

# DOE-ID NEPA CX DETERMINATION

**SECTION A. Project Title: Direct Production of ODS Ferritic Alloys for Long-life Reactor Fuel Bundles: Sheet Material for Ducts and Tube Preforms for Cladding – Iowa State University**

**SECTION B. Project Description**

Iowa State University (ISU) proposes to exploit the inherent uniformity, reasonable compressibility, and thermally activated sintering of gas atomization reaction synthesis (GARS) precursor oxide dispersoid strengthened (ODS) ferritic steel powder to produce full-density powder compacts by conventional vacuum warm pressing. After vacuum sintering of the compacts, resulting billets will be cold cross-rolled to ODS sheet material and formed into duct shapes. Hollow preforms also will be produced using the same vacuum warm pressing and sintering parameters developed for GARS powder billets but will incorporate a dissimilar powder core that can be readily removed from the resulting billet. These “mother tubes” can be pilgered by ISU’s industry partner (Westinghouse) to produce ODS ferritic steel cladding in final shapes. Thus, low-cost conventional processing will be used with innovative GARS powder to give new life to these nuclear materials without the high-cost of prolonged mechanical alloying (MA)-based processing to replace swelling-prone austenitic steels in fuel bundle duct and oxidation-sensitive zircaloy cladding. The robust GARS ODS materials will enhance the long-term viability and competitiveness of existing reactors by being drop-in ready to replace sheet and tube forms of current reactors. Also, GARS ODS alloys maintain the national strategic supply chain infrastructure by a U.S. manufacturing route demonstration to provide these advanced alloys for new reactor designs and enabling concepts, such as higher temperature operation and longer lifecycles.

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

The university 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 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). For purposes of this category, “demonstration actions” means actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment. Demonstration actions frequently follow research and development and pilot projects that are directed at establishing proof of concept.

Justification: The activity consists of an investigation to validate GARS ODS alloy performance as a cost-effective strategy to produce high-performance structural materials for nuclear reactors.

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

Approved by Jason Anderson, DOE-ID NEPA Compliance Officer, on 08/31/2021.