

**Core Modifications to Ensure the Continued Safe and
Reliable Operation of the Maryland University Training
Reactor**

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Program: *University Research Reactor Upgrades Infrastructure Support*

ABSTRACT:

Background: After over 45 years of operation, the Maryland University Training Reactor (MUTR) is no longer able to reach its full licensed power of 250 kW. The Office of Nuclear Energy at the Department of Energy (DOE) has recognized the importance of the MUTR, as one of 24 university research reactors in the U.S., in supporting both scientific experimentation and student education/training. As a result, the DOE delivered lightly used fuel from storage at Idaho National Laboratory in March 2017 in order to restore the MUTR to full power operations. Permission to add the fuel to the core was received from the U.S. Nuclear Regulatory Commission (NRC) in May 2020. The COVID-19 pandemic delayed the assembly of the fuel elements into bundles and their installation into the core until March 2021.

Problem: During the planned installation of the lightly used fuel bundles into the core, Reactor Operators discovered that these additional fuel bundles would not fit into the grid plate. It was determined that the original bundles had been installed into the grid plate in the wrong orientation, causing interference which prevented the installation of additional bundles.

Solution: To install the new fuel, Reactor Operators will need to unload the current core and disassemble all fuel bundles for inspection before reinstalling them in the correct orientation. The MUTR does not currently have the parts and equipment required to complete this project. The necessary equipment to be obtained includes new fuel handling, storage, and inspection equipment, as well as new end assemblies for fuel bundles to be used in rebuilding the core. Once this equipment is delivered, the reactor core will be offloaded, and the original fuel bundles will be disassembled and inspected. The fuel will be reassembled into bundles using the new end assemblies and replaced in the core in the correct orientation. Once this has been completed, the lightly used fuel elements will be added to the core and full power operations may be resumed. The team estimates that the process can be accomplished in 4 months once materials/equipment are purchased and delivered.

Justification: The proposed modification will ensure the continued safe and reliable operation of the reactor facility. Return to full power operations has great potential to benefit and impact University of Maryland (UMD) faculty, staff, students, and external users by enhancing the MUTR's capabilities. The MUTR is a unique facility that serves to educate students interested in reactor operations and neutron science through tours, outreach events, and laboratory classes. The successful completion of this project will support and advance UMD's educational and research missions.