

# DOE-ID NEPA CX DETERMINATION

**SECTION A. Project Title: Lower Length Scale Characterization and Validation of Formation and Stability of Helium Bubbles in Nano-structured Ferritic Alloys under Irradiation – Clemson University**

**SECTION B. Project Description**

Clemson University, in collaboration with Oak Ridge National Laboratory and Argonne National Laboratory, proposes to characterize helium bubbles within 14YWT alloys with both theoretical understanding and experimental observation. Tasks include:

1. Conduct a thoroughly energetic study to elucidate the interaction between helium and various nanoparticles within 14YWT under relaxed condition. A theoretical model will be proposed to explain the formation of helium gas bubbles and stability criteria will be established.
2. Investigate the theoretical model under various temperature and strain condition.
3. Experimentally characterize helium bubbles to study their stability, size, and location variation and their relation with nano-clusters and nano-precipitates in 14YWT after ion irradiations.

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

The research would involve ion irradiation and characterization of 14YWT alloys. The action would not create additional environmental impacts above those already occurring 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 activity consists of ion irradiation 14YWT alloys and characterization of helium bubbles for research purposes.

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

Approved by Jason Sturm, DOE-ID Deputy NEPA Compliance Officer on 11/26/2013