NEUP Nuclear Energy University Programs
U.S. Department of Energy

Core Verification and CRDM Upgrades for the University of Maryland Training Reactor

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Collaborators: N/A

Program: Reactor Upgrades

ABSTRACT:

Project Objectives: The objective of this proposal is the acquisition of critical instruments and ancillary components to ensure continued operation of the University of Maryland (UMD) TRIGA reactor and support the efforts to regain full reactor licensed power.

- Purchase a new control rod drive assembly system so as to ensure the safe and reliable operation of our research reactor to continue to provide support for research and educational programs.

- Manufacture of unique mechanical end assemblies for new fuel to our reactor. The MUTR is a conversion reactor that requires end subassemblies to bundle the fuel elements in groups of four for handling and placement into the core.

- Upgrade our existing low background HPGe gamma ray spectroscopy system with the Canberra Laboratory Sourceless Calibration Software (LabSOCS) detector characterization and software system.

Description of the Project: The Maryland University Training Reactor (MUTR) is a 250 kW conversion type TRIGA reactor. Over the past three years, the University of Maryland has substantially invested in renovating the MUTR laboratory to transform our reactor into a world-class teaching and research facility though improvements to safety, infrastructure and staff. The MUTR's primary training dedication is to a newly formed undergraduate operator program. Currently we have 9 licensed operators, and are anticipating that growing to a steady state of 20. The initial training and requalification requirements places a greater demand on the reactor than ever before in its history of operation. In addition to need for new fuel there is an urgent need to replace the Control Rod Drive Mechanisms. Presently the MUTR is equipped with split phase AC drive motors for the control rod drive mechanisms (CRDM). As these motor control systems are no longer supported by the manufacture an alternate method of controlling the rod position is necessary. This upgrade forces the installation of a complete new system of motors and their controllers as well as integration into the existing console system. The current MUTR fuel is still the original fuel loading and although we are licensed for 250kW, the MUTR can only achieve a maximum power of 200 kW. The DOE has "slightly irradiated" conversion TRIGA fuel and is pioneering the effort return it to service at MUTR. The MUTR must submit a License Amendment Request to the NRC for use of the new fuel, which requires an analysis and measurement of the MUTR's core neutronics. To benchmark the expected MCNP results in-core flux measurements by method of wire and foil activation is necessary. The Canberra LabSOCS program to characterize the geometry our existing low background 50% HPGe gamma ray detector and outfit it with the LabSOCS software will increase our measurement throughput, making possible the necessary flux mapping with our existing equipment. We are also requesting support to manufacture the "end bundle assemblies" for the new fuel elements. MUTR is a conversion (from MTR to TRIGA) type reactor that requires unique mechanical end assemblies to bundle and adapt the fuel to

the bottom grid plate. A successful award would make a significant impact for the continued safe and reliable operation of MUTR to support research and education.