



U.S. Department of Energy

Upgrades to the Maryland University Training Reactor Cooling and Neutron Activation Analysis Systems for Enhanced Operational Reliability and Capability

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***Program:** University Research Reactor Upgrades Infrastructure Support*

ABSTRACT:

Project Goals: The primary objective of this project is to restore and increase the safety, operational availability, and experimental capabilities of the Maryland University Training Reactor (MUTR). This upgrade will include: 1) a complete overhaul of the MUTR Primary and Secondary Coolant Systems to enable the reactor to operate continuously at its full licensed power, and 2) the purchase of a microbalance and fume hood to improve the sensitivities of the Neutron Activation Analysis (NAA) program.

Background: The refurbishment of the cooling system and NAA facility is part of a greater long-term goal to enhance the MUTR's effectiveness as an educational and research tool. Recent facility upgrades include installing reliable power and radiation monitoring instrumentation, digital logging systems, improvements to the Rabbit experimental facility, and the installation of lightly used fuel delivered in 2017. With this lightly used fuel, a return to 250 kW operations is anticipated in the fall of 2023. Upgrading the cooling system will be imperative to allow the reactor to operate effectively at this power level. Currently, the reactor is limited to approximately 3 hours of operation at 250 kW before water temperature exceeds safe levels, requiring shutdown and days of passive cooling. The proposed new cooling system will provide active cooling up to 300 kW of thermal power. The microbalance and fume hood will increase the capabilities of the growing NAA program at the MUTR by reducing experimental uncertainties and allowing operators to more safely prepare samples and standards with less risk of contamination.

Justification and Impact: The outcomes and potential impacts of this project will benefit MUTR students, researchers, and external users. This project will ensure the continued safe and efficient operational life of the reactor facility, enhancing the MUTR's abilities to contribute to the DOE mission through various projects over many disciplines, including but not limited to applications in medical isotope production, neutron detectors, radiation effects on materials and biological samples. The successful completion of this project will allow the MUTR to continue to grow its educational mission, nuclear science outreach programs, workforce development, and research collaborations.