

**SECTION A. Project Title: Condition Monitoring of Dry Storage Canisters by Helical Guided Ultrasonic Waves – The University of Texas at Austin****SECTION B. Project Description**

The University of Texas at Austin (UTA) proposes to develop a technology to enable the next generation of “intelligent spent nuclear fuel (SNF) dry storage canisters (DSCs),” that is, canisters with integrated sensing and processing capabilities to enable real-time state awareness. It is proposed to use a novel low-cost sensing system based on helical guided ultrasonic waves (HG UW) and advanced data processing techniques for interrogating the outer surface of the canister. Specifically, the sensing system will enable the: monitoring of internal pressure and temperature profiles, detection of helium leakages, and stress corrosion cracking. The proposed technology will be able to operate in a dual monitoring mode: 1) real-time continuous (or passive mode), and 2) in-situ routine periodic inspections (or active mode). The proposed work includes use of robotic system(s) to remotely apply the HG UW technology on in-service DSCs. To focus the scope of the project, the new technology will be developed in the context of welded stainless steel canisters, which are used in a large number of DSCs. The objectives of the proposed project will be accomplished through performance of the following tasks: 1) Establish performance specifications; 2) Indirect measurements using HG UW; 3) Robotic system for sensors placement; 4) Laboratory and field demonstrations; and 5) Environmental survivability validation.

**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 develop a novel condition monitoring (CM) technology to inspect and monitor dry cask storage systems.

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 09/17/2021.