

SECTION A. Project Title: Tribological Behavior of Structural Materials in High Temperature Helium Gas-Cooled Reactor Environments**SECTION B. Project Description**

The project will investigate the wear mechanisms of surface treatments for alloys 800H and 617 will be investigated to: **(i)** mitigate tribological damage in High Temperature Gas Reactor (HTGR) environments, **(ii)** minimize sensitivity of corrosion to various impurity regimes and provide greater predictability in wear behavior, **(iii)** promote the formation of a mechanically stable oxide layer that would acquire a low friction glaze nanostructure during the high temperature wear process, and **(iv)** impede carbon diffusion into or out from the alloys (for carburizing and decarburizing environments, respectively). Examples of surface treatments include NiCrAlY and Nitronic™ coatings, and shot peening. Characterization of the wear mechanisms under various test conditions will be performed using a suite of characterization techniques, including scanning electron microscopy (SEM) in conjunction with energy dispersive spectroscopy (EDS), x-ray diffraction (XRD), transmission electron microscopy (TEM), Auger electron spectroscopy (AES), and x-ray photoelectron spectroscopy (XPS).

SECTION C. Environmental Aspects / Potential Sources of Impact

University of Wisconsin has procedures in place to handle 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 project will conduct R&D on the wear mechanisms on surface treated alloys for use in next generation HTGRs.

Approved by Jack Depperschmidt, DOE-ID NEPA Compliance Officer on 07/01/2016