Mitigation Action Plan for the

W.A. Parish Post-Combustion CO_2 Capture and Sequestration Project

U. S. Department of Energy

National Energy Technology Laboratory

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INTRODUCTION:

The United States (U.S.) Department of Energy (DOE) issued a final environmental impact statement (EIS; DOE/EIS-0473) for the W.A. Parish Post-Combustion CO_2 Capture and Sequestration Project (Parish PCCS Project) in March 2013. DOE announced its decision to provide $167 million in cost-shared funding to NRG Energy, Inc. (NRG) for the proposed project under DOE's Clean Coal Power Initiative (CCPI) Program in a Record of Decision signed on May 8, 2013 and published in the *Federal Register* on May 23, 2013 (78 FR 30901). The ROD identified requirements to mitigate potential adverse impacts associated with the project, as identified and analyzed in the EIS. This Mitigation Action Plan (MAP) briefly describes the mitigation actions and monitoring and reporting requirements the recipient must implement during the design, construction, and demonstration of the project. DOE prepared this MAP in accordance with 10 CFR 1021.331.

DOE prepared the EIS to evaluate the potential environmental impacts associated with DOE's proposed action of providing cost-shared funding for the Parish PCCS Project. The EIS also evaluated the impacts associated with construction and operation of the proposed Parish PCCS Project, as submitted by NRG. The Parish PCCS Project will construct and operate a new post-combustion CO_2 capture and compression system at Unit 8 of the existing W.A. Parish power plant and transport the captured CO_2 via a new 81-mile pipeline to the West Ranch oil field for use in enhanced oil recovery (EOR).

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 is issued and shall be referenced therein.*
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> ***(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.*
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> ***(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 four main 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; and
4) To identify the party or parties responsible for implementing the mitigation measures in the MAP

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 not addressed in detail in this document. DOE will review the final project design to ensure its consistency with the impacts and mitigation measures 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.

BACKGROUND:

Public Law 107-63, enacted in November 2001, first provided funding for the CCPI program, a federal program to accelerate the commercial readiness of advanced technologies in existing and new coal-based power plants. The program encompasses a broad spectrum of commercial-scale demonstrations that target today's most pressing environmental challenges, including reducing mercury and greenhouse gas (GHG) emissions. When integrated with other DOE initiatives, the program will help the nation successfully commercialize advanced power systems to produce electricity at greater efficiencies, release almost no emissions, create fuels, and employ CO_2 management capabilities.

The purpose of DOE's proposed action under the CCPI Program is to meet program goals by providing cost-shared funding for this proposed project to demonstrate the feasibility of advanced coal-based technologies at a commercial scale that capture and geologically sequester CO_2 emissions. The principal *need* addressed by DOE's proposed action is to satisfy the responsibility Congress imposed on DOE to demonstrate advanced coal-based technologies that can generate clean, reliable, and affordable electricity in the U.S. A successful commercial-scale demonstration of an amine-based carbon capture technology at NRG's W.A. Parish Plant with beneficial use of the CO_2 at an existing oil field would generate technical, environmental, and financial data from the design, construction, and integrated operation of the CO_2 capture facility, pipeline, EOR, and CO_2 monitoring facilities at the oil field. These data would be used to evaluate whether the deployed technologies could be effectively and economically implemented at a commercial scale.

PROJECT DESCRIPTION AND LOCATION

The Parish PCCS Project would result in the construction and operation of a CO_2 capture facility utilizing an advanced amine-based absorption technology to capture at least 90% (approximately 1.6 million tons) of CO_2 annually from a flue gas slipstream taken from Unit 8 at the W.A. Parish Plant. This existing power plant is located on 4,880 acres in rural Fort Bend County within the incorporated area of the town of Thompsons, Texas. Up to 5,475 tons per day of captured CO_2 would be dried, compressed, and transported via a newly constructed approximately 81-mile long pipeline to the West Ranch oil field where it would be used in EOR operations. The four primary components of the project include the following:

1. *CO_2 Capture Facility* - A post-combustion CO_2 capture facility would be constructed and attached to Unit 8 at the existing W.A. Parish Plant in Fort Bend County, Texas. A new 80-MW natural gas-fired turbine, currently under construction at the plant site, would produce the auxiliary electricity and steam needed by the proposed CO_2 capture system.
2. *CO_2 Pipeline* - Captured CO_2 would be transported via a new, approximately 81-mile-long, 12-inch-diameter pipeline to the West Ranch oil field, located near Vanderbilt, Texas, in Jackson County. The pipeline route includes mostly rural and sparsely-developed agricultural lands in Fort Bend, Wharton, and

Jackson Counties. NRG plans to use existing mowed and maintained utility ROWs to the extent practicable to minimize environmental impacts and avoid sensitive resources. A joint venture between NRG and HEC, known as Texas Coastal Ventures LLC (TCV), would operate the pipeline.

3. *EOR Operations* - The proposed project would deliver up to 1.6 million tons of CO_2 per year to the West Ranch oil field for its use in EOR. The CO_2 would be injected into the 98-A, 41-A, Glasscock, and Greta sand units of the Frio Formation, approximately 5,000 to 6,300 feet below ground surface (bgs). The portions of the West Ranch oil field in which EOR operations would be conducted are currently owned or leased by TCV. HEC has been contracted to conduct the EOR operations. TCV plans to make additional investments outside of the DOE funded program to modernize and prepare the West Ranch oil field to safely accept CO_2 injection, but the activities are included in this project description because they are integrated into the project concept and considered connected actions.
4. *CO_2 Monitoring Program* - TCV would implement a program to monitor the injection and migration of CO_2 within the geologic formations at the EOR site based on a CO_2 Monitoring Plan developed in cooperation with the Texas Bureau of Economic Geology (BEG). The CO_2 monitoring program would be established and operated in accordance with requirements of the CCPI program and Railroad Commission of Texas (RRC) regulations for certification of CO_2 storage related to EOR operations (i.e., as specified in 16 TAC 5.305) and provisions of underground injection control (UIC) permits for injection wells at the West Ranch oil field (i.e., existing permits for existing injection wells and new permits that would be required for newly installed injection wells).

DOE'S PROPOSED ACTION

DOE's proposed action is to provide $167 million in cost-shared funding through a cooperative agreement with NRG for its proposed project. DOE has already provided $7 million to NRG under Phase I for preliminary design and related preliminary activities of the project, as described above. The estimated total project cost is $845 million.

AGENCY DECISION

The United States (U.S.) Department of Energy (DOE) issued a final environmental impact statement (EIS; DOE/EIS-0473) for the W.A. Parish Post-Combustion CO_2 Capture and Sequestration Project (Parish PCCS Project) in March 2013. DOE announced its decision to provide cost-shared funding to NRG Energy, Inc. for the proposed project under DOE's Clean Coal Power Initiative (CCPI) Program in a Record of Decision which was signed on May 8, 2013 and published in the *Federal Register* on May 23, 2013 (78 FR 30901). The ROD identified requirements to mitigate potential adverse impacts associated with the project, as identified and analyzed in the EIS. This Mitigation Action Plan (MAP) briefly describes the mitigation actions and monitoring and reporting requirements the recipient must implement during the design, construction, and demonstration of the project. DOE prepared this MAP in accordance with 10 CFR 1021.331.

MITIGATION

DOE's decision incorporates measures to avoid or minimize adverse environmental impacts during the design, construction and operation of the project. DOE requires that the participants comply with all applicable federal, state, and local environmental laws, orders, and regulations. During project planning, NRG incorporated various mitigation measures and anticipated permit requirements, and the analyses completed for the EIS assumed that such measures would be implemented. These measures are identified in Chapter 4 of the EIS, described as needed in each resource section of Chapter 3, and incorporated into the ROD as conditions for DOE's financial assistance under the cooperative agreement between DOE and NRG.

Mitigation measures beyond those typically required by regulation or specified in permit conditions are addressed in this MAP. DOE prepared the MAP, consistent with 10 CFR 1021.331, to outline how the mitigation measures will be planned, implemented, and monitored. Since the MAP is an adaptive management tool, mitigation conditions could be removed if equivalent conditions are otherwise established by permit, license, or law. Compliance with permit, license or regulatory requirements is not considered mitigation subject to DOE control and therefore not included in the MAP. The following table lists the resource areas, mitigation commitments, and the applicable monitoring and reporting requirements. The table also identifies the party or parties responsible for implementing each of the requirements.

DOE will ensure that commitments in the MAP are met through management of its cooperative agreement with NRG. The cooperative agreement requires that NRG fulfill the monitoring and mitigation requirements specified in the ROD and this MAP. The 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

DOE entered into a cooperative agreement with NRG to provide cost-shared funding for the project under CCPI. With regard to NEPA, the cooperative agreement states:

> *Recipient is restricted from taking any action using Federal funds under this Award that would have an adverse effect on the environment or limit the choice of reasonable alternatives prior to DOE completing the NEPA process for this Project. Prohibited actions include, but are not limited to, demolition of existing buildings, site clearing, ground breaking, construction, and detailed design. This restriction also prohibits the purchase of long lead-time equipment until DOE issues a Record of Decision (ROD) or Finding of No Significant Impact (FONSI). However, activities necessary for site characterization may be performed before the NEPA process is completed.*
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> *Prior to DOE's issuance of a ROD or FONSI, DOE agrees to discuss with the Recipient any proposed conditions, limitations, or requirements that may be included in the ROD or FONSI if DOE decides to proceed with its proposed action. However, DOE retains sole discretion on whether to include in the ROD or FONSI any conditions, limitations or requirements.*
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> *If DOE decides to proceed with its proposed action subject to conditions, limitations, or requirements specified in a ROD or FONSI, the Recipient agrees to:*
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> *a) abide by the conditions, limitations, and requirements specified;*
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> *b) make changes to the Project's schedule, costs, or scope as necessary to effect the specified conditions, limitations, and requirements;*
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> *c) allow DOE's authorized representatives to visit the site and facilities at reasonable times and upon reasonable notice to verify compliance with any conditions, limitations and requirements; and*
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> *d) submit data or otherwise meet reporting requirements that may be specified in the ROD or FONSI.*
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> *If the Recipient finds the conditions, limitations, or requirements specified in the ROD or FONSI unacceptable, it has the right to terminate the Award in accordance with 10 C.F.R. 600.161(a)(3), 244(b), 351(a)(3), as applicable.*

DOE and the Recipient will coordinate the NEPA review of the Project with the environmental review conducted by Texas Commission on Environmental Quality (TCEQ), the Railroad Commission of Texas (RRC), Texas Parks and Wildlife Department (TPWD) and Texas Historical Commission (THC) under Texas laws in order to ensure an expedited and efficient federal and state review of the Project's potential environmental impacts.

As the recipient named in the cooperative agreement, NRG is the party responsible for the commitments described in this MAP, either directly or indirectly through its affiliates and contractors. DOE will ensure that NRG meets these commitments 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, as described in the cooperative agreement between DOE and NRG.

Mitigation, Monitoring and Reporting Requirements for the W.A. Parish Post-combustion CO2 Capture and Sequestration Project

Resource Area	Mitigation	Monitoring	Reporting	Implementing Party
Air Quality	To control fugitive dust, NRG must stabilize open piles and disturbed areas by covering and/or applying water or other dust control additive. NRG shall also limit the speed of non-earthmoving equipment to 15 mph and earthmoving equipment to 10 mph to prevent spilling hauled materials. Disturbed areas must be revegetated as soon as possible using methods approved by the state of Texas and in coordination with land owners. To control mobile and stationary source emissions, NRG must use modern, well-maintained diesel-powered equipment during construction and limit idling of heavy equipment. EPA recommended limiting idling to less than five minutes.	Inspection and oversight by construction manager	Quarterly Report Annual Report	NRG
Greenhouse Gases	NRG must design and construct the Parish PCCS Project to capture at least 90 percent of the carbon in the fossil fuels when operating under normal conditions, and use best efforts to achieve at least a 90 percent capture rate during the demonstration period.	As required in the cooperative agreement	Quarterly Report	NRG
Geology	NRG must develop a CO_2 monitoring plan, in coordination with the Texas Bureau of Economic Geology (BEG) and DOE, to account for the CO_2 used for EOR and ultimately sequestered.	As required in the CO_2 monitoring plan and approved by the state of Texas and DOE.	Quarterly Report Reports identified in the CO_2 monitoring plan and which are submitted to agencies representing the state of Texas must also be submitted to DOE.	NRG

Resource Area	Mitigation	Monitoring	Reporting	Implementing Party
Surface Water	NRG must implement the additional mitigation measures, e.g., double silt fencing, identified by the TPWD in a March 20, 2012 letter when crossing or working near Ecologically Significant Stream Segments during pipeline construction.	Inspection and oversight by construction manager	Quarterly Report	NRG
Wetlands	NRG must implement the mitigation techniques described above and analyzed in the EIS, including but not limited to reducing the construction ROW width in wetland areas, use timber mats or low ground pressure equipment, and the use of HDD to cross sensitive areas. If compensatory wetland mitigation becomes necessary as part of any USACE permit, NRG shall implement additional mitigation as required and described in the permit(s).	Inspection and oversight by construction manager	Quarterly Report	NRG
Biological Resources	NRG must continue consultation with the Texas Parks and Wildlife Department (TPWD) to minimize potential impacts on state-listed mussel species at pipeline crossings at larger rivers. As described in the EIS, HDD methods shall be employed at these and other crossings, with appropriate actions taken to locate soil borings and temporary water intakes and discharges to minimize impacts to nearby mussel beds. If mussel relocations become necessary, NRG will coordinate its efforts with the TPWD. NRG must avoid ground disturbing activities during migratory bird nesting and breeding season to protect species protected by the Migratory Bird Treaty Act. If this is not practicable, a qualified biologist shall survey potentially affected areas prior to ground disturbing activities and determine the appropriate actions needed to avoid impacts. During the whooping crane migration period (late March to early April; and late October to mid-December), if whooping cranes are observed in areas planned for pipeline construction, NRG must temporarily suspend activities in those immediate areas until the cranes continue with migration. NRG, in coordination with DOE, must continue consultation with the	Inspection and oversight by construction manager	Quarterly Report	NRG

Resource Area	Mitigation	Monitoring	Reporting	Implementing Party
	TPWD and may request technical assistance from the USFWS if project changes require additional disturbance at new locations. This may occur if the currently proposed pipeline route needs to be altered or for other unforeseen areas of ground disturbance not included in the EIS. NRG must complete any additional surveys and identified mitigation prior to construction in those areas. NRG must revegetate disturbed areas using methods approved by the state of Texas and with coordination with land owners.			
Cultural Resources	NRG, in coordination with DOE, must continue consultation with the Texas Historical Commission (State Historical Preservation Office) for areas not previously surveyed for cultural resources. This may occur if the currently proposed pipeline route needs to be altered or for other unforeseen areas of ground disturbance not included in the EIS. NRG shall complete any additional surveys prior to construction in those areas.	Inspection and oversight by construction manager	Quarterly Report	NRG
Aesthetics	NRG must install down-shielded lighting for permanent light needs wherever possible.	Inspection and oversight by construction manager	Quarterly Report	NRG