

SECTION A. Project Title: Microstructure, Thermal, and Mechanical Properties Relationships in U and UZr Alloys**SECTION B. Project Description**

The proposed research will use the state-of-the-art, 3D, synchrotron-based characterization techniques, novel techniques that couple thermal and mechanical properties, existing experimental facilities, and complementary multiscale modeling to evaluate microstructure-properties relationships (both thermal and mechanical) in U and UZr alloys that have been previously neutron irradiated. The research is divided into three task areas:

- 1.) Microstructural Evolution
- 2.) In-situ/ex-situ Thermal and Mechanical Properties
- 3.) Multiscale Modeling Connections to Microstructure, Thermal, and Mechanical Properties

SECTION C. Environmental Aspects / Potential Sources of Impact

Purdue University has procedures in place to handle radioactive materials and any waste that will be generated through this project. The action would not create additional environmental impacts above those already permitted at the university.

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 proposed action consists of research and development aimed at understanding the effects of irradiation on candidate fuel systems for transmutation based reactors that can be used to burn long-lived minor actinides and fission products in fast spectrum reactors.

Approved by Jason Sturm, DOE-ID Acting NEPA Compliance Officer on 7/05/2016