

**U.S. Department of Energy-Idaho Operations Office  
National Environmental Policy Act  
Categorical Exclusion Determination**

**Project Title:** Supply of Materials for Prototypic Fabrication Development and Advanced Irradiation Testing (Lightbridge)

**Project Description and Purpose:**

The Idaho National Laboratory (INL) will support the testing of advanced nuclear fuel developed by Lightbridge Corporation. The project involves designing, fabricating, shipping, irradiating, and examining small experimental fuel samples to evaluate their performance under conditions similar to those in commercial nuclear power reactors. INL will serve as the lead organization for this work, with Lightbridge Corporation as the primary industry partner. Irradiation testing will be conducted at the Atomic Alchemy demonstration reactor, an off-site private facility. INL will also coordinate with project partners, including Atomic Alchemy and Oklo, to support safe transportation and testing activities. The purpose of this project is to obtain real-world performance data on an advanced nuclear fuel design. Testing under controlled reactor conditions is required before new fuel designs can be licensed for use in commercial nuclear power plants. The data generated will support the development of safer, more efficient nuclear fuels that could improve the performance of existing reactors and support future small modular reactors. These advancements contribute to clean energy generation, energy security, and scientific understanding of nuclear fuel behavior.

**Task 1: Planning and Quality Assurance:**

The INL will perform project planning and quality assurance activities to ensure all work is conducted in accordance with established INL nuclear safety, security, and quality requirements. This includes reviewing and maintaining project procedures and documentation.

**Task 2: Experimental Design Determination:**

The INL, in coordination with Lightbridge Corporation and Atomic Alchemy, will determine the appropriate design and configuration for the fuel irradiation experiment. Atomic Alchemy will provide information on the capabilities and requirements of the demonstration reactor to support this determination.

**Task 3: Experimental Design:**

The INL will perform detailed design activities for the fuel irradiation experiment based on the agreed-upon configuration. Lightbridge Corporation and Atomic Alchemy will participate in technical discussions as needed to support the design effort.

**Task 4: Fuel Fabrication and Material Provision:**

The INL will fabricate small experimental fuel samples at existing laboratory facilities using uranium and zirconium materials provided under Department of Energy authorization. All material handling and fabrication activities will be conducted using existing equipment and approved procedures. The fabrication and assembly will occur at the Experimental Fuels Facility (EFF) and Advanced Fuels Facility (AFF) at the Materials and Fuels Complex (MFC)

**Task 5: Shipment of Fresh Fuel:**

The INL will package up to 10 samples and support the shipment of fresh Lightbridge fuel samples from INL to the Atomic Alchemy demonstration reactor using approved transportation containers. INL will perform the required engineering and safety analyses to ensure compliance with applicable transportation regulations.

**Task 6: Irradiation Testing:**

Atomic Alchemy will conduct irradiation testing of the fuel samples within its demonstration reactor at an off-site private facility. Oklo will participate as a partner in the reactor demonstration project. Irradiation activities will take place indoors and within existing, authorized reactor facilities.

**Task 7: Shipment of Irradiated Fuel:**

The INL will support the safe shipment of irradiated fuel samples from the Atomic Alchemy demonstration reactor back to INL using approved transportation methods and containers.

**Task 8: Post-Irradiation Examination:**

The INL will perform post-irradiation examination of the tested fuel in shielded hot-cell facilities at the Hot Fuels Examination Facility.

**Task 9: Material Disposition:**

INL will manage the final disposition of project materials, including storage and return to inventory, in accordance with Department of Energy and INL requirements, and will store the samples for a predetermined period of five years until Lightbridge approves disposal.

Waste generated during this project is expected to include approximately 1 lb of industrial waste consisting of metals and other solid materials and approximately 5 lbs of PPE and wipes. Experiment disassembly and post-irradiation examination (PIE) activities will create relatively small amounts of low-level radioactive waste (LLW) for disposal. Cutting, slicing, grinding, and polishing operations will generate small volumes of remote-handled LLW, and project transuranic (TRU) waste volume is projected to be less than 1 m<sup>3</sup>. All waste streams, including industrial, LLW, remote-handled LLW, and TRU waste, will be characterized and managed in accordance with applicable DOE, INL, and facility-specific requirements, with assistance from Waste Generator Services. The PIE related waste will be generated at HFEF and assembly and fabrication related waste will be at EFF and AFF.

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**Environmental Aspects or Potential Sources of Impact:**

**Air Emissions**

Radionuclide emissions are expected from the fuel experiment manufacturing, as well as the post irradiation examination conducted at the MFC facilities.

**Discharging to Surface-, Storm-, or Ground Water**

NA

**Disturbing Cultural or Biological Resources**

CULTURAL RESOURCES: Pursuant to 2023 Programmatic Agreement as amended in 2025, this federal undertaking is excluded from project-specific Section 106 consultation. The proposed activity results in no historic properties affected.

**Generating and Managing Waste**

When wastes are generated, how they are disposed can adversely affect the environment. Managing wastes appropriately and responsibly and implementing recycling or reuse practices, where feasible, during project activities can reduce the potential impact on the environment.

**Releasing Contaminants**

When chemicals are used during the project there is the potential for spills that could impact the environment (air, water, soil).

**Using, Reusing, and Conserving Natural Resources**

NA

**Determination:**

For Categorical Exclusions (CXs), the proposed action must not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environmental, safety, and health, or similar requirements of Department of Energy (DOE) or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment or facilities; (3) disturb hazardous substances, pollutants, contaminants, or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources (see 10 CFR 1021); (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, Appendix B. The proposal has not been segmented to meet the definition of a categorical exclusion. Segmentation can occur when a proposal is broken down into small parts in order to avoid the appearance of significance of the total action. However, segmentation does not include proposals that are developed and potentially implemented over multiple phases where each phase results in a decision whether to proceed to the subsequent phase. There is no extraordinary circumstance related to the proposal that is likely to cause a reasonably foreseeable significant adverse effect or for which DOE does not know the environmental effect. Extraordinary circumstances are unique situations presented by specific proposals, including, but not limited to, scientific controversy about the environmental effects of the proposal; uncertain effects or effects involving unique or unknown risks; and unresolved conflicts concerning alternative uses of available resources.

**References:**

B3.6 Small-scale research and development, laboratory operations, and pilot projects. Siting, construction, modification, operation, and decommissioning of facilities for small-scale 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.

NEPA coverage for the transportation and disposal of waste to WIPP are found in the Final Waste Management Programmatic Environmental Impact Statement [WM PEIS] (DOE/EIS-0200-F, May 1997) and Waste Isolation Plant Disposal Phase Supplemental EIS (SEIS-II) (DOE/EIS-0026-S-2, Sept. 1997), respectively. The 1990 ROD also stated that a more detailed analysis of the impacts of processing and handling TRU waste at the generator-storage facilities would be conducted. The Department has analyzed TRU waste management activities in the Final Waste Management Programmatic Environmental Impact Statement (WM PEIS) (DOE/EIS-200-F, May 1997). The WM PEIS analyzes environmental impacts at the

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potential locations of treatment and storage sites for TRU waste; SEIS-II addresses impacts associated with alternative treatment methods, the disposal of TRU waste at WIPP and alternatives to that disposal, and the transportation to WIPP.

The environmental impacts of transferring LLW from the INL Site to the Nevada National Security Site were analyzed in the 2014 Final Site-Wide Environmental Impact Statement for the Continued Operation of the Department of Energy/National Nuclear Security Administration Nevada National Security Site and Off-Site Locations in the State of Nevada (DOE/EIS-0426) and DOE's Waste Management Programmatic EIS (DOE/EIS-200). The fourth Record of Decision (ROD) (65 FR 10061, February 25, 2000) for DOE's Waste Management Programmatic EIS established the Nevada National Security Site as one of two regional LLW and MLLW disposal sites.

The proposal fits within the classes of actions listed in Appendix B to 10 CFR Part 1021 or Appendix B and C of DOE's NEPA Implementing Procedures and satisfies the conditions that are integral elements of the classes of actions therein. The proposal does 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, 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, Appendix B.

There is no extraordinary circumstance related to the proposal that is likely to cause a reasonably foreseeable significant adverse effect or for which DOE does not know the environmental effect. Extraordinary circumstances are unique situations presented by specific proposals, including, but not limited to, scientific controversy about the environmental effects of the proposal; uncertain effects or effects involving unique or unknown risks; and unresolved conflicts concerning alternative uses of available resources.

The proposal has not been segmented to meet the definition of a categorical exclusion. Segmentation can occur when a proposal is broken down into small parts in order to avoid the appearance of significance of the total action. However, segmentation does not include proposals that are developed and potentially implemented over multiple phases where each phase results in a decision whether to proceed to the subsequent phase.

Based on my review of the proposed action, 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.

Approved by Robert Douglas Herzog, DOE-ID NEPA Compliance Officer on: 4/14/2026