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**Progress on U.S. High Performance
Research Reactor LEU Fuel Element Designs**

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ABSTRACT

Based on favorable irradiation behavior, U-10Mo monolithic fuel has been selected for qualification in the LEU conversion of the U.S. high performance research reactors (US HPRR). Irradiation behavior has previously been demonstrated in test plate geometry across a range of irradiation conditions similar to those found in the current US HPRR. Based on the initial success of this fuel system, LEU fuel element designs of the US HPRR LEU conversion cores have been optimized by each reactor facility to allow the reactors to meet mission, operational, and safety basis requirements using monolithic LEU fuel.

The reactors regulated by the NRC have each undertaken a Preliminary Safety Analysis Report (PSAR) which will review the methods in advance of fuel qualification, and establish the assumed safety basis requirements to be met through fuel specifications and fuel performance data. The PSAR for NBSR reactor conversion at the National Institute of Standards and Technology has been submitted to, and is under review by, the NRC. PSARs are currently being completed by the MITR and MURR reactors. The US HPRR reactors ATR and HFIR, operated and regulated by the U.S. Department of Energy, are in the process of completing design safety analyses.

Conversion fuel assembly design is a critical step in the US HPRR program since the program fabrication process demonstration, and subsequent irradiation testing at mini-plate, full-size plate, and fuel assembly levels is planned across the range of reactor-specific proposed LEU plate geometries and irradiation conditions.