U.S. Department of Energy
Categorical Exclusion Determination Form

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Proposed Action Title: Converting Used Nuclear Fuel (UNF) Radioisotopes Into Energy (CURIE) Program (FOA No. DE-FOA-0002691 and DE-FOA-0002692)

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): AL, CA, CO, GA, ID, IL, MA, MI, NC, NM, NV, NY, OH, TN, TX, UT, VA, WA

Proposed Action Description:

FIRST AMENDED PROGRAMMATIC NEPA DETERMINATION (See attached original Programmatic Determination, dated December 16, 2022).The CURIE Program seeks to develop innovative technologies to reprocess used nuclear fuel (UNF) to recover reusable actinides and recycling them into new fuel for advanced reactors (AR) to improve fuel utilization and reduce the volume of waste requiring permanent disposal. Specifically, projects funded under the CURIE Program will develop innovative separation technologies, material accountancy of UNF, and online monitoring technologies, as well as designs for a reprocessing facility that will enable group recovery of actinides for AR feedstocks. If successful, CURIE projects will minimize waste volumes, enable a 1-cent per kilowatt hour fuel cost for AR fuels, maintain disposal costs of 0.1-cent per kilowatt hour, ultimately reducing the use of fossil fuels for energy generation and the production of greenhouse gases. The CURIE Program is composed of 12 small-scale research and development projects that will be conducted by universities, for-profit entities, and federal laboratories. This First Amended Determination adds 5 projects (See Attachment A for all 9 projects covered by this and the prior Determination). All 5 projects fit within the class of actions identified under the DOE Categorical Exclusions identified below and do not involve any extraordinary circumstances that may affect the significance of the environmental effects of the projects. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of each project. All prime recipients have certified that project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and Local regulatory requirements.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

B3.15 - Small-scale indoor research and development projects using nanoscale materials

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of 10 CFR Part 1021.

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

☑ The proposal 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 proposal that may affect the significance of the environmental effects of the proposal.

☑ The proposal 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.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: GEOFFREY GOODE Digitally signed by GEOFFREY GOODE Date: 2023.01.13 11:16:08 -05'00' Date Determined:

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Location(s) (City/County/State): CO, ID, IL, NM, NV, OH, UT, VA

Proposed Action Description:

The CURIE Program seeks to develop innovative technologies to reprocess used nuclear fuel (UNF) to recover reusable actinides and recycling them into new fuel for advanced reactors (AR) to improve fuel utilization and reduce the volume of waste requiring permanent disposal. Specifically, projects funded under the CURIE Program will develop innovative separation technologies, material accountancy of used nuclear fuel, and online monitoring technologies, as well as designs for a reprocessing facility that will enable group recovery of actinides for advanced reactor feedstocks. If successful, CURIE projects will minimize waste volumes, enable a 1-cent per kilowatt hour fuel cost for AR fuels, maintain disposal costs of 0.1-cent per kilowatt hour, ultimately reducing the use of fossil fuels for energy generation and the production of greenhouse gases.

The CURIE Program is composed of 12 small-scale research and development projects that will be conducted by universities, for-profit entities, and federal laboratories. This Determination covers 4 of the 12 projects (listed in Attachment A). All 4 projects fit within the class of actions identified under the DOE Categorical Exclusions identified below. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of each project. All project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and Local regulatory requirements.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

B3.15 - Small-scale indoor research and development projects using nanoscale materials

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of 10 CFR Part 1021.

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

☑ The proposal 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 proposal that may affect the significance of the environmental effects of the proposal.

☑ The proposal 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.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: GEOFFREY GOODE Digitally signed by GEOFFREY GOODE Date: 2022.12.16 14:16:06 -05'00' Date Determined:

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Attachment A: Projects in the CURIE (FOA No. DE-FOA-0002691 and DE-FOA-0002692) Program

Prime Recipient (Control No.)	Project Title	Categorical Exclusion
Electric Power Research Institute (2691-1549)	**Establishing an Advanced Reactor Fuel Cycle Enterprise**	**A9**
Argonne National Laboratory (2691-1536)	**Highly Efficient Electrochemical Oxide Reduction for U/TRU Recovery from LWR Fuel**	**A9; B3.6**
NuVision Engineering Inc. (2691-1515)	**Modular Power Fluidics and Online Optical Spectroscopy for Reprocessing Plant Control and Accountancy**	**A9; B3.6**
University of North Texas (2691-1516)	**Self-Powered Wireless Hybrid Density-Level Sensing with Differential Pressure Sensors for Safeguarding and Monitoring of Electrochemical Processing of Nuclear Spent Fuel**	**A9; B3.6**
University of Alabama at Birmingham (2691-1508)	**Group Hexavalent Actinide Separation: A Single-Step, Proliferation-Resistant Approach to Nuclear Fuel Reprocessing**	**A9; B3.6**
Argonne National Laboratory (2691-1517)	Radioisotope Capture Intensification Using Rotating Packed Bed Contactors	A9; B3.6
University of Colorado – Boulder (2691-1518)	Achieving 1 % Assay of Special Nuclear Materials in 2 Minutes with Microcalorimeter-Array Gamma-Ray Spectroscopy	A9; B3.6
University of Utah (2691-1521)	Pyrochemical Dissolution of LWR Spent Fuel with Actinide Recovery for Advanced Reactors	A9; B3.6
Mainstream Engineering Corporation (2692-1515)	Improved Volatile and Semi-volatile Radionuclide Off-Gas Management	A9; B3.6; B3.15

Bold text indicates the five projects added in the First Amended CX.