Mitigation Action Plan

FutureGen 2.0 Project
DOE/EIS-0460

U.S. Department of Energy
National Energy Technology Laboratory

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INTRODUCTION

The Department of Energy (DOE) issued the Final Environmental Impact Statement (EIS) for the FutureGen 2.0 Project (DOE/EIS-0460) in October 2013 and the Record of Decision (ROD) in January 2014 (79 Federal Register [FR] 3577). DOE prepared the EIS to evaluate the potential environmental impacts associated with DOE's proposed action of providing approximately $1 billion of financial assistance for the project through cooperative agreements with the FutureGen Industrial Alliance (the Alliance), as well as the impacts of the project as proposed by the Alliance. The ROD documented DOE's decision to fund the FutureGen 2.0 Project as analyzed in the EIS. Mitigation measures beyond those specified in permit conditions will be addressed in this Mitigation Action Plan (MAP). This MAP briefly describes those required mitigation actions and the monitoring and reporting requirements the Alliance must implement during the design, construction, and operation of the FutureGen 2.0 Project. DOE prepared this MAP in accordance with 10 Code of Federal Regulations (CFR) §1021.331.

PURPOSE

10 CFR §1021.331 of the DOE regulations implementing the National Environmental Policy Act (NEPA) provides that:

> *(a) Following completion of each EIS and its associated ROD, DOE shall prepare a Mitigation Action Plan that addresses mitigation commitments expressed in the ROD. The Mitigation Action Plan shall explain how the corresponding mitigation measures, designed to mitigate adverse environmental impacts associated with the course of action directed by the ROD, will be planned and implemented. The Mitigation Action Plan shall be prepared before DOE takes any action directed by the ROD that is the subject of a mitigation commitment.*
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> *(b) In certain circumstances, as specified in 1021.322(b)(1), DOE shall also prepare a Mitigation Action Plan for commitments to mitigations that are essential to render the impacts of the proposed action not significant. The Mitigation Action Plan shall address all commitments to such necessary mitigations and explain how mitigation will be planned and implemented. The Mitigation Action Plan shall be prepared before the FONSI* [Finding of No Significant Impact] *is issued and shall be referenced herein.*
>
> *(c) Each Mitigation Action Plan shall be as complete as possible, commensurate with the information available regarding the course of action either directed by the ROD or the action to be covered by the FONSI, as appropriate. DOE may revise the Plan as more specific and detailed information becomes available.*
>
> *(d) DOE shall make copies of the Mitigation Action Plans available for inspection in the appropriate DOE public reading room(s) or other appropriate location(s) for a reasonable time. Copies of the Mitigation Action Plans shall also be available upon written request.*

Accordingly, the MAP has five major purposes:

1) To specify the environmental impacts subject to mitigation as indicated in the EIS and the ROD;
2) To describe the mitigation measures to be performed;
3) To identify the party or parties accountable for the mitigation measures;
4) To identify the party or parties responsible for implementing the mitigation measures in the MAP; and
5) To make this information available to the public.

In addition to the mitigation measures identified in the MAP, all parties must comply with applicable federal, state, and local environmental laws, orders, and regulations. As a result, for purposes of the MAP, such compliance activities are not considered to be mitigation measures subject to DOE control and hence are not addressed in detail in this document. DOE will review final project plans to ensure their consistency with the impacts and mitigation measures analyzed and described in the EIS, ROD, and MAP. This MAP may be amended to identify additional mitigation measures needed to minimize any environmental impacts not previously addressed in the EIS or ROD. Mitigation measures beyond those specified in permit conditions will be addressed in this MAP.

BACKGROUND

DOE considers the advancement of carbon capture and storage technology critically important to addressing carbon dioxide (CO_2) emissions and global climate change concerns associated with coal-fueled energy. The purpose of DOE's proposed action is to demonstrate the commercial feasibility of an advanced coal-based energy technology (oxy-combustion) that may serve as a cost-effective approach to implementing carbon capture at new and existing coal-fueled energy facilities. The proposed project would also demonstrate commercial-scale integration of transport and permanent storage of captured CO_2 in a deep geologic formation. Implementation of the FutureGen 2.0 Project supports the objectives of the FutureGen Initiative to establish the feasibility and viability of producing low-carbon electricity from coal with near-zero emissions of air pollutants.

One of DOE's primary strategic goals is to protect our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally sound energy. DOE's action is needed to further this strategic goal with the recognition that coal serves an important role in the nation's energy supply, and that there is growing need to upgrade or replace the nation's aging energy infrastructure. DOE identified oxy-combustion as a potentially cost-effective approach to implementing carbon capture at an existing coal facility, including a large cross-section of the world's existing pulverized coal plants. The development of carbon capture and storage technologies through the FutureGen 2.0 Project would support the ongoing and future use of the nation's abundant coal reserves in a manner that addresses both aging infrastructure and environmental challenges. Federal financial support is needed to help reduce the risks inherent in these first-of-a-kind projects, which without financial assistance would likely not occur.

PROJECT DESCRIPTION AND LOCATION

The FutureGen 2.0 Project would result in the construction and operation of a CO_2 capture facility utilizing oxy-combustion technology to capture at least 90 percent (approximately 1.2 million tons [1.1 million metric tons] annually) of CO_2 during steady-state operation of a repowered electricity generating unit at the Meredosia Energy Center. This existing energy center is located on a 263-acre site adjacent to

the east side of the Illinois River, south of the village of Meredosia in Morgan County, west central Illinois. The captured CO_2 would be conditioned, compressed, and transported approximately 30 miles via a newly constructed pipeline to a newly constructed injection well site where it would be injected into the Mt. Simon Formation (approximately 4,000 feet below ground surface), which is one of the Illinois Basin's major deep saline formations. The maximum extent of the subsurface CO_2 plume after 20 years of injection would be approximately 4,000 acres, based on modeling results; the Alliance has acquired the subsurface rights of all properties within a 6,800-acre CO_2 storage study area above the modeled subsurface plume. The primary components of the project are:

1) *Oxy-Combustion Large Scale Test* – The Alliance would acquire portions of the Meredosia Energy Center from Ameren and repower an existing unit with oxy-combustion technology. Principal construction features would include a new air separation unit to generate oxygen, modifications to the power block (including a new boiler and gas quality control system), a new compression and purification unit to capture CO_2, and additional modifications including reconstruction of the main cooling tower, two new cooling towers, process water system upgrades, new process water and wastewater treatment systems, and a new concrete exhaust stack. The new oxy-combustion facility would operate on a blended coal mixture of bituminous and sub-bituminous coal. The repowered unit would generate 168 megawatt electrical (gross) for distribution to the regional power grid; and capture, condition, and compress CO_2 emissions for transport by pipeline.

2) *CO_2 Pipeline* – The Alliance would construct a new pipeline approximately 30 miles long to transport captured CO_2 to a new injection well site to be constructed northeast of Jacksonville in Morgan County, Illinois. The pipeline would be constructed of either a 12-inch or 10-inch (nominal) diameter pipe. The proposed pipeline route crosses mostly rural and sparsely developed agricultural lands in Morgan County. The Alliance plans to use existing rights-of-way (ROW) to the extent practicable to minimize environmental impacts and avoid sensitive resources. The CO_2 pipeline would have an operational ROW of 50 feet wide with a construction ROW of 80 feet wide (130 feet in limited circumstances).

3) *CO_2 Storage* – The proposed project would convey approximately 1.2 million tons (1.1 million metric tons) of CO_2 annually to a new injection well site on a 9.5-acre site northwest of the intersection of Beilschmidt Road and Martin Road in eastern Morgan County, Illinois. The CO_2 would be injected via four horizontally drilled injection wells into the Mt. Simon Formation approximately 4,000 feet below the ground surface, and would be confined in the geologic saline formation by an overlying impermeable caprock layer (the Eau Claire Formation) approximately 480 feet thick. The maximum extent of the subsurface CO_2 plume after 20 years of injection would be approximately 4,000 acres based on modeling results; the Alliance has acquired the subsurface rights of all properties within a 6,800-acre CO_2 storage study area above the modeled subsurface plume. The Class VI Underground Injection Control (UIC) permits to be issued by the United States Environmental Protection Agency (USEPA) for the four horizontal injection wells will require the implementation of a monitoring, verification, and accounting (MVA) program to monitor the injection and geologic storage of CO_2 and to verify that the CO_2 stays within the target formation. The MVA program, including monitoring wells and other technologies, would proceed throughout the planned injection period (20 years) and continue for another 50 years or until such time as the UIC permitting authority is satisfied that the CO_2 plume is stable and no further monitoring is required.

4) *Educational Facilities* – The Alliance would construct and operate visitor, research, and training facilities (the educational facilities) to support public outreach and communication, and to provide training and research opportunities associated with near-zero emissions power generation and CO_2 capture and storage technologies. The intended general location for the

educational facilities is the vicinity of Jacksonville, Illinois, which is the largest community in Morgan County. The Alliance has been working with local stakeholders to identify a location that would be advantageous to the FutureGen 2.0 Project and to the local community. Siting of the facilities would require a maximum of 3.5 acres at a location that has or is adjacent to existing utility infrastructure and roadway access to support operations.

DOE'S PROPOSED ACTION

DOE's proposed action is to provide approximately $1 billion in cost-shared funding through cooperative agreements with the Alliance for the proposed FutureGen 2.0 Project.

AGENCY DECISION

DOE announced its decision to provide cost-shared funding to the Alliance for the proposed FutureGen 2.0 Project in a ROD, which was signed on January 13, 2014 and published in the Federal Register on January 22, 2014 (79 FR 3577). In addition to documenting DOE's decision, the ROD identified requirements to mitigate potential adverse impacts associated with the project, as identified and analyzed in the EIS. This MAP briefly describes the required mitigation actions and the monitoring and reporting requirements the Alliance must implement during the design, construction, and operation of the project. DOE prepared this MAP in accordance with 10 CFR §1021.331. The required actions are described below.

MITIGATION

DOE's decision incorporates measures to avoid or reduce potential adverse environmental impacts during the design, construction, and operation of the project. Additionally, DOE requires that recipients of financial assistance comply with all applicable federal, state, and local environmental laws, orders, and regulations. During project planning, the Alliance incorporated various best management practices, mitigation measures, and permit requirements into its project, and the analyses completed for the EIS assumed that such measures would be implemented. Since these measures have been incorporated into the design and/or permitting of the FutureGen 2.0 Project, they are not specifically called out in this MAP.

Measures beyond those typically required by regulation or specified in permits to mitigate impacts are addressed in this MAP. DOE prepared this MAP to outline how the mitigation measures will be planned, implemented, and monitored. Since this document is an adaptive management tool, mitigation conditions described herein could be removed if equivalent conditions are otherwise established by permit, license, or law. Furthermore, the MAP could add additional mitigation requirements if new environmental impacts are identified or otherwise result from project changes. Compliance with permit, license, or regulatory requirements is not considered mitigation subject to DOE control and, therefore, would not be included in this document.

Through management of its cooperative agreement with the Alliance, DOE will ensure that the Alliance fulfills the monitoring and mitigation requirements specified in this MAP, as presented in Table 2 at the end of this document. This MAP can be viewed online with the related NEPA documentation for this project at http:///www.netl.doe.gov/publications/others/nepa/index.html.

ROLES AND RESPONSIBILITIES

The FutureGen 2.0 Project components will be owned and operated by the Alliance. DOE entered into a cooperative agreement with the Alliance to provide approximately $1 billion of financial assistance for the FutureGen 2.0 Project. With regard to NEPA and mitigation requirements specified in the ROD, the cooperative agreement states:

> *If DOE decides to proceed with its proposed action subject to conditions, limitations, mitigation requirements, or monitoring requirements specified in a ROD, MAP, or both, the Recipient agrees to:*
>
> *a) abide by the conditions, limitations, mitigation requirements, and monitoring requirements specified in the ROD or MAP;*
>
> *b) negotiate changes to the Project schedule, costs, and/or scope as necessary to effect the requirements or conditions in the ROD or MAP;*
>
> *c) allow DOE's authorized representatives to visit the site and facilities upon notice to verify Project status and compliance to include conditions and requirements in the ROD or MAP; and*
>
> *d) submit data or otherwise meet specified reporting requirements that may be in the ROD or MAP.*

As the recipient named in the cooperative agreement, the Alliance is responsible for the commitments described in this MAP directly or through its affiliates and contractors. DOE will ensure that these commitments are met through management of the cooperative agreement.

MITIGATION PERIOD AND MANAGEMENT

The conditions of the ROD and MAP extend through the end of the demonstration period for the project (5 years), as described in the cooperative agreement between DOE and the Alliance. Table 1 lists the reporting schedule for the various monitoring and mitigation commitments stipulated in Table 2 of this MAP.

Table 1. Mitigation Action Reporting Schedule

Reporting Frequency	Report Due
Quarterly	By end of the following quarter.
Annually	By April 1st of the following year.
Final Design	By 3 months after completion of the final design.
Completion of Construction	By 3 months after completion of the construction.

Upon the end of demonstration, no further quarterly or annual reports shall be due. Any partial quarter or calendar year not addressed in a separate report shall be covered in the final report. Reports shall include a summary of compliance with the relevant mitigation commitments. All reporting will be performed by the Alliance. Monitoring, mitigation, and reporting commitments listed in Table 2 will be removed from the MAP if equivalent mitigation requirements are otherwise established by permit, license, or law (e.g., as part of a permit issued under Section 404 of the Clean Water Act [CWA]) or under Section 10 of the Rivers and Harbors Act of 1899 if barge facilities are constructed. Once such an external mitigation requirement becomes effective, the Alliance shall notify DOE of that requirement in writing. Unless DOE determines within 60 days of such notification that the mitigation requirements established by permit,

license, or law would not appropriately address the commitment specified in this MAP, then the corresponding monitoring, mitigation, and reporting commitments will no longer apply.

Table 2 below lists the monitoring requirements, mitigation commitments, and reporting requirements for the FutureGen 2.0 Project. As the recipient named in the cooperative agreement, the Alliance is the party responsible for implementing these monitoring and mitigation commitments. DOE will ensure that these commitments are met through management of the cooperative agreement.

Table 2. Mitigation Measures for the FutureGen 2.0 Project

ID	Mitigation Measure	Resource Area	Method / Monitoring	Reporting Frequency
PROJECT PHASE/COMPONENT				
A) CONSTRUCTION: Land Disturbance/Clearing - General				
A1	Conduct a cultural resources survey in areas that have not been disturbed or surveyed previously, prior to the construction in accordance with the signed **Programmatic Agreement.**[1]	Cultural Resources	Provide summary documentation of surveys completed, key events and findings, measures taken, and consultations.	Quarterly
A2	Implement steps from the **Programmatic Agreement**[1] if cultural resources are discovered unexpectedly during construction (inadvertent discovery procedures).			
A3	Upon temporary cessation of an earth disturbance activity or any stage or phase of an activity where a cessation of earth disturbance activities will exceed 4 days, the site shall be immediately seeded, mulched, or otherwise protected from accelerated erosion and sedimentation pending future earth disturbance activities.	Soils and Water Resources	Conduct routine and/or periodic inspections. Provide summary documentation of inspections completed and compliance verification.	Quarterly
A4	In forested areas, only conduct construction activities (i.e., land clearing and land disturbance) between November and February to avoid disturbing the Indiana bat, the northern long-eared bat, the bald eagle, and migratory birds.[2]	Biological Resources	Provide construction schedule and documentation on when forested areas were cleared.	Quarterly
A5	Bore under wetlands within forested stream corridors and channelized waterways to avoid impacts on potential Indiana bat and northern long-eared bat summer habitat and minimize erosion and siltation of streams.[2]		Provide documentation of crossing types and locations used in final design.	
A6	Conduct a preconstruction survey for the decurrent false aster, because decurrent false aster can remain viable in the seed bank.[2]		Provide documentation of surveys completed, key findings, and consultations.	
A7	Incorporate erosion control with properly installed and maintained silt fences and rapid re-vegetation of disturbed land with appropriate species (i.e., native species and cover crops in agricultural areas).[2]		Conduct routine and/or periodic inspections. Provide summary documentation of inspections completed and compliance verification.	
A8	On non-agricultural land, use soil stabilization measures (e.g., seeding, mulching, or matting) to reduce erosion. On agricultural land, follow guidelines of the **Agricultural Impact Mitigation Agreement.**[3]	Air Quality, Biological Resources, Soils, and Water Resources	Conduct routine and/or periodic inspections. Provide summary documentation of inspections completed and compliance verification.	Quarterly
A9	Stabilize temporary access roads, haul roads, parking areas, laydown, material storage, and other onsite vehicle transportation routes as soon as practicable after grading to reduce the erosion potential.			
A10	Preserve natural vegetation as much as practicable, but especially in critical areas such as on steep slopes and in areas adjacent to watercourses, swales, or wetlands.			
A11	Revegetate disturbed areas as soon as practicable after disturbance. On agricultural land, follow guidelines of the **Agricultural Impact Mitigation Agreement.**[3]		Detail activity on construction schedule and provide summary documentation of completion.	

ID	Mitigation Measure	Resource Area	Method / Monitoring	Reporting Frequency
B) CONSTRUCTION: Materials and Waste, Vehicles, and Equipment - General				
B1	Remove construction and demolition waste materials from construction sites on a regular basis, and recycle whenever possible.	Materials and Waste, and Water Resources	Conduct routine and/or periodic inspections. Provide summary documentation of inspections completed and compliance verification.	Quarterly
B2	Remove waste spoil, debris, piling, construction materials, and any other obstructions resulting from or used during construction as soon as practicable.			
B3	Restrict use of oil, solvents, and other hazardous materials to designated areas equipped with spill containment measures (e.g., secondary containment) appropriate to the hazard and volume of material being stored on the construction site.		Conduct routine and/or periodic inspections. Provide summary documentation of inspections completed and compliance verification. Provide summary report of any spills or releases and actions taken.	Quarterly
B4	Keep hazardous materials covered when not actively in use.			
B5	Contain and clean up any spills involving fuel or other liquid or dry chemicals immediately, including any affected soil. Contain and dispose of spill cleanup wastes and contaminated soils in accordance with applicable regulations and approved spill plans and procedures.			
B6	Keep construction materials, debris, construction chemicals, construction staging, fueling, etc. at a safe distance from surface waters, wetlands, and floodplains to prevent unintentional contamination.			
B7	Keep spill kits on hand to reduce response time in case of spills.			
B8	Monitor official statements issued by the National Weather Service regarding flood potential and/or USACE estimates of river levels in the area, and, if flooding is likely or imminent, construction equipment would be moved out of the floodplain prior to any incidents of flooding to the extent practicable.	Wetlands and Floodplains	Provide summary of emergency equipment relocation plan and documentation of any occurrence.	Quarterly
B9	Limit vehicle speeds on roads and exposed areas to control fugitive dust emissions. Post appropriate signage.	Air Quality	Provide summary documentation of signage posted. Monitor and enforce speed limits. Provide summary documentation of enforcement measures.	Quarterly
B10	Reduce equipment idling time. Post appropriate signage.			
B11	Sweep or remove spilled material from paved surfaces to reduce the potential for fugitive dust.		Conduct routine and/or periodic inspections. Provide summary documentation of inspections completed and compliance verification.	
B12	At the power plant site and injection site, remove excess soil from truck tires by installing exit tracking/rock pads to reduce fugitive dust on public roads. Rock exit pads to be periodically replaced as warranted when soil loading renders them ineffective.			
B13	Maintain engines and equipment according to manufacturer specifications.			

ID	Mitigation Measure	Resource Area	Method / Monitoring	Reporting Frequency
C) CONSTRUCTION: CO_2 Pipeline				
C1	Adhere to procedures and IDOA Pipeline Construction Standards and Policies outlined in the signed **Agricultural Impact Mitigation Agreement**[3] to reclaim agricultural lands that would be impacted by pipeline construction.	Land Use, Soils, and Water Resources	Provide documentation of completed surveys, key events and findings, measures taken, and consultations.	Quarterly
C2	Conduct construction activities outside of the planting and growing seasons to the extent practicable.		Develop schedule that indicates planting and growing season exclusions. Document compliance and/or instances where compliance was not practicable with supporting basis.	
C3	Contain surface disturbance from construction of the pipeline within the pipeline construction ROWs.		Conduct routine and/or periodic inspections. Provide summary documentation of inspections completed and compliance verification.	
C4	Document the location of irrigation systems, drainage tiles, and sensitive soils within the construction ROW.			
C5	Remove topsoil from within the construction ROW and temporarily store onsite separately from other excavated material to preserve integrity of topsoil in temporarily disturbed areas during pipeline construction.			
C6	Use wattles/fiber rolls, or other appropriate option, to reduce and disperse runoff velocity and capture sediment during pipeline construction.			
C7	After pipeline installation is complete, restore the pipeline construction site to its original grade to maintain appropriate contours and natural drainages.			
C8	Replace the topsoil as the uppermost soil layer following pipeline construction to maintain the soil profile and expedite vegetation growth.			
C9	In agricultural areas, restore the land to its original condition to allow the current land use to resume after construction.	Land Use	Detail activity on construction schedule and provide documentation when complete.	Quarterly
C10	Conduct pressure testing of the CO_2 pipeline prior to project startup.	Groundwater, and Human Health and Safety	Provide documentation of pressure testing results prior to startup.	Completion of Testing

ID	Mitigation Measure	Resource Area	Method / Monitoring	Reporting Frequency
C11	Use trenchless technologies, including horizontal directional drilling or jack and bore tunneling, for pipeline crossings of waterways and wetlands consistent with the authorization terms of the USACE's Nationwide Permit 12, any related requirements specific to the state or region, and as described in EIS (in coordination with USACE).	Surface Water, Wetlands, and Floodplains	Provide documentation of crossing types, locations, and procedures used in the final design. Conduct routine and/or periodic inspections. Document compliance.	Final Design and Quarterly
C12	In the event that trenching is used for crossings of dry ephemeral stream channels, construct pipeline crossings using the most direct route and construct water crossings during periods of low flow conditions to the extent practicable. Use crossing sites that have low, stable banks, a firm stream bottom, and minimal surface runoff if possible.			
C13	In the event that trenching is used for crossings of dry ephemeral stream channels, excavated wetland soils should be backfilled into the trenches so that the deepest soils excavated would be returned as the deepest soils backfilled. All work shall be consistent with the authorization terms of the USACE's Nationwide Permit 12, any related requirements specific to the state or region, and as described in EIS (in coordination with USACE).			
D) CONSTRUCTION: Injection Wells				
D1	Comply with applicable well drilling and construction industry standards developed by the ANSI/ASSE and the API.	Groundwater, and Human Health and Safety	Provide final design documentation. Provide inspection documentation that wells were constructed according to plans.	Final Design and Completion of Construction
D2	Construct injection wells with corrosion-resistant steel and CO_2-resistant cements to maintain well integrity and to prevent upward migration of CO_2.			
D3	For each injection well, install surface casing through the base of the lowermost USDW and cement the well casing to the surface to maintain well integrity.			
D4	Construct each injection well such that a competent cement seal extends through the caprock formation and penetrates into the top of the Mt. Simon Formation to maintain well integrity and to prevent upward migration of CO_2.			
D5	Construct mud pits with a synthetic liner (plastic sheeting) that has a thickness of at least 30 mils.	Groundwater and Surface Water	Provide final design and construction inspection documentation.	Final Design and Completion of Construction
D6	Install a synthetic liner (plastic sheeting) beneath tanks, mud pumps, and the drilling rig (rig underliner) to prevent releases of drilling fluids to the ground surface.			

ID	Mitigation Measure	Resource Area	Method / Monitoring	Reporting Frequency
D7	Maintain emergency spill kits or an inventory of absorbent materials (e.g., pads and booms) that can be used to respond to spills or releases of hazardous materials (e.g., engine oil, hydraulic oil, diesel fuel, gasoline, antifreeze, drilling fluids or any other contaminants as a result of the driller's activities).	Groundwater and Surface Water	Conduct routine and/or periodic inspections. Provide summary documentation of inspections completed and compliance verification. Provide summary report of any spills or releases and actions taken.	Quarterly
D8	Contain and clean up any spills involving fuel or other liquid or dry chemicals immediately, including any affected soil. Contain and dispose of spill cleanup wastes and contaminated soils in accordance with applicable regulations and approved spill plans and procedures.			
D9	Employ noise control options to mitigate the noise impacts to surrounding residences during the 24-hour drilling of the injection wells, such as positioning of trailers, berms, and obstructions.	Noise	Provide final design and summary documentation of control measures implemented and noise measurements.	Final Design and Quarterly
PROJECT PHASE/COMPONENT				
E) OPERATIONS: General				
E1	Permanently preserve wetland areas during facility operations through appropriate signage so that these areas are not inadvertently filled, disturbed, mowed, or cleared of vegetation. Incorporate wetlands management activities into appropriate facility plans and SOPs, as needed (e.g., SPCC, SWPPP, pesticides application, etc.).	Wetlands and Floodplains	Provide summary documentation of plans prepared, signage posted, and compliance.	Final Design and Quarterly
E2	Perform refueling, lubrication, and degreasing of vehicles and heavy equipment in designated areas.	Materials and Wastes	Conduct routine and/or periodic inspections. Provide summary documentation of inspections completed and compliance verification. Provide summary report of any spills or releases and actions taken.	Quarterly
E3	Contain and clean up any spills or releases of hazardous materials immediately, including any affected soil. Contain and dispose of spill cleanup wastes and contaminated soils in accordance with applicable regulations.			
F) OPERATIONS: Meredosia Energy Center				
F1	Achieve at least a 90 percent CO_2 capture rate during the demonstration period.	Air Quality	Provide summary documentation of carbon capture and storage demonstration project goals, including CO_2 capture rate, problems encountered, and actions taken.	Quarterly and Annually
F2	Divert any stormwater runoff exposed to the coal storage and ash area (including coal pile runoff, coal handling dust suppression water, coal handling equipment wash-down water, and stormwater from the coal yard) to the new lined settling basin or passive water treatment system through berms and above-ground conveyance systems.	Water Resources	Provide final design documentation. Conduct routine and/or periodic inspections. Provide summary documentation of inspections completed and compliance verification. Provide summary report of any events where contaminated stormwater was not contained and actions taken.	Final Design and Quarterly

ID	Mitigation Measure	Resource Area	Method / Monitoring	Reporting Frequency
G) OPERATIONS: CO_2 Pipeline				
G1	As required by the **Agricultural Impact Mitigation Agreement,**[3] conduct at least 2 years of monitoring and remediation immediately following the initial operation of the pipeline or the completion of initial ROW restoration, whichever occurs last. Identify and address any remaining impacts associated with the pipeline construction that would require restoration.	Soils	Provide monitoring schedule and summary documentation of completion.	Quarterly
G2	Provide for automatic and manual operations of mainline block valves.	Human Health and Safety	Provide final design documentation.	Final Design
G3	Monitor the pressure, flow, and other parameters in the pipeline, using a SCADA system.		Provide summary documentation confirming activities undertaken.	Quarterly
H) OPERATIONS: Injection Wells				
H1	Implement the USEPA-approved MVA Plan in accordance with UIC Permit.	Groundwater	Provide DOE with copies of agency reports required by UIC permit.	According to Permit
H2	Utilize outdoor security and site lighting systems that are low in height, shielded so not directed skyward, and of minimal brilliance to illuminate the intended area and meet the intended purpose at that location (e.g., parking lots, signs, walkways, and safety and work areas).	Aesthetics	Provide final design documentation and verification report that lights were installed according to plans. Conduct routine and/or periodic inspections to verify lighting design is maintained. Document compliance.	Final Design and Quarterly

[1] Programmatic Agreement among the Illinois Historic Preservation Agency, the FutureGen Industrial Alliance, Inc., and the U.S. Department of Energy Regarding the Design, Construction, and Operation of the FutureGen 2.0 Project, an Oxy-Combustion Power Generation Facility, Pipeline, and CO_2 Storage Reservoir Project in Morgan County, Illinois. August 2013. **See Appendix B3 of EIS, Cultural Resources Consultation.**

[2] Biological Assessment for Proposed Meredosia Energy Center Improvements and CO_2 Pipeline and Storage Reservoir Construction for the FutureGen 2.0 Project. Prepared for U.S.DOE, on behalf of FutureGen Industrial Alliance, Inc., prepared by Pacific Northwest National Laboratory. October 2013.

[3] 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. January 2012. **See Appendix H of EIS, Agricultural Mitigation.**

Acronyms used in table: ANSI = American National Standards Institute; API = American Petroleum Institute; ASSE = American Society of Safety Engineers; CO_2 = carbon dioxide; DOE = Department of Energy; EIS = environmental impact statement; IDOA = Illinois Department of Agriculture; MVA = monitoring, verification, and accounting; ROW = right of way; SCADA = supervisory control and data acquisition; SOP = standard operating procedure; SPCC = spill prevention, control, and countermeasures; SWPPP = stormwater pollution prevention plan; UIC = underground injection control; USACE = United States Army Corps of Engineers; USDW = underground source of drinking water; USEPA = United States Environmental Protection Agency