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**Gamma Irradiation Facility Exposure of Candidate Materials
for the SHINE Subcritical Assembly Vessel and Components**

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ABSTRACT

Laboratory corrosion testing was performed on candidate alloys including Zr-4 representing the target solution vessel, and 316L, 2304, and 17-4 PH stainless steels representing process piping and balance-of-plant components in support of the proposed SHINE process to produce ⁹⁹Mo from low-enriched uranium. This testing utilized depleted uranyl sulfate in various concentrations, excess sulfuric acid concentrations, and iodine additions. Testing was completed at the Oak Ridge National Laboratory's High Flux Isotope Reactor (HFIR) utilizing the Gamma Irradiation Facility (GIF). Testing consisted of static immersion of coupons (fully immersed and in vapor) as previously done in our lab based experiments. Gamma exposures were chosen for the encapsulated materials based on dosimetry data taken on the spent fuel cores and testing previously. To generate active gamma-radiolysis conditions test were carried out over a six to seven day period with thermocouples tracking solution temperatures. Candidate alloys were then analyzed and compared to previous data and found to be resistant to gamma exposed corrosion under the of exposure conditions available.

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