



U.S. Department of Energy

Categorical Exclusion Determination Form

Proposed Action Title: Categorical Exclusion Determination for Research and Development Operation of the Material-Plasma Exposure eXperiment (MPEX) Target Station for Neutron-Irradiated Samples at Oak Ridge National Laboratory (4433X)

Program or Field Office: Office of Science - ORNL

Location(s) (City/County/State): Oak Ridge, Tennessee

Proposed Action Description:

The DOE Office of Science routinely conducts both ongoing and new research and development activities within existing facilities at the Oak Ridge National Laboratory (ORNL), supporting a diversity of scientific missions and programs. DOE proposes to operate a system to safely expose target materials to plasma conditions expected to exist in fusion energy devices. Fusion energy is a promising energy source for the future, and the identification of plasma facing materials (PFMs) that are compatible with the extreme conditions in the fusion reactor environment is one of the most important problems to be solved for progressing to a commercial fusion reactor. The development of plasma material interaction (PMI) science and the technology of plasma facing components (PFC) are key elements in fusion device development in the United States. Some of these elements can be addressed with ORNL's advanced Material Plasma Exposure eXperiment (MPEX), to be housed in Buildings 7625 and 7627 at ORNL.

During operations, the MPEX system target station will be attached to a linear vacuum chamber where candidate PFMs and PFCs will be exposed to conditions anticipated in fusion reactor divertor regions, including dense, high-temperature plasmas with steady state heat fluxes and ion fluxes. The plasmas will be created and heated using radiofrequency and microwave electromagnetic energy. Plasma shape within the vacuum chamber will be maintained via a series of room-temperature and superconducting magnets. Following plasma exposure, PFMs and PFCs will be transferred from the MPEX device for examination within a Surface Analysis Station.

Since PFCs in fusion devices will have to withstand neutron irradiation displacement damage, the MPEX system is designed to eventually accommodate handling of irradiated PFMs and PFCs, from receipt of radioactive target material, through plasma exposure and post-exposure examination, and subsequent disposition of radiological materials. This will enable investigations of the impact of neutron damage on materials.

As an input to the design, an assessment of radiological material handling for MPEX was conducted during the preliminary design phase of the project to identify all the steps between receipt of irradiated targets and post-exposure target examination, characterization, and disposition. In particular, the factors associated with the receipt of radioactive specimens, their storage and preparation, configuration at the plasma-specimen interface, post-plasma-exposure handling and examination, have been evaluated and are being incorporated in system design. This design includes facility modifications, as well as the MPEX technical system design. Additionally, an evaluation of the facility hazard categorization indicated that an upgrade from "Standard Industrial" to "Radiological" will be necessary prior to receipt of first irradiated targets around FY30.

Any activities which have the potential for routine radiation exposure to workers or the public that are above regulatory, DOE Order, or local administrative limits are not covered by this categorical exclusion. These actions will not require major construction or major upgrades to existing facilities and would not result in substantive changes in ongoing operations at ORNL. The study of advanced materials and exposure of materials to extreme conditions, including irradiated materials have been longstanding Research and Development activities at ORNL and have required the development of robust environmental monitoring programs, public and worker safety programs, and waste management programs that routinely ensure these efforts are undertaken in a responsible manner that adhere to their respective requirements and do not cause significant impacts to the environment. Any activity which will cite this categorical exclusion will be carefully reviewed to determine whether the introduction of new processes or equipment will require development of new procedures, additional regulatory consultations, and/or modifications to any existing environmental permit or a new permit. Any wastes generated during research and development activities would be appropriately characterized and disposed of at existing permitted/approved waste storage, treatment, or disposal facilities.

ORNL Buildings 7625 and 7627 are not eligible for listing on the National Register of Historic Places and are not located within a Registry-Eligible Historic District. The proposed Action has been reviewed in accordance with the Programmatic Agreement among the Department of Energy Oak Ridge Operations Office, the Tennessee State Historic Preservation Office, and the Advisory Council on Historic Preservation Concerning the Management of Historical and Cultural Properties at the Oak Ridge National Laboratory, and it is determined that there will not be an adverse effect to any historic properties included or eligible for inclusion in the National Register of Historic Places (National Register). If it is determined that any future associated actions would have an adverse effect on properties included or eligible for inclusion in the National Register, DOE would consult with the State Historic Preservation Officer (SHPO) and initiate actions specified in procedures set forth in the Advisory Council's regulations in 36 CFR Part 800.

The proposed action meets the conditions that are integral elements of the classes of actions which may be categorically excluded from further NEPA documentation. Should the action be determined to not meet the conditions for CX consideration, a separate NEPA document would be prepared.

Categorical Exclusion(s) Applied:

B1.10 - Onsite storage of activated material

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

B3.13 - Magnetic fusion experiments

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of [10 CFR Part 1021](#).

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

The proposal fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D.

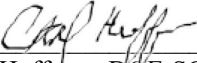
To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (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, Subpart D, 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, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal.

The proposal has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)) and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

The above description accurately describes the proposed action, which reflects the requirements of the CX cited above. Therefore, I recommend that the proposed action be categorically excluded from further NEPA review and documentation.

Program Point of Contact:



Chad Huffman, DOE-SC-OSO
Director, Operations Division

7/12/2022
Date Determined

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Policy 451.1B), 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.

NEPA Compliance Officer:

Peter Siebach, DOE-SC-41.1
DOE-SC NEPA Compliance Officer

Date Determined