

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

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Categorical Exclusion Posting No.: DOE-ID-INL-24-071 R1

Project Title: Versatile Autonomous Lightweight Kilowatt-class Reactor Experiment (VALKRE) R1

Project Description and Purpose:

Revision 1:

This revision includes modification to the Year 1 scope and involves building a reactor experiment set up and gathering data. In Year 1, a non-radiological mockup of the experiment will be built at Idaho National Laboratory (INL) in the Microreactor Agile Non-Nuclear Experimental Test Bed (MAGNET) facility at the Energy Systems Laboratory (ESL). This experiment involves electrically heating the system, exercising the key components of the system, and taking various measurements (such as temperature).

No waste will be associated with this revision.

Equipment purchases will include hardware and various components, which will remain at INL for future use.

Original :

This Idaho National Laboratory (INL) project involves working to assemble use cases and user requirements for a High-Assay Low-Enriched Uranium (HALEU), solid moderator, kilowatt class nuclear reactor, and then designing, procuring, and testing a First-of-a-Kind, minimum viable reactor protoboard experiment to gather valuable neutronics performance measurements of metal hydride moderators.

INL will review and validation of use cases, a technical report, along with modeling and simulation. No waste or air emissions will be associated with this project. The INL portion of the Year 1 task will take at IF-654.

This ECP covers funded tasks in Year 1 only, not including equipment purchases. A revision of this ECP will be required for equipment purchases if a decision from the Go/No-Criteria is to move forward to Year 2 tasks.

Tasks in Years 2 and 3 will require a review/revision of this ECP, prior to funding these tasks.

Year 1 Scope of Work:

- Analysis of use cases, this includes creating an integrated product team (IPT) to collect use cases. The IPT team participates in structured wargaming exercises to validate the use cases. Modeling and simulation include high-fidelity predictive modeling of temperature extremes, cooling, stress/strain on components, and nuclear safety at various power levels during normal and off-normal operating environments of the reactor design.
- Designing a modified version of the kilowatt-class reactor to meet requirements, and
- Material selection (This does not include acquisition, this will require a revision of this ECP prior to purchase).

Year 1 Tasks:

Task 1.1: Project Team collects, analyzes, and facilitates review and approval by independent expert reviewers of use cases for:

- size, weight, and power limits
- timescales for mobilization and demobilization
- risk and vulnerability against selected external threats
- specialist workforce availability at remote locations

Task 1.2: Project Team develops a modified design of the kilowatt class reactor that meets the needs and presents results in the form a breadboard-level design document including:

- Results of modeling and simulations
- Initial plan for the reactor physics experiment
- National Environmental Policy Act (NEPA) and authorization strategy for the VALKRE experiment

Task 1.3: Project Team finalizes selection of materials and initiates critical material procurement schedules and cost estimates for the reactor protoboard experiment documented in a fabrication plan independently reviewed by experts.

Task 1.4: Project Team will document Year 1 activities in an annual report.

Year 1 Go/No-Go Criteria:

Successful completion of independently reviewed and approved Year 1 tasks

- Delivery of annual technical report
- Determination of favorable feasibility and risk profile of the design solution based on results of Tasks 1.1, 1.2, and 1.3
- Years 2 and 3 (not covered by this ECP) will focus on the procurement, testing and start-up for a reactor that will be located at the INL facility, Demonstration and Operation of Microreactor Experiments (DOME) Test Bed.

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All off-site partners will comply with their local procedures and state/federal regulations as identified in contract agreements.

Environmental Aspects or Potential Sources of Impact:

Air Emissions

NA

Discharging to Surface-, Storm-, or Ground Water

NA

Disturbing Cultural or Biological Resources

Rev 0-1: Cultural: Pursuant to the 2023 Programmatic Agreement, the proposed action does not meet the threshold of a federal undertaking and there is no effect to historic properties.

Generating and Managing Waste

Rev 0-1: Waste will not be generated in association with Year 1 tasks.

Releasing Contaminants

NA

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"

Justification: For the DOE procedures regarding categorical exclusions, including the full text of each categorical exclusion, see 10 CFR 1021.102 and Appendix B to 10 CFR Part 1021, and also Section 5.4 (Applying one or more categorical exclusions to a proposal) and Appendices B and C of DOE's National Environmental Policy Act Implementing Procedures (June 30, 2025). Requirements and guidance in 10 CFR 1021.102 and DOE's NEPA Implementing Procedures: (See full text in regulation and in Implementing Procedures)

The proposal fits within a class of actions that is listed in Appendix B to 10 CFR Part 1021 or Appendix B and C of DOE's NEPA Implementing Procedures (June 30, 2025). To fit within the classes of actions listed in Appendix B to 10 CFR Part 1021, or Appendix B of DOE's NEPA Implementing Procedures, a proposal must satisfy the conditions that are integral elements of the classes of actions in Appendix B of both 10 CFR Part 1021 and DOE's NEPA Implementing Procedures.

There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal. DOE or an applicant may modify the proposal to avoid reasonably foreseeable adverse significant effects such that the categorical exclusion would apply.

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The proposal has not been segmented to meet the definition of a categorical exclusion.

[Note: For proposals that fit within the categorical exclusions listed in Appendix C of DOE's NEPA Implementing Procedures, see DOE's notice of adoption for the subject Appendix C categorical exclusion for additional considerations. DOE notices of adoption for other agency categorical exclusions may be found on DOE's Section 109 webpage.]

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.

Approved by Robert Herzog, DOE-ID NEPA Compliance Officer on: 7/24/2025