

DOE-ID NEPA CX DETERMINATION

SECTION A. Project Title: Smart Multimodal Acousto-optic Sensors for Integrated Measurement of Advanced Reactor Process Parameters – Pacific Northwest National Laboratory

SECTION B. Project Description

Pacific Northwest National Laboratory (PNNL), in collaboration with the University of North Texas, proposes to design and develop a multimodal sensor for measurements of critical process parameters in advanced non-light water-cooled nuclear power plants (NPPs) for the early detection and characterization of atypical operating conditions. This project focuses on the development of an integrated sensor concept that simultaneously measures temperature, pressure, and gas composition from the same sensor platform using surface acoustic wave (SAW) devices. The project proposes to develop an economic SAW sensing module for the detection of hydrogen, xenon, and krypton gases using aluminum nitride (AlN) thin film coated silicon substrate. The tasks associated with this project are (1) Design of the AlN-based SAW temperature and pressure sensor; (2) Design of the SAW gas sensor; (3) Thin film fabrication and experimental pressure, temperature, and gas composition testing; and (4) Data analytics. Existing laboratory facilities and equipment will be used.

SECTION C. Environmental Aspects / Potential Sources of Impact

Chemical Use/Storage – Various gases, specifically hydrogen, xenon, and krypton will be stored and utilized in small amounts, but will be contained in cylinders and captured through proper ventilation equipment.

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 research activities to develop a single-platform sensor array to measure temperature, pressure, and gas composition at the same time.

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 08/29/2019