

DOE-ID NEPA CX DETERMINATION

SECTION A. Project Title: Multilayer Composite Fuel Cladding for LWR Performance Enhancement and Severe Accident Tolerance – Massachusetts Institute of Technology

SECTION B. Project Description

The Massachusetts Institute of Technology, in collaboration with several partners, proposes to develop multi-metallic layered composites (MMLC) to enhance the performance and accident tolerance of current and future light water reactors (LWR), mainly by removing as much zirconium as possible from the core without significant drops in performance. Unique mechanisms by which the MMLC's welds and other joints are expected to degrade in-service in LWR cores will be investigated.

SECTION C. Environmental Aspects / Potential Sources of Impact

Chemical Use/Storage / Chemical Waste Disposal / Hazardous Waste Generation – Metallurgical consumables for polished samples preparation include diamond suspensions, 50nm colloidal silica, and dilute acids (Nital, Kallings, Aqua Regia) for etching polished microstructures. These will be stored in hazardous waste bottles and disposed of using MIT's Environmental Health and Safety (EHS) pickup system. Additional aqueous hazardous waste will be generated during corrosion testing. Aqueous wastes will be of a similar form and composition as those at MIT (dilute aqueous acids with traces of dissolved metals) and will be disposed of in a similar manner.

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 aimed at investigating multilayer composite fuel cladding for light water reactors performance and accident tolerance.

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

Approved by Jack Depperschmidt, DOE-ID NEPA Compliance Officer on 07/09/2015