

**SECTION A. Project Title: HIP Cladding and Joining to Manufacture Large Dissimilar Metal Structures for Modular and GEN IV Reactors – Auburn University****SECTION B. Project Description**

Auburn University proposes to develop for commercial demonstration an integrated cost/time reduction and quality improvement by implementing powder-based hot isostatic pressing (HIP) cladding and joining strategy (powder-to-solid or powder-to-powder) for manufacturing large-size and thick-section dissimilar metal pressure retaining components of small modular reactors (SMRs) and Generation IV reactors. The project goals are to; 1) Establish a general standard practice for robust HIP-based manufacturing for dissimilar metal cladding and joining, 2) Explore innovative joint configurations (e.g. compositionally graded transition joint) to eliminate the traditional design of buffer layer, 3) Create HIP modeling tools to improve the prediction accuracy of part quality, geometry distortion, process optimization, and long-term reliability for large-size dissimilar component with complex material transition, 4) Develop understanding of feedstock powder quality control, 5) Demonstrate the technology on the selected GE and Westinghouse components per OEMs' requirements, 6) Demonstrate the feasibility and cost/time benefit of HIP cladding and joining for commercial-scale dissimilar metal component fabrication in SMRs and GEN IV reactors, and 7) Evaluate the long-term risk of material degradation due to thermal aging and corrosion.

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

Chemical Use/Storage / Chemical Waste – A small amount of acids will be used for material testing and metallurgical sample etching. The chemicals will be disposed per university policy.

**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 performing FOAK engineering and testing for an innovative method for reactor component fabrication.

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 7/29/2020