

PMC-ND

(1.08.09.13)

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

**RECIPIENT:**C-Crete Technologies, LLC**STATE:** TX

PROJECT TITLE: Microwaving Graphene-Based Thermoset Polymers for Rapid, In-situ and Durable Multistage Zonal Isolation

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001945	DE-EE0008485	GFO-0008485-001	

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.

B3.15 Small-scale indoor research and development projects using nanoscale materials Siting, construction, modification, operation, and decommissioning of facilities for indoor small-scale research and development projects and small-scale pilot projects using nanoscale materials in accordance with applicable requirements (such as engineering, worker safety, procedural, and administrative regulations) necessary to ensure the containment of any hazardous materials. Construction and modification activities would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible).

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide federal funding to C-Crete Technologies, LLC (C-Crete) to develop microwavable, graphene-based, thermoset polymers for in-situ multistage zonal isolation of geothermal wells. Novel polymer composites and a downhole tool prototype would be developed. The project would be completed over two Budget Periods (BP), with a Go/No-Go Decision Point in between each BP.

BP2 Task 7 of the project would include scale-up of the technology and pilot testing involving drilling at a site that has not yet been selected. Information gathered from previous tasks, including technical and budgetary information, would inform site selection and how pilot testing would be completed during Task 7. Because this information is not yet available, this Task will be reviewed at a later date. Accordingly this review only covers BP1 activities and BP2 Tasks 1-6.

Proposed project activities under BP1 would include development of polymer packers, fabrication of a downhole tool prototype, and component characterization and analysis. Activities under BP2 would include performance testing under simulated Enhanced Geothermal Systems (EGS) conditions (e.g. sealing testing, permeability testing) and prototype optimization. All project activities would be completed by C-Crete and its project partner Baker Hughes at existing, purpose-built facilities that regularly conduct work similar in nature to that included as part of this project's scope of work. No change in the use, mission or operation of existing facilities would be required. C-Crete would

complete synthesis, characterization, and testing of polymer composites at its laboratory facility in Stafford, TX. Design, fabrication, and testing of the downhole tool would be completed by Baker Hughes at its manufacturing facility in Tomball, TX.

The project would involve the use and handling of industrial chemicals and solvents, as well as performance testing at high temperatures and pressures. Additionally, graphene nanoribbons would be used for the development of polymer packers. The nanoribbons are non-toxic and would be disposed of using a licensed waste management company. Inhalation risks associated with the handling of nanomaterials would be mitigated through training, ventilation via fume hoods, and the use of proper safety equipment. Risks associated with carrying out all other project activities would be mitigated through adherence to established health and safety policies and procedures. Protocols would include employee training, the use of personal protective equipment, engineering controls, monitoring, and internal assessments. Both C-Crete and Baker Hughes would observe all applicable Federal, State and local health, safety and environmental regulations.

NEPA PROVISION

DOE has made a conditional NEPA determination.

The NEPA Determination applies to the following Topic Areas, Budget Periods, and/or tasks:

[Budget Period 1](#)

[Budget Period 2 Tasks 1-6](#)

The NEPA Determination does not apply to the following Topic Area, Budget Periods, and/or tasks:

[Budget Period 2 Task 7](#)

Notes:

[Geothermal Technologies Office](#)

[This NEPA determination requires a tailored NEPA Provision.](#)

[NEPA review completed by Jonathan Hartman, 12/10/2018](#)

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.

A portion of the proposed action is categorically excluded from further NEPA review. The NEPA Provision identifies Topic Areas, Budget Periods, tasks, and/or subtasks that are subject to additional NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: _____



[Casey Strickland](#)

NEPA Compliance Officer

Date: 12/10/2018

FIELD OFFICE MANAGER DETERMINATION

- 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: _____
Field Office Manager

Date: _____