



Department of Energy

Idaho Operations Office

1955 Fremont Avenue
Idaho Falls, ID 83415

May 13, 2025

Subject: U.S. DEPARTMENT OF ENERGY PROPOSED FINDING OF NO SIGNIFICANT IMPACT FOR THE ENVIRONMENTAL ASSESSMENT FOR THE DEMONSTRATION OF MICROREACTOR EXPERIMENT (DOME) TEST BED OPERATIONS (DOE/EA-2268) (CLN250643)

Agency: U.S. Department of Energy

Action: Proposed Finding of No Significant Impact (FONSI)

Summary: The U.S. Department of Energy (DOE) prepared an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with the operation of the Demonstration of Microreactor Experiments (DOME) test bed facility to accommodate testing of advanced nuclear reactor designs at the Materials and Fuels Complex (MFC) at the Idaho National Laboratory (INL) Site.

The National Reactor Innovation Center (NRIC) Program, sponsored by the DOE Office of Nuclear Energy (DOE-NE) and headquartered at INL, supports the testing and validation of private sector nuclear reactor designs. NRIC aims to resolve technical challenges, improve innovative technologies, and provide access to the U.S. national laboratory system's resources. Under DOE's Advanced Reactor Demonstration Program (ARDP), public-private cost-sharing projects aim to deploy reliable, cost-effective, and licensable advanced reactors. NRIC plays a crucial role by offering test bed facilities for innovative reactor designs and is developing advanced reactor experiment capabilities in the refurbished former Experimental Breeder Reactor (EBR)-II facility at MFC, now the NRIC DOME test bed. The DOME test bed facility would support advanced reactor projects up to 20-megawatt thermal (MWth) and is essential for advancing these zero-emission nuclear energy technologies.

Based on the impact analysis of the proposed action, any potential impact associated with these activities would not significantly affect the quality of the human environment. Reactor developers can propose experiments at the DOME test bed, subject to DOE's final authorization. Proposals would be evaluated based on reactor type, technology maturity, fuel type, industry experience, company profile, funding viability, and alignment with the proposed plant parameter envelope.

DOE-NE also analyzed a "No Action" alternative in the EA. Under the no action alternative, DOE-NE would not site advanced nuclear reactors in the DOME test bed or perform associated experimentation. The consequences of the no-action alternative serve as a baseline, enabling decision makers to compare the magnitude of environmental effects of the proposed action alternative. The project area would be available for other uses.

Purpose and Need: The DOE-NE mission is to advance the nuclear energy science and technology and to meet U.S. energy, environmental, and economic needs. Many advanced nuclear reactor conceptual designs under development in the U.S. anticipate commercial deployment within the next decade. To advance the deployment of this advanced nuclear reactor technology, DOE-NE needs to resolve technical challenges by evaluating reactor designs and better enable reactor developers to integrate this technology into end-user applications for broad deployment and use.

The purpose of the operational activities within the DOME test bed is to address technical and regulatory topics associated with advanced nuclear reactor technology by integrating and operating privately developed reactor experiments in a controlled test environment. Operational activities within the DOME test bed would be used to increase the knowledge level of key phenomena that are essential to the successful Nuclear Regulatory Commission licensing of advanced reactor technologies.

Analysis: To determine whether the Proposed Action could cause significant environmental effects, the EA analyzed the potential impacts of the proposal on human and natural resources and presented them in Section 3, "Affected Environment and Environmental Consequences." The following discussion provides a summary of the Proposed Action's potential impacts and the reasons these impacts would not be significant.

Air Quality

Reactor projects sited in the DOME test bed would produce minor amounts of air emissions. Transport of these emissions would produce negligible ambient air pollutant concentrations at offsite locations. Therefore, any minor increase in offsite air pollutant concentrations produced from DOME test bed operations, in combination with emissions from other past, present and reasonably foreseeable future actions, including future demonstration reactor projects would result in air pollutant concentrations that would not exceed the state and National Ambient Air Quality Standards and would not substantially contribute to cumulative air quality impacts. Radioactive air emissions would result in negligible dose impacts to collocated workers and offsite members of the public. Any potential direct, indirect, or cumulative impacts to air quality from DOME test bed operations would be considered low.

Ecological Resources

There is potential for the DOME test bed activities to impact various wildlife species both directly and indirectly during transportation, installation, and operation activities. The loss of protected or sensitive species or loss of local populations from direct mortality or diminished survivorship is not anticipated. Regulatory and planning controls used for installation and facility operations on the INL Site can greatly reduce any of the potential impacts to ecological resources discussed in Section 3.4. No negative dose impacts to biota are expected. Therefore, any potential impact to ecological resources from radiological air emissions would be negligible to low. Cumulative impacts to ecological resources of the DOME test bed when added to past, present, and reasonably foreseeable actions at the INL Site would be low.

Cultural and Historic Resources

At this time, Section 106 review cannot be completed until an application is received for a reactor experiment in the DOME test bed. When user applications are received, DOE would evaluate how the proposed experiment activities fall within the parameters of this EA, and a concurrent Section 106 review would be conducted. The outcome of the Section 106 review would help inform the evaluation. Although there are historic properties within the affected environment for these activities, it is anticipated that a majority, if not all, of these actions would result in no historic properties affected determination.

Geology and Soils

The DOME test bed is an existing facility. The proposed action limits ground disturbance to previously disturbed areas within the MFC fence; therefore, there are no anticipated impacts to geological or soil resources. Potential impacts due to seismic activity are not expected. Therefore, no cumulative impacts to geologic or soil resources from other past, present, and reasonably foreseeable future actions are expected.

Infrastructure

Reactor operations, shielding, and office use would result in a small increase in water consumption, but would not affect the ability of the system to provide an adequate supply to meet the requirements of existing personnel, process, and fire protection purposes. Any potential impacts to water consumption at the INL Site would be small. When combined with the total amount of water estimated to be used per year for DOME test bed operations, in combination with ongoing INL Site activities and proposed construction of the High Temperature Test Facility (HTTF), cumulative water use would amount to about 0.09 percent of the INL Site's Federal Reserved Water Right of 11.4 billion gallons per year. The cumulative impacts to water use from operating the DOME test bed would be small.

The small increase in effluent to the sanitary sewer system from new employees would not affect the ability of the system to perform as currently designed. Any potential impacts to the sanitary sewer system at MFC would be low.

Based on the expected fuel use quantities any potential impact would be considered negligible.

It is anticipated that operations within the DOME test bed would have negligible to low impacts on current INL Site infrastructure. Direct and indirect impacts would be nearly indiscernible from current operations when combined with past, present, and reasonably foreseeable future actions. Any cumulative impacts are expected to be low.

Waste Management

The projected amount of waste to be generated would be within the current capacities of either onsite or offsite waste storage facilities. All waste generated during DOME test bed operations is expected to have a clear and accepted disposition pathway with little uncertainty, and the

additional amounts contributed from integration, operations, and decommissioning would have a negligible direct or indirect impact on onsite or offsite storage facilities. All waste management activities would comply with federal, state, and local statutes and regulations. Therefore, any potential impacts would be temporary in nature from current operations and low when combined with past, present, and reasonably foreseeable future actions. The proposed action would not generate transuranic or high-level waste.

Irradiated Fuel

DOE reactors would need to be defueled and deconstructed to facilitate disposal of project components. The irradiated fuel, which may remain under DOE's ownership following reactor experimentation, will have significant value for future advanced reactor fuel or advanced fuel cycle R&D material. As such, it is proposed that these materials be managed and stored for future programmatic use at an appropriate INL storage facility. If the material should be determined to no longer have programmatic value (either as TRISO fuel or advanced fuel cycle R&D material), then the DOE waste determination process would be invoked, and the material would be managed accordingly and stored in a compliant manner while awaiting final disposition.

An initial plan for the management of post-irradiated fuel from the DOME experimental reactors has been developed and identifies that the reactors and fuel will be removed from DOME, stored temporarily at the Radioactive Scrap and Waste Facility (RSWF), defueled, identified post irradiation examinations (PIE) performed, returned to temporary storage, have a fuel determination, and disposed of as spent nuclear fuel (SNF) if it is determined as SNF.

Irradiated materials reserved for PIE would be stored with other similar DOE-irradiated materials and experiments at MFC, most likely in the Hot Fuel Examination Facility or the RSWF, in accordance with DOE's Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement (DOE, 1995a), Record of Decision (DOE, 1995b), supplemental analyses, and the Amended Record of Decision (DOE, 1996). Ultimate disposal of the irradiated materials that have been declared waste would be in accordance with similar DOE-owned irradiated materials and experiments currently at MFC.

The specific quantity of nuclear fuel needed for an individual reactor project is unknown. However, based on the nuclear fuel needs for similar advanced nuclear technology projects, DOE anticipates about 0.52 metric tons of fuel would be needed for an individual project sited in the DOME test bed with a total of 10.4 metric tons over the 20-year lifetime of operations within the DOME test bed. Even if this entire amount was designated as SNF, this would be about 3.2 percent of the total current SNF inventory, and the impacts are anticipated to be negligible.

Health and Safety

The average dose to the individual worker (involved worker) and the cumulative dose to all INL Site workers (total workers) would be below the radiological regulatory limits of 10 CFR § 835.

Potential impacts to workers and public health and safety from direct radiation and radiological emissions are expected to be low.

Due to the distance between the DOME test bed and the nearest public receptor, potential impacts to the public from the use of hazardous materials or operations is not expected. Potential impacts would be negligible.

Existing low-population exposures to humans from radiation resulting from a hypothetical accident, when considering the containment structure and reactor vessel retention within the DOME test bed, would be low.

Intentional Destructive Acts

The potential for an intentional destructive act to occur—including its exact nature, location, and consequential magnitude—is inherently uncertain. However, DOME test bed operations would be performed within a protected area, under a high level of security at MFC. If an intentional destructive act involving the DOME test bed occurred, the potential consequences would be dependent on the amount of fissile material in those facilities at the time of the event and would be similar to the maximum reasonably foreseeable accident.

Cumulative Impacts

The quantitative and qualitative impacts to the critical resource areas from implementing the proposed action were individually insignificant. Additive impacts from implementing the proposed action to those manifested from past, present, or reasonably foreseeable future projects or programs on and adjacent to the INL were evaluated and determined to be insignificant.

EA Public Participation

The 30-day public comment period for the Draft EA for the DOME test bed operations ended on November 7, 2024. DOE extended the public comment period for an additional 14 days to November 21, 2024. DOE received and considered four individual public comments. DOE provided responses to comments on a comment-by-comment basis and those are captured in Appendix A of the Final EA.

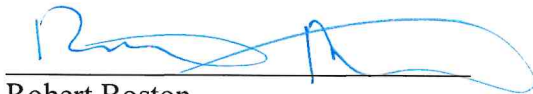
EA Coordination and Consultation:

- DOE briefed the Shoshone-Bannock Department of Energy Tribal staff and the Fort Hall Business Council on the DOME test bed's operations on September 25, 2024.
- DOE briefed staff from the Idaho Governor's Office of Energy and Mineral Resources on the HTTF EA and project on September 30, 2024.

Determination: Based on its analysis and public comments received on the EA, DOE has determined that the Proposed Action to implement the DOME test bed operations is not a major federal action significantly affecting the quality of the human environment, within the meaning of the National Environmental Policy Act of 1969 (42 United States Code [USC] 4321 *et seq.*).¹ Therefore, the preparation of an environmental impact statement is not required, and DOE is issuing this FONSI for the Proposed Action.

Mitigation is not necessary to render the impacts of this action not significant.

Issued at Idaho Falls, Idaho on this 13th day of May 2025.



Robert Boston
Manager

Copies of the EA and Proposed FONSI are available from: Danielle Miller, Office of Communications, Idaho Operations Office, U.S. Department of Energy, 1955 Fremont Avenue, Idaho Falls, ID 83415, or by calling 208-526-5709.

For further information on the NEPA process contact: Jason Anderson, NEPA Compliance Officer, U.S. Department of Energy, 1955 Fremont Avenue, Idaho Falls, ID 83415, or by email at domeea@id.doe.gov.

¹ DOE is aware that the Council on Environmental Quality (CEQ), on February 25, 2025, issued an interim final rule to remove its NEPA implementing regulations at 40 C.F.R. Parts 1500–1508. Based on CEQ guidance, and to promote completion of its NEPA review in a timely manner and without delay, in this EA DOE is voluntarily relying on the CEQ regulations, in addition to DOE's own regulations implementing NEPA at 10 C.F.R. Part 1021, to meet its obligations under NEPA, 42 U.S.C. §§ 4321 *et seq.*"