

# DOE-ID NEPA CX DETERMINATION

**SECTION A. Project Title: Irradiation of Optical Components of In-Situ Laser Spectroscopic Sensors for Advanced Nuclear Reactor Systems – University of Michigan**

**SECTION B. Project Description**

The University of Michigan (UM), in collaboration with Ohio State University, proposes to investigate the effect of radiation damage in optical materials (such as transparent viewports) on the operation and performance of laser spectroscopic sensors. These sensors require unimpeded optical access to the surface or bulk of the material being measured. The project will also evaluate the effect of irradiation on nonlinear optical absorption which is critical for propagation. Windows and optical fibers comprised of various materials (including fused silica glass, BK7 glass, and quartz) will be irradiated by gamma rays and neutrons at the Ohio State University's Nuclear Reactor Laboratory (OSU-NRL) to determine the effect of irradiation on their optical transparency. The tasks associated with this project are (1) Construct and test mobile optical characterization setup and sample furnace; (2) Conduct preliminary gamma irradiation and post-irradiation examination (PIE); (3) Conduct irradiation and PIE with post-heating; (4) Conduct irradiation and PIE concurrent heating; and (5) Develop preliminary concepts for deployment in advanced reactors. Existing laboratory facilities will be used.

**SECTION C. Environmental Aspects / Potential Sources of Impact**

Radioactive Waste Generation – The project will include irradiation of optical components at the OSU-NRL, which may result in neutron activation. The estimated number of optical samples to be irradiated over the life of the project is 32. The appropriate office at Ohio State for establishing and maintaining controls and records regarding the disposal of radioactive materials is the Office of Radiation Safety. That office provides approved storage containers for low-level radioactive waste to laboratories such as the NRL. Once those containers are full, the NRL contacts the Office of Radiation Safety to pick up the containers.

**SECTION D. Determine the Level of Environmental Review (or Documentation) and Reference(s):** Identify the applicable categorical exclusion from 10 CFR 1021, Appendix B, give the appropriate justification, and the approval date.

Note: 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, including requirements of DOE orders; 2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities; 3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; 4) adversely affect environmentally sensitive resources. In addition, no extraordinary circumstances related to the proposal exist which would affect the significance of the action, and the action is not "connected" nor "related" (40 CFR 1508.25(a)(1) and (2), respectively) to other actions with potentially or cumulatively significant impacts.

References: B3.6 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 development.

B3.10 Siting, construction, modification, operation, and decommissioning of particle accelerators, including electron beam accelerators, with primary beam energy less than approximately 100 million electron volts (MeV) and average beam power less than approximately 250 kilowatts (kW), and associated beamlines, storage rings, colliders, and detectors, for research and medical purposes (such as proton therapy), and isotope production, within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible), or internal modification of any accelerator facility regardless of energy, that does not increase primary beam energy or current. In cases where the beam energy exceeds 100MeV, the average beam power must be less than 250 kW, so as not to exceed an average current of 2.5 milliamperes (mA).

Justification: The activity consists of university-scale research activities to help develop new technologies to give greater real-time reactor monitoring capability.

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act)  Yes  No

Approved by Jason Sturm, DOE-ID NEPA Compliance Officer on 08/20/2019