RERTR 2018 – 39TH International Meeting on
Reduced Enrichment for Research and Test Reactors

November 4-7, 2018
Sheraton Grand Hotel and Spa
Edinburgh, Scotland

Conversion Status of the University of Missouri-Columbia Research Reactor from Highly Enriched to Low-Enriched Uranium Fuel

L. Foyto, K. Kutikkad, J. C. McKibben, W. Cowherd and N. Peters
University of Missouri-Columbia Research Reactor
1513 Research Park Drive, Columbia, Missouri 65211 – USA

J. Stillman, E. Feldman, T. Heltemes, D. Jaluvka and E. Wilson
Argonne National Laboratory
9700 South Cass Avenue, Argonne, Illinois 60439 – USA

ABSTRACT

The University of Missouri Research Reactor (MURR®) is one of five U.S. high performance research and test reactors that are actively collaborating with the U.S. National Nuclear Security Administration (NNSA) Office of Material Management and Minimization (M^3) to find a suitable low-enriched uranium (LEU) fuel replacement for the currently required highly enriched uranium (HEU) fuel. In August 2017, a Preliminary Safety Analysis Report (PSAR) for a proposed core loaded with U-10Mo monolithic LEU fuel, which is currently being tested for qualification, was submitted to the NRC for review. The PSAR includes detailed analyses of steady-state and transient conditions that demonstrate, with the proposed fuel form and a power uprate from 10 to 12 MW, sufficient margins to safety and operational performance. More recently, detailed analyses are being conducted to determine safety margins and operational performance for the transition core fuel cycle. Earlier work anticipated that a burnable poison would be needed in up to twelve (12) LEU fuel elements in order to provide some reactivity hold-down during the initial, fresh LEU core startup cycles to limit perturbations to the axial flux profile in the flux trap and graphite reflector regions that would negatively impact the reactor's mission. In the current work, detailed analyses are being performed to determine the feasibility of achieving experimental performance during the LEU transition cycles without poisoned LEU fuel elements that is similar to the current HEU fuel cycle. An initial, non-typical fuel cycle scheme and potentially shifting sample materials in the irradiation positions until there is sufficient burnup in the LEU fuel elements is being explored. Also included is a discussion of the analyses performed to determine the impact on HEU and LEU core operations and safety margins if LEU targets, for the purpose of producing Mo-99, are placed adjacent to the core.