

SECTION A. Project Title: Multi-modal Surface Acoustic Wave Sensing System for Pressure and Temperature Monitoring of Spent Fuel Canisters – University of North Texas**SECTION B. Project Description**

The University of North Texas proposes to develop a multi-modal wireless passive SAW (Surface Acoustic Wave) sensor array, which is deployed on the outside surface of the canister, to monitor the strain of the canister and thus determine the internal pressure. In addition, the SAW sensor could also measure the surface temperature and potentially monitor possible leaked helium gas. The objectives of this proposal will be achieved through the following innovations: (1) Multi-modal Langasite (LGS) SAW single device for simultaneous strain and temperature measurement of the spent fuel canisters; and (2) System integration with 3-D sensor arrays for real-time canister mapping for gas leak prevention and detection. The specific objectives of the work proposed here are: (1) Developing a multimodal LGS SAW strain/temperature sensor to monitor the internal pressure and temperature of the canister; (2) System integrating with 3-D sensor arrays for real-time pressure/temperature canister mapping for gas leak prevention and detection; (3) Investigating the potential to use the proposed LGS strain/temperature sensor array to monitor Helium gas; and (4) Testing and evaluating the accuracy and reliability of fabricated sensors.

SECTION C. Environmental Aspects / Potential Sources of Impact

The chemicals used in this project are Photoresist Developer and Photoresist Remover, which are handled in state-of-the-art cleanroom environment and they will be disposed professionally. The amount used is also very limited and will not have any influence on environments.

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 innovative methods for periodic measurement/inspection of internal conditions within a target dry storage cask (DSC).

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.