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(1.08.09.13)

U.S. DEPARTMENT OF ENERGY
OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY
NEPA DETERMINATION

RECIPIENT: Research Triangle Institute **STATE:** NC

PROJECT TITLE: Intensified Water-Lean Solvent CO2 Capture System for Cement Flue Gas

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002252	DE-EE0009415	GFO-0009415-001	

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Policy 451.1), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:
Description:

A9 Information gathering, analysis, and dissemination	Information gathering (including, but not limited to, literature surveys, inventories, site visits, and audits), data analysis (including, but not limited to, computer modeling), document preparation (including, but not limited to, conceptual design, feasibility studies, and analytical energy supply and demand studies), and information dissemination (including, but not limited to, document publication and distribution, and classroom training and informational programs), but not including site characterization or environmental monitoring. (See also B3.1 of appendix B to this subpart.)
B3.6 Small-scale research and development, laboratory operations, and pilot projects	Siting, construction, modification, operation, and decommissioning of facilities for smallscale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.
B3.11 Outdoor tests and experiments on materials and equipment components	Outdoor tests and experiments for the development, quality assurance, or reliability of materials and equipment (including, but not limited to, weapon system components) under controlled conditions. Covered actions include, but are not limited to, burn tests (such as tests of electric cable fire resistance or the combustion characteristics of fuels), impact tests (such as pneumatic ejector tests using earthen embankments or concrete slabs designated and routinely used for that purpose), or drop, puncture, water-immersion, or thermal tests. Covered actions would not involve source, special nuclear, or byproduct materials, except encapsulated sources manufactured to applicable standards that contain source, special nuclear, or byproduct materials may be used for nondestructive actions such as detector/sensor development and testing and first responder field training.
B1.31 Installation or relocation of machinery and equipment	Installation or relocation and operation of machinery and equipment (including, but not limited to, laboratory equipment, electronic hardware, manufacturing machinery, maintenance equipment, and health and safety equipment), provided that uses of the installed or relocated items are consistent with the general missions of the receiving structure. Covered actions include modifications to an existing building, within or contiguous to a previously disturbed or developed area, that are necessary for equipment installation and relocation. Such modifications would not appreciably increase the footprint or height of the existing building or have the potential to cause significant changes to the type and magnitude of environmental impacts.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide funding to the Research Triangle Institute (RTI) to design, fabricate, and field test a highly efficient and cost-effective carbon dioxide (CO2) capture process for cement plants. Optimal packing configurations for a non-aqueous solvent (NAS) used in the absorber would be identified and the pilot-scale CO2 capture system would be designed, constructed, and evaluated at a cement plant host site. Project participants would also research commercially viable CO2 utilization solutions for the cement industry. The project would be completed over two Budget Periods (BPs) with a Go/No-Go Decision Point in between each BP. This NEPA Determination is applicable to both BPs.

RTI International in Research Triangle Park, NC would oversee the project. Project partners would be Oak Ridge National Laboratory (ORNL) in Knoxville, TN; Carbon Clean USA Inc. (CCUS) in Cumming, GA; CEMEX Construction Materials Pacific in Victorville, CA; and Petrak Industries , Inc. in Joliet, IL.

Development and design of the CO2 capture system would occur at RTI and ORNL with additional data supplied by CCUS. Absorber packing configurations would be tested and optimized for temperature distribution at ORNL. A small

set of CO2 capture runs with the solvent would occur with RTI's existing Bench-scale Gas Absorption System (BsGAS) where computer models would be used to optimize the intensified absorbers for cement flue gas capture. RTI would model the integration of the cement plant with the CO2 capture system. CCUS would oversee the design of the modular CO2 capture system.

Fabrication of the skid-mounted CO2 capture system would occur at Petrak Industries, Inc fabrication shop and would be shipped to CEMEX White Mountain Cement Plant in Victorville, CA for integration into the existing cement facility. In preparation for installation of the CO2 capture system at its cement plant, CEMEX would prepare the site for the outdoor CO2 capture system, which would include ducting the flue gas slipstream, preparing electrical signals and connections, and finalizing any necessary permit and corporate approvals. The electrical conduit currently in place on CEMEX property would be extended approximately 150 feet from existing equipment to the pilot system location and buried underground. A foundation pad of approximately 2500 square feet would be poured for the pilot system, which would be accessed using existing roads. RTI would lead installation activities. Once the skid mounted system is installed, the system would undergo initial testing to operate on water then on flue gas with the ultimate goal of at least 1,000 hours time-on-stream CO2 capture. The testing period is planned for approximately 10 months, after which the system would be decommissioned by CCUS and prepared for shipping for future testing in other projects. RTI would perform sample and data analysis, evaluate the cost and technical integration of the captured CO2 into concrete products to understand commercial viability, and conduct an environmental health and safety assessment of the commercial-scale modular CO2 capture process.

The CEMEX project site is outside of the 100-year floodplain and is not listed on the National Register of Historic Places. The U.S. Fish and Wildlife Service's Information for Planning and Consultation database (iPaC) shows three birds (California Condor, Least Bell's Vireo, Southwestern Willow Flycatcher), one reptile (Desert Tortoise), one amphibian (Arroyo Toad), and one fish (Mohave Tui Chub) as endangered or threatened species that have the potential to be in or around the project area. Considering all project activities would occur on already disturbed land within the CEMEX cement production facility that is not suitable habitat for these species, DOE has determined that this project will have no effect on any special status species of concern.

Project activities would involve the use and handling of hazardous materials (including non-aqueous solvent chemicals) and fabrication of the CO2 capture systems. Any risks associated with the handling of these materials would be mitigated through adherence to established health and safety policies and procedures. Protocols would include employee training, engineering controls, the use of personal protective equipment, monitoring, and internal assessments. Labs at all locations and enclosed structures at the CEMEX test site are equipped with local exhaust systems with fast air exchange rates to minimize worker exposure to emissions. Hazard and operability reviews would be conducted of the complete engineered system and integration design to identify hazards and mitigation strategies to be implemented in more detailed engineering. All waste products would be disposed of by licensed waste management service providers. RTI and its project partners would observe all applicable Federal, state, and local health, safety, and environmental regulations. The proposed 10 tons per day (tpd) CO2 capture pilot system testing at CEMEX would generate CO2 emissions from a natural gas boiler at approximately 1.56 tpd and amine emissions to the atmosphere at a rate of 10 kg per day while testing is in progress. Overall, the system is expected to have net negative CO2 emissions. An updated emissions permit would be required for the CEMEX Construction Materials Pacific, LLC Victorville cement production facility from the Mojave Desert Air Quality Management District.

Any work proposed to be conducted at a federal facility may be subject to additional NEPA review by the cognizant federal official and must meet the applicable health and safety requirements of the facility.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Advance Manufacturing Office
This NEPA determination does not require a tailored NEPA provision.
Review completed by Shaina Aguilar on 5/18/21.

FOR CATEGORICAL EXCLUSION DETERMINATIONS

The proposed action (or the part of the proposal defined in the Rationale above) fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D. To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous

substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects of the proposal.

The proposed action has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

The proposed action is categorically excluded from further NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By: Casey Strickland Date: 5/26/2021

NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

- [x] Field Office Manager review not required
- [ ] Field Office Manager review required

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____ Date: _____

Field Office Manager