

**SECTION A. Project Title: Transient Reactor Experiments to Validate MBM Fuel Performance Simulations (TREAT) – Utah State University****SECTION B. Project Description**

Utah State University, in collaboration with Texas A&M University, University of South Carolina, and Idaho National Laboratory, proposes to conduct benchmark experiments to provide critical validation data for reactivity initiated accident (RIA) scenarios in LWRs. The proposed research includes separate effect experiments at the participating universities and integral experiment in the Transient Reactor Test Facility (TREAT) at the Idaho National Laboratory (INL) using commercial reactor fuels.

The specific objectives of this proposed work are:

1. Characterize, intensively, 1) fuel fracture/fragmentation patterns, 2) cladding mechanical behavior under different hydride levels and characteristics, and 3) fast transient boiling of water under typical PWR conditions from separate effect validation experiments informed by computational modeling to provide detailed initial, boundary, and property data for the reactor experiment, as well as a basis for model improvement;
2. Design TREAT benchmark experiments (using multi-SERTTA vessel) based on separate effect modeling and experiments and implement twelve (12) integral experiments for transient fuel performance under RIA conditions with detailed pre- and post-test characterization and advanced in-pile instrumentation;
3. Utilize the data to improve models and quantify accuracy and validation uncertainty of Multiphysics MBM codes in modeling RIA events; and
4. Integrate the research result with the OECD-NEA RIA benchmark effort and into NEKVAC database, and translate the lessons learned to classroom experience through NESN 6699 Verification & Validation as well as a V&V education module for further dissemination.

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

Radioactive Material Use/Radioactive Waste Generation – This project will involve small samples of UO<sub>2</sub> and other fuel pellets at three locations: University of South Carolina, Texas A&M, and Idaho National Laboratory. At the two university sites, the focus is to fabricate fuel pellets (small batch < 200 gram) for fuel fracture testing. At INL, the industrial partners of the project, i.e., Westinghouse, GE and AREVA will supply ATF fuel rods for TREAT testing. The total amount is estimated to be less than 600 gram. All three sites have established radioactive labs and have been processing nuclear fuels and depleted uranium for some time. The handling and disposal of small amounts of radioactive waste are performed strictly under procedures and processes established under corresponding radiation safety offices in each university and INL.

**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.

The impacts of transporting and disposing of waste resulting from defense activities that was placed in retrievable storage pursuant to a 1970 Atomic Energy Commission policy (see Section 1.2) and TRU waste that was reasonably expected to be generated by ongoing activities and programs was analyzed in DOE/EIS-0026 (October 1980) and the Final Supplement Environmental Impact Statement for the Waste Isolation Pilot Plant (SEIS-I) (DOE/EIS-0026-FS, January 1990).

NEPA coverage for the transportation and disposal of waste to WIPP are found in DOE/EIS-0200-F (May 1997) and Waste Isolation Plant Disposal Phase Supplemental EIS (SEIS-II) (DOE/EIS-0026-S-2, Sept. 1997), respectively. The 1990 ROD also stated that a more detailed analysis of the impacts of processing and handling TRU waste at the generator-storage facilities would be conducted. DOE has analyzed TRU waste management activities in DOE/EIS-200-F (May 1997). The WM PEIS analyzes environmental impacts

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at the potential locations of treatment and storage sites for TRU waste; SEIS-II addresses impacts associated with alternative treatment methods, the disposal of TRU waste at WIPP and alternatives to that disposal, and the transportation to WIPP. (SEIS-II also includes potential transportation between generator sites.)

Justification: The activity consists of conducting validation experiments to collect critical data for accident scenarios in light water reactors for research and development purposes of accident tolerant fuels.

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

Approved by Jack Depperschmidt, DOE-ID NEPA Compliance Officer on 09/26/2016