U.S. Department of Energy
Categorical Exclusion Determination Form

Proposed Action Title: Experimental Neutrino Detector in Lake Superior

Program or Field Office: DOE - SC

Location(s) (City/County/State): Lake Superior, Lake County, Minnesota

Proposed Action Description:

The Experimental Neutrino Detector (END) project is a scientific project focused on testing a new method of detecting particles called neutrinos in the waters of Lake Superior, near Two Harbors, Minnesota. The END project involves deploying special optical sensors (Digital Optical Modules detectors) in the open water to detect particles called muons traveling horizontally through the lake. These muons are created when neutrinos interact with water molecules. The goal is to detect the light that is emitted as they pass through the water. END will operate at night, as enough daylight reaches the lake floor at 200 meters to overwhelm the faint particle flashes. It is estimated that END will detect several beam neutrinos per day of beam operations. The sensors will be placed at a depth of about 200 meters, which presents some challenges due to the depth and environment. To overcome these, the technology needs to be adapted to work in the lake's conditions and detect particles moving horizontally, using precise timing and advanced technology, such as high-speed fiber optic cables to send data back to shore. The sensors will be mounted on five (5) array frames with cables laid on the lakebed, connecting the frames to shore at the water plant in Two Harbors. The array frame location intersects a neutrino beam generated by the FermiLab. The water plant was selected as the landing point to utilize existing pipe and the facility. The system would be deployed in November 2026 and the frames recovered in the fall of 2027. The cables may be left in place for future scientific use.

Categorical Exclusion(s) Applied:

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

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.

✔ 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.]

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

NEPA Compliance Officer: Kathleen Green Digitally signed by Kathleen Green Date: 2026.10.30 13:30:55 -04'00'

Date Determined: 10/30/2026

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