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U-Mo Monolithic Fuel Qualification for US High Performance Research Reactors

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ABSTRACT

Based on results from lab-scale scoping irradiation tests, U-Mo monolithic fuel was selected as the primary LEU conversion fuel for U.S. high performance research reactors (USHPRR). The fuel design consists of U-10Mo alloy foils having a Zr diffusion barrier on top and bottom surfaces, clad in AA6061 by hot isostatic pressing. A recent comprehensive review of the R&D conducted to date has shown that the U-Mo monolithic fuel system generally meets performance requirements for generic fuel qualification. As a result of this review, the US HPPR has begun a new phase of fuel testing that is intended to lead to qualification of this new plate-type LEU fuel through the US Nuclear Regulatory Commission. Planned tests include miniature-plate, full-size plate, and fuel element irradiations, during which fuel test specimens fabricated with qualified and optimized commercial-scale fabrication processes will be irradiated under conditions that bound the NRC-regulated reactors in order to demonstrate that all fuel performance requirements are satisfied. Data collected during post-irradiation of the qualification tests will also feed into reactor-specific safety analysis and subsequent licensing and inform on-going integrated fuel performance and microstructural modeling efforts that in turn provide a feedback to further optimize the fabrication process.