

# DOE-ID NEPA CX DETERMINATION

**SECTION A. Project Title: Oxidation Behavior of Silicon Carbide and Graphitic Materials – Missouri University of Science and Technology**

**SECTION B. Project Description**

Missouri University of Science and Technology, in collaboration with the University of Idaho and Idaho National Laboratory (INL), proposes to design and perform oxidation experiments of unirradiated and irradiated matrixgrade graphite in moisture in the kinetic oxidation regime, oxidation of unirradiated surrogate tristructural isotropic (TRISO) particles and irradiated silicon carbide (SiC) in oxygen and moisture in the passive/active transition regime, and oxidation of unirradiated surrogate TRISO fuel compact in moisture. The TRISO fuel matrix material will be subjected to oxidation by moisture with conditions relevant to the moisture ingress accident, especially in the kinetic oxidation regime to determine the kinetic parameters and oxidation mechanisms, and oxidation behavior of SiC TRISO particles will be studied under the simulated air ingress and moisture ingress accident conditions, with a focus on the poorly understood passive/active transition and oxidation kinetics under low oxygen or steam pressure. In addition, oxidation in moisture will be performed on surrogate fuel compact to study the effect of TRISO fuel matrix burnoff on the rate of oxidation and on reaction kinetics, and determine partial pressures of H<sub>2</sub>O transported to the TRISO fuel particles.

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

Radioactive Material Use – This project will involve using neutron irradiated graphitic material and silicon carbide for oxidation study and microstructural examination. Some of the microstructural examination will be performed in the Center for Advanced Energy Studies (CAES) in Idaho Falls, Idaho. The amount of irradiated graphitic material involved is <15 grams. The amount of irradiated silicon carbide involved is ~0.2 grams. These materials have relatively low radioactivity. The irradiated materials will come from the INL. All of INL, Missouri Science and Technology, and CAES have well established procedures and specific offices responsible for handling and disposing radioactive materials.

**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.

Justification: The activity consists of university-scale research activities aimed at testing irradiated matrix material and SiC to reveal the effects of irradiation on the oxidation behavior of the materials.

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 07/31/2018