensure conformance with accepted engineering standards and regulatory requirements. DOE considers the information provided in Chapter 2 of the Draft EIS about project features and conditions to be appropriate for conformance with the intent of NEPA and to support the decisions DOE will make with respect to the proposed action.

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General Review Comments

Future Gen 2.0 Draft Environmental Impact Statement

(DOE/EIS-0460D)

Introduction:

The following series of collected comments are those of the writer. They were made after reading all plus 1000 pages of the subject draft EIS for Future Gen. Future Gen is a proposed Morgan County Illinois carbon dioxide sequestration demonstration project. The goal is the capture of carbon dioxide products from the coal fired generation of electricity converting the gas to a gas/liquid interphase and then injecting it for underground storage. It is by definition a touchy feely program that is highly political.

Geological/Formation Comments:

The computer modeling shows a rather uniform plume pattern formed by the injected carbon dioxide into the Mount Simon aqueous brine sandstone formation. This will not happen because the injected carbon dioxide will have various surface, electro- chemical and mechanical reactions etc. with the formation acidic saline brine. It will take the path of least resistance so the plume will be distorted. The math algorithms in the simulations does not fully account for these physical phenomena at the 4500 foot injection lateral.

Most data has been extrapolated from the gas storage wells and field in Illinois for this project. Gas has different properties than semi-liquid carbon dioxide. You cannot just "plug and play the data" and say they are the same.

15-11

The calculated and partially measured porosity of the Mount Simon injection zone is about 9.6 to 17.1 % on page 188 (3.4) and then given as 20% in the Geology Appendix G. Experience shows that porosity has a major impact on formation storage capacity and gas propagation. This maybe a major cause of the expansion of the required storage field from 1000 to +5000 surface acres.

The thickness of the injection lateral injection area is only 26-ft. from the casing in the Geo Appendix?? This is a very small area with a low 20% porosity…?????

There is very little comment on local abandoned wells. They appear shallow and maybe plugged. Are they properly plugged and who will pay for this???

Equipment Comments

Where is the basic equipment list for this project?? **15-12**

1

Response

15-11 Figure 2-26 of the Draft EIS has been updated in the Final EIS with a revised plume extent, as the model was refined in preparation for submission of the UIC permit applications. The figure shows an areal representation of the furthest extent that the CO_2 plume would reach after 70 years, including 99 percent of the separate-phase (gas-phase) of CO_2 mass. As discussed in the response to Comment 15-08, the plume model accounts for the different properties of the injection zone, and it included site- and project-specific data for each layer to ensure that the model accurately represents the Morgan County CO_2 storage area. The injection wells would be perforated at about 4,030 feet bgs. The ranges of permeability and porosity have been updated in Section 3.4, Geology, of the Final EIS to match the measured data presented in the UIC permit applications and Appendix G of the Final EIS.

The model does not rely solely on extrapolation of data from oil and gas wells; however, data from the surrounding area helps to support the measurements taken from the stratigraphic well (Griffith et al. 2011). A basic description of the oil and gas wells in the UIC survey area and their current status can be found in Table 3.4-1 of the Draft EIS. Information on the status of groundwater wells in the UIC survey area is presented in Section 3.5.2.3 of the Draft EIS. Please see the responses to Comments 12-20 and 12-21 for further information on this subject.

15-12 The specific data requested in this comment pertain to aspects of the detailed design that are beyond the scope of an EIS to provide. Please see DOE's response to Comment 12-28.

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Where are the supporting calculations for equipment sizing?? Discussion on this area of the project is missing?? A 710 BHP motor driver for the injection pumps is not logical. There are 700, 750, 800 BHP etc. sized standard motors but a 710 BHP motor would be a very expensive and unique item. It appears that the true motor size is 850 BHP or so for each injection pump to maintain the required pressure of 1200 psi minimum at the given required injection rates. The motor should be sized larger so it will run cooler, and able to respond to its variable speed drive requirements without bogging down. If pressure drops below 1200 psi you will have a state of multi-phase flow. This is dangerous to equipment and can cause catastrophic equipment failure at these pressures. False instrument readings will occur and bad things happen. Has anyone considered this in the evaluation???	**15-12** ***con't***	
<u>Utilities:</u> Only six (6) hours of UPS power in an emergency for instrumentation. Per code a 24-hour backup UPS is required on all critical instrumentation. Then there is an emergency generator that is sized for 150% of normal load and a seven (7) day run time. Section 3.15 needs revision. It should reflect power calculations and a true load study for the project. Who will pay for the new required substation, transmission lines, 4160 VAC or 13.8 KV motor supply? The local population should not have to pay for these project infrastructure upgrades. This is not mentioned in the documentation. IEEE and API guidelines are never mentioned and they have major cost effects. The loads on the roads will easily be 100 tons for the deep drilling equipment. Just the draw-works for the rig will run +90 tons before adding in the special truck. Who is going to pay for this???	**15-13**	**15-13** The responses to Comments 12-24 and 12-29 are applicable to the subjects of this comment.
Initial water for drilling and fracturing the well laterals should be considered. It could be as high as half a million gallon. The local supply and disposal of the fluids is a logics issue not mentioned.	**15-14**	**15-14** Please see the response to Comment 12-29, which addresses the same subject. Section 2.5.2.3 of the Draft EIS discusses the construction of injection wells.
By the way, what is the overall effect on the new boilers etc. thermal plant performance efficiency? The current plant HHV net efficiency is about 21.5%. What is the new value factoring in carbon capture and sequestration? The efficiency will go down because there is more load. How far down did it go? Are there any mass and heat calculations on overall energy efficiencies of the project for review??	**15-15**	**15-15** Please see the response to Comment 12-11 regarding energy efficiency and losses of the FutureGen 2.0 Project.
<u>Pipe Line Comments:</u> What standards are being followed for design and construction? This is high pressure line pipe requiring special fittings, valves, welding procedures etc. for a safe installation. The delivery of these items is very long. Where is the basic project overall schedule and basic budget estimate. Normally pipe is buried 8-10 feet below the surface in 2013 high pressure installations. Five feet is too close to the surface and raises the probability of damage in future earth moving actions on the farms etc. This should be considered in budgeting etc.	**15-16**	**15-16** The CO_2 pipeline design is described in Section 2.5.1.2 of the Draft EIS, and construction is described in Section 2.5.1.3. These sections have been refined and updated as appropriate in the Final EIS. The response to comment 15-10 provides DOE's position regarding the level of detail to be included in an EIS.

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An eighty (80-ft) foot wide pipeline construction area will not happen. It will be a hundred (100-ft) feet wide in actuality when built.

Report:

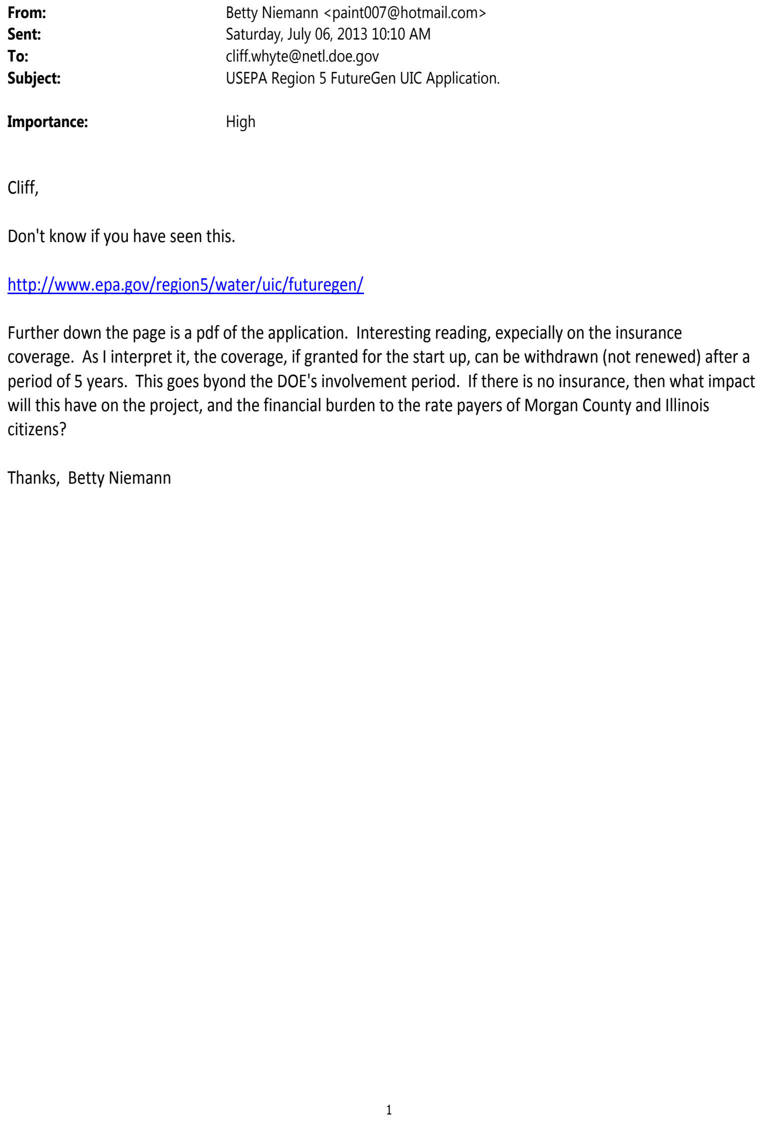
If a drilling engineer, reservoir engineer, and equipment engineer would have been involved in the various sections, the writing would be more specific and direct. Many ambiguities would not be present. **15-16 *con't***

The areas on the specific environmental issues were thoughtful and detailed. Really fourteen (14) endangered species located in the vicinity of the project area; that is food for thought and speaks volumes. **15-17**

Response

15-17 Thank you for your comment. The Draft EIS describes DOE's coordination to date with USFWS for compliance with the Endangered Species Act and the analysis of potential impacts in Section 3.8, Biological Resources, under several subheadings titled "Protected Species." The response to Comment 15-06 also addresses the subject of protected species. The Final EIS has been updated to reflect current developments.

Commentor 16 - Betty Niemann



From: Betty Niemann <paint007@hotmail.com>
Sent: Saturday, July 06, 2013 10:10 AM
To: cliff.whyte@netl.doe.gov
Subject: USEPA Region 5 FutureGen UIC Application.

Importance: High

Cliff,

Don't know if you have seen this.

http://www.epa.gov/region5/water/uic/futuregen/

Further down the page is a pdf of the application. Interesting reading, expecially on the insurance coverage. As I interpret it, the coverage, if granted for the start up, can be withdrawn (not renewed) after a period of 5 years. This goes byond the DOE's involvement period. If there is no insurance, then what impact will this have on the project, and the financial burden to the rate payers of Morgan County and Illinois citizens? **16-01**

Thanks, Betty Niemann

1

Response

16-01 Under Financial Responsibility in 40 CFR 146.85, the UIC regulations specifically require that the owner or operator of the injection facility must demonstrate and maintain financial responsibility as determined by the Director of the USEPA UIC Program. The supporting documentation for the Alliance's UIC permit applications (posted at the USEPA UIC website: http://www.epa.gov/region5/water/uic/futuregen/) states under Section 9.4.2.5, Renewal, that the insurance market will not guarantee renewal of a policy after the initial 3- to 5-year term at the present time. However, third-party insurance is only one of several financial instruments listed as qualifying under the UIC regulations, and permit applicants may use multiple instruments. The Alliance has also proposed a trust fund as described in Section 9.3 of the UIC permit applications. The information included in Section 9.0 (Financial Responsibility) of the permit application documentation is intended to meet the requirements of the UIC regulations for approval of the Class VI permits. The Director of the USEPA UIC Program has the authority and responsibility to make the final determination whether the requirements have been satisfied before issuing the permits.

APPENDIX I3

DOE'S NOTICE OF AVAILABILITY

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consistent with its approved application and budget. In making a continuation grant, the Secretary also considers whether the grantee is operating in compliance with the assurances in its approved application, including those applicable to Federal civil rights laws that prohibit discrimination in programs or activities receiving Federal financial assistance from the Department (34 CFR 100.4, 104.5, 106.4, 108.8, and 110.23).

VII. Agency Contact

FOR FURTHER INFORMATION CONTACT: Carol Lyons, U.S. Department of Education, 400 Maryland Avenue SW., Room 4W203, Washington, DC 20202–5930. Telephone: (202) 453–7122. FAX: (202) 205–5631 or by email: *i3@ed.gov.*

If you use a TDD or a TTY, call the FRS, toll free, at 1–800–877–8339.

VIII. Other Information

Accessible Format: Individuals with disabilities can obtain this document and a copy of the application package in an accessible format (e.g., braille, large print, audiotape, or compact disc) on request to the program contact person listed under FOR FURTHER INFORMATION CONTACT in section VII of this notice.

Electronic Access to This Document: The official version of this document is the document published in the **Federal Register**. Free Internet access to the official edition of the **Federal Register** and the Code of Federal Regulations is available via the Federal Digital System at: *www.gpo.gov/fdsys.* At this site you can view this document, as well as all other documents of this Department published in the **Federal Register**, in text or Adobe Portable Document Format (PDF). To use PDF you must have Adobe Acrobat Reader, which is available free at the site.

You may also access documents of the Department published in the **Federal Register** by using the article search feature at: *www.federalregister.gov.* Specifically, through the advanced search feature at this site, you can limit your search to documents published by the Department.

Dated: April 30, 2013.

James H. Shelton, III,

Assistant Deputy Secretary for Innovation and Improvement.

[FR Doc. 2013–10466 Filed 5–2–13; 8:45 am]

BILLING CODE 4000–01–P

DEPARTMENT OF ENERGY

Notice of Availability; Draft Environmental Impact Statement for the FutureGen 2.0 Project

AGENCY: U. S. Department of Energy.

ACTION: Notice of availability and public hearing.

SUMMARY: The U.S. Department of Energy (DOE) announces the availability of the *Draft Environmental Impact Statement for the FutureGen 2.0 Project* (DOE/EIS–0460D) for public review and comment, as well as the date, location, and time for a public hearing. The draft environmental impact statement (EIS) analyzes the potential impacts associated with the FutureGen 2.0 Project (FutureGen 2.0), which would be designed, constructed, operated, and partially funded by the FutureGen Industrial Alliance, Inc. (Alliance). In addition to Alliance funding, FutureGen 2.0 may receive approximately $1 billion in federal financial assistance under the American Recovery and Reinvestment Act (ARRA).

DOE prepared this draft EIS in accordance with the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 et seq.), the Council on Environmental Quality regulations that implement the procedural provisions of NEPA (40 CFR parts 1500–1508), DOE's procedures implementing NEPA (10 CFR part 1021), and DOE's procedures for compliance with floodplain and wetland review requirements (10 CFR part 1022).

DATES: DOE invites the public to comment on the draft EIS during the public comment period, which ends June 17, 2013. DOE will consider all comments postmarked or received during the public comment period when preparing the final EIS and will consider late comments to the extent practicable.

DOE will hold a public hearing on May 21, 2013, at Jacksonville High School, 1211 N. Diamond Street, Jacksonville, Illinois. An informational session will be held from 5:00 p.m. to 6:00 p.m., preceding the formal presentations and comment period from 6:00 p.m. to approximately 8:00 p.m. See the PUBLIC HEARING section for details on the hearing process.

ADDRESSES: Requests for information about this draft EIS or for a paper copy should be directed to: Mr. Cliff Whyte, M/S: I07, National Energy Technology Laboratory, 3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507–0880.

Additional information about the draft EIS may also be requested by electronic mail at *cliff.whyte@netl.doe.gov,* by telephone at (304) 285–2098, or by toll-free telephone at 1–800–432–8330, extension 2098. The draft EIS will be available at *http://energy.gov/nepa.* Copies of the draft EIS are also available for review at the locations listed in the AVAILABILITY OF THE DRAFT EIS section of this notice.

Written comments on the draft EIS can be mailed or sent electronically to Mr. Whyte at the addresses noted above. Written comments may also be submitted by fax to (304) 285–4403. Oral comments on the draft EIS will be accepted during the public hearing scheduled for the date and location provided in the DATES section of this notice.

FOR FURTHER INFORMATION CONTACT: For further information on the proposed project or the draft EIS, please contact: Mr. Cliff Whyte (see ADDRESSES). For general information regarding DOE's NEPA process, please contact: Ms. Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance (GC–54), U.S. Department of Energy, 1000 Independence Avenue SW., Washington, DC 20585; Telephone: (202) 586–4600; Fax: (202) 586–7031. You may also call Ms. Borgstrom at (800) 472–2756.

SUPPLEMENTARY INFORMATION: DOE proposes to provide financial assistance (approximately $1 billion), through two cooperative agreements, to the Alliance for its proposed FutureGen 2.0 Project. FutureGen 2.0 is a public-private partnership formed for the purpose of developing and sharing the cost of the world's first commercial-scale oxy-combustion electricity generation plant integrated with carbon dioxide (CO_2) capture and storage. Babcock & Wilcox Power Generation Group, Inc. and Air Liquide Process and Construction, Inc., among others, would participate in the project by supplying technology, major components, and construction services.

The project would use oxy-combustion technology to generate electric power and would capture CO_2 for permanent storage underground. The plant would generate 168 megawatts (MW) (gross) of electricity. The Alliance would design and construct the plant to capture at least 90 percent of the CO_2 generated (up to 98 percent could be captured). Captured CO_2 would be transported through a 30-mile pipeline to a facility where it would be injected into the Mount Simon formation for permanent storage. This saline rock formation is approximately 4,000–4,500 feet below ground. The project would be designed to capture, transport, and inject approximately 1.1 million metric tons of CO_2 annually, or a total of approximately 33 million metric tons over 30 years of operation. The Alliance would also construct and operate a visitor and research center and training facilities related to carbon capture and storage in the vicinity of Jacksonville, Illinois. The DOE-funded demonstration period would last for 56 months, from the start of operations (July 2017) through February 2022, but the plant is expected to continue commercial operations after this date.

The oxy-combustion plant would be built on a 263-acre existing power plant site in Morgan County, Illinois, approximately one mile south of the Village of Meredosia. Ameren Energy Resources (Ameren) has agreed to sell to the Alliance the assets at the Meredosia Energy Center that are necessary for the FutureGen 2.0 Project. These assets include Unit 4, which was constructed in 1975. The Unit 4 steam turbine, material and fuel handling facilities, process water sources, cooling systems, high-voltage interconnection lines, and certain other facilities would be used for the new plant. Ameren would continue to own the three other electricity generation units at the Meredosia Energy Center. Operation of these units has been suspended since 2011.

The CO_2 storage site would be located 30 miles east of the plant site, on the eastern side of Morgan County. A new 12-inch diameter pipeline would be sited and constructed using an 80-foot construction right-of-way and a 50-foot permanent right-of-way. The Alliance has identified two possible routes for the pipeline and has proposed to use the route that would minimize impacts to landowners and the environment. The Alliance has not identified a final location for the proposed injection wells, but has identified an approximately 5,300-acre site in which the wells would be located and under which the CO_2 would be permanently stored. Up to 25 acres of land would be used for the injection facilities, associated infrastructure and buildings, and access roads.

The draft EIS evaluates the potential impacts of the proposed project, connected actions, and reasonable alternatives. Because the proposed project may affect wetlands, the draft EIS includes an assessment of impacts to wetlands in accordance with DOE's regulations under Compliance with Floodplains and Wetlands Environmental Review Requirements (10 CFR part 1022).

DOE analyzed two alternatives in the draft EIS: the proposed action and the no action alternative. Under the proposed action, DOE would provide approximately $1 billion in cost-shared ARRA funding to the proposed project.

Under the no action alternative, DOE would not provide continued funding. Without DOE funding, it is unlikely that the Alliance, or the industry in general, would undertake the utility-scale integration of CO_2 capture and geologic storage with a coal-fueled power plant using oxy-combustion. Therefore, the no action alternative also represents a ''no-build'' alternative. Without DOE's investment in a utility-scale facility, the development of oxy-combustion repowered plants integrated with CO_2 capture and geologic storage would occur more slowly or not at all.

The draft EIS considers the environmental consequences that may result from the proposed project and describes additional mitigation that might be used to reduce various impacts.

Availability of the Draft EIS: Copies of the draft EIS have been distributed to members of Congress; Native American tribal governments; federal, state, and local officials; and agencies, organizations, and individuals who may be interested or affected. The draft EIS will be available on the Internet at: *http://energy.gov/nepa/nepa-documents*. Copies of the draft EIS are available for public review at the following locations: M–C River Public Library District, 304 Main Street, Meredosia, Illinois; Jacksonville Public Library, 201 West College Avenue, Jacksonville, Illinois; Taylorville Public Library, 121 West Vine Street, Taylorville, Illinois; Arcola Public Library, 407 East Main Street, Arcola, Illinois; and Tuscola Public Library, 112 Sale Street, Tuscola, Illinois. Additional copies also can be requested (see **ADDRESSES**).

Public Hearing: DOE will conduct a public hearing on May 21, 2013 at the Jacksonville High School, Jacksonville, Illinois to obtain comments on the draft EIS. Requests to speak at the public hearing can be made by calling or writing to Mr. Whyte (see **ADDRESSES**). Requests to speak not submitted prior to the hearing will be accepted in the order in which they are received during the hearing. Speakers are encouraged to provide a written version of their oral comments or supplementary materials for the record. Each speaker will be allowed approximately five minutes to present comments. Those speakers who want more than five minutes should indicate the length of time desired in their request. Depending on the number of speakers, DOE may need to limit all speakers to five minutes initially and provide additional opportunities as time permits. Comments will be recorded by a court reporter and will become part of the public record. Oral and written comments will be given equal consideration.

The public hearing will begin at 5:00 p.m. with an informational session. Formal presentations and a formal comment session will begin at approximately 6:00 p.m. DOE will begin the hearing's formal session with overviews of its clean coal program, proposed FutureGen 2.0 Project, and the NEPA process, followed by oral statements by pre-registered speakers. Speakers may be asked questions to help ensure that DOE fully understands their comments. A presiding officer will establish the order of speakers and provide any additional procedures necessary to conduct the hearing.

The public hearing will be accessible to people with disabilities. In addition, any individual needing specific assistance, such as a sign language interpreter or a translator, should contact Mr. Whyte (See **ADDRESSES**) at least 48 hours in advance of the hearing so that arrangements can be made.

Dated: May 1, 2013.

Mark J. Matarrese,

Director, Office of Environment, Security, Safety and Health, Office of Fossil Energy.

[FR Doc. 2013–10662 Filed 5–1–13; 4:15 pm]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Environmental Management Site-Specific Advisory Board, Savannah River Site

AGENCY: Department of Energy.

ACTION: Notice of Open Meeting.

SUMMARY: This notice announces a meeting of the Environmental Management Site-Specific Advisory Board (EM SSAB), Savannah River Site. The Federal Advisory Committee Act (Pub. L. 92–463, 86 Stat. 770) requires that public notice of this meeting be announced in the **Federal Register**.

DATES: Monday, May 20, 2013, 1:00 p.m.–5:15 p.m.; Tuesday, May 21, 2013, 8:30 a.m.–5:00 p.m.

ADDRESSES: North Augusta Community Center, 495 Brookside Avenue, North Augusta, SC 29841.

FOR FURTHER INFORMATION CONTACT: Gerri Flemming, Office of External Affairs, Department of Energy, Savannah River Operations Office, P.O. Box A, Aiken, SC, 29802; Phone: (803) 952–7886.

SUPPLEMENTARY INFORMATION:

Purpose of the Board: The purpose of the Board is to make recommendations to DOE–EM and site management in the areas of environmental restoration, waste management, and related activities.