

DOE-ID NEPA CX DETERMINATION

SECTION A. Project Title: Nanocrystalline SiC and Ti₃SiC₂ alloys for High-Temperature Reactor Materials – Battelle-PNWD, Operator of PNNL for US DOE

SECTION B. Project Description

This research will focus on the structural response to ion irradiation to high doses at elevated temperatures and modification of mechanical properties of SiC/Ti₃SiC₂ nanocomposites, with and without carbon nanotube reinforcements. An integrated experimental and computational approach will be used to study the material behavior under high-dose irradiation at elevated temperatures. This includes microstructural responses to ion irradiation, diffusion behavior of fission products, and modification in mechanical properties.

SECTION C. Environmental Aspects / Potential Sources of Impact

Hazardous Waste Generation – This project may generate hazardous waste associated with its proposed use of nanomaterials, including carbon nanotubes, and Si, SiC, and TiC nanopowders.

Chemical Waste Disposal – The project will generate chemical waste due to use of solvents and metallographic polishing compounds. Typical solvents are Acetone, Methanol, and Ethanol in gram or mL quantities.

Chemical Use/Storage – This project will use and store chemicals, such as the solvents and polishing compounds. There will also be storage and use of engineered nanomaterials.

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 analyzing composite materials irradiated with an ion accelerator for research purposes.

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 8/9/2011