



## Department of Energy

### Idaho Operations Office

1955 Fremont Avenue  
Idaho Falls, ID 83415

**Subject:** U.S. DEPARTMENT OF ENERGY PROPOSED FINDING OF NO SIGNIFICANT IMPACT FOR THE ENVIRONMENTAL ASSESSMENT FOR THE MOLTEN CHLORIDE REACTOR EXPERIMENT PROJECT AT IDAHO NATIONAL LABORATORY

**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 potential impacts of the design, construction, and operation of the liquid-fueled, fast-spectrum, chloride salt-fueled Molten Chloride Reactor Experiment (MCRE) in the National Reactor Innovation Center Laboratory for Operation and Testing in the United States (LOTUS) testbed at Idaho National Laboratory (INL).

In 2020, DOE announced an award to Southern Company Services, which would fund the advancement of the TerraPower, LLC Molten Chloride Fast Reactor (MCFR) technology through the design, construction, and operations testing of MCRE. The primary objective of the MCRE project is to reduce the technical, licensing, and operational/human factors risks of the MCFR technology. MCRE will have a power level of approximately 200 kW thermal, will be cooled with an inert gas, and will use a eutectic mixture of sodium chloride and uranium trichloride fuel salt. Once started up, MCRE will be the first critical fast-spectrum circulating fuel system. MCRE will not have power conversion equipment and will be tested for approximately six months and will then be decommissioned. DOE will support the MCRE project by performing the following activities: (1) supporting the design and fabrication, (2) installing MCRE in the LOTUS testbed, (3) developing and synthesizing fuel salt, (4) operating the MCRE, and (5) decommissioning MCRE.

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. Implementation of the proposed action supports the DOE mission objective to advance nuclear power as a resource capable of meeting the nation's energy, environmental, and national security needs.

A "No Action" alternative analysis was performed for MCRE in the EA. Under this analysis, existing operations and activities at INL would continue, and the MCRE project would not be implemented. INL would continue to pursue other opportunities to demonstrate and test private sector reactor designs. Not demonstrating MCRE would limit DOE's ability to ensure the availability of a diverse portfolio of advanced reactor designs to support the energy needs of the

future. This would also negatively impact the licensing and deployment of the commercial MCFR design.

**Purpose and Need:** The primary mission of DOE's Office of Nuclear Energy is to advance nuclear power as a resource capable of meeting the nation's energy, environmental, and national security needs by resolving technical, cost, safety, security, and proliferation resistance through research, development, and demonstration. Advanced nuclear energy concepts under development in the United States anticipate commercial deployment as soon as this decade. To prepare, DOE must resolve technical challenges, develop experimental infrastructure to enable testing and demonstration, and enable advanced nuclear energy concepts integration into end-user applications for broad commercial deployment and use as well as for public safety.

The purpose of the MCRE project is to address technical and regulatory topics associated with the MCFR technology by designing, constructing, and operating a fueled experiment to generate data required for development of a commercial design. The MCRE project will be used to increase the knowledge of key phenomena that are essential to successfully licensing reactors based on MCFR technology through the Nuclear Regulatory Commission.

**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**

Impacts to air quality would not be significant.

- No direct emissions from the fission products during normal reactor operations because of the inert cover gas.
- The estimated  $2.4 \times 10^{-3}$  mrem/year dose to a member of the public is significantly less than both the 10 mrem/year regulatory standard and the minor source threshold of 0.1 mrem/year.
- The estimated potential dose to a co-located worker of  $7.62 \times 10^{-2}$  mrem/year is significantly less than the 5,000 mrem/year regulatory dose standard.
- Emission of criteria air pollutants and greenhouse gases from the proposed activities are not expected to substantially increase emissions from the INL Site.

### **Ecological Resources**

Impacts to ecological resources would not be significant.

- The proposed project would occur entirely within existing facilities at INL. There would be no change in the sensitive species populations or habitat, in the movement of native resident or migratory wildlife species, or existing habitat conservation plans.

## **Cultural Resources**

Impacts to cultural resources would not be significant.

- The integration, operations, and decommissioning of MCRE at INL would have no effect on historic properties.

## **Geological Resources**

Impacts to geological resources would not be significant.

- There would be no change to existing land use nor would substantial soil erosion or loss of topsoil occur because ground disturbing activities are not expected.
- Potential impacts due to seismic activity are not expected as the LOTUS testbed will be designed per DOE-STD-1020 and American Society of Civil Engineers Standard 4-16.

## **Site Infrastructure**

Impacts to site infrastructure and utilities would not be significant.

- Potential increases in electricity, fuel (for equipment), water, and facility wastewater would be indiscernible from existing usage at the INL Site.

## **Waste Management**

Impacts to waste management processes would not be significant.

- The estimated 332 m<sup>3</sup> of low-level waste generated from project activities would not significantly alter existing waste management processes at INL or result in the construction of new or expanded onsite or offsite radioactive waste disposal facilities. No mixed low-level waste or transuranic waste would be generated from project activities.
- All waste generated from project activities would have an established disposition pathway.

## **Transportation**

Impacts to transportation would not be significant.

- Any potential increase in commuters would not substantially change the existing traffic to and from the INL Site.
- There would not be significant hazard to the public or the environment through the transport of hazardous materials to and from the INL Site.

## **Worker and Public Health and Safety**

Impacts to health and safety of workers or the public would not be significant.

- The estimated  $2.4 \times 10^{-3}$  mrem/year dose to a member of the public is significantly less than both the 10 mrem/year regulatory standard and the minor source threshold of 0.1 mrem/year.
- The estimated potential dose to a co-located worker of  $7.62 \times 10^{-2}$  mrem/year is significantly less than the 5,000 mrem/year regulatory dose standard.
- The estimated total effective dose to INL Site workers from project activities is within the 700 mrem/year administrative control level for INL workers.
- There would not be a change in the level of risk to site workers. Continued use of existing occupational health and safety programs will ensure that industry-specific standards are met.
- There would not be a significant hazard to the public or the environment in the event of a facility accident. Existing low-population exposures to humans from radiation for a hypothetical accident would be indiscernible from existing conditions.
- There would not be a change to the existing emergency management systems at INL.

## **Environmental Justice**

Impacts to environmental justice would not be significant.

- There would not be a change in the socioeconomics, tribal or cultural resources, or access to natural resources affecting the environmental justice disadvantaged communities.

## **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 INL were evaluated and determined to be insignificant.

## **EA Public Participation**

The initial comment period for the Draft EA for the MCRE Project ended on March 31, 2023. DOE extended the comment period to April 14, 2023, in response to extension requests. DOE received and considered the forty-five comments that were received during the public comment period. Most of the comments focused on the following: (1) the experimental value of a molten salt reactor, (2) the public comment period, (3) the aquifer, (4) safety, (5) use of tax dollars, and (6) legacy waste. Many commentors expressed their general opposition or support for DOE's action. Comments focusing on activities, such as past business practices; perceived mismanagement, fraud, waste, and abuse; and ethical responsibility, were noted but no further responses were prepared as they are outside the scope of the EA. 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 staff from the Idaho Office of Energy and Mineral Resources on the MCRE project on March 8, 2023.
- DOE briefed the Shoshone-Bannock Tribal staff and Fort Hall Business Council on the MCRE EA and project on April 3, 2023.
- DOE briefed staff from the Idaho Department of Environmental Quality on the MCRE project on June 21, 2023.

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

**Determination:** Based on its analysis and public comments received in the EA, DOE has determined that the Proposed Action to implement the MCRE project 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.). Therefore, the preparation of an environmental impact statement is not required, and DOE is issuing this FONSI for the Proposed Action.

Issued at Idaho Falls, Idaho on this 31<sup>st</sup> day of July 2023.

  
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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 calling (208) 526-0174.