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**Validation of the Laue-Langevin High Flux Reactor (RHF) Neutronic
Model and LEU Design Risk Mitigation Activities**

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ABSTRACT

The Institute Laue-Langevin (ILL) *Réacteur à Haut Flux* (RHF) based in Grenoble, France is a research reactor designed primarily for neutron beam experiments for fundamental science. It delivers one of the most intense cold neutron fluxes worldwide. The RHF has a single fuel element made of 280 involute-shaped fuel plates. It currently operates with HEU fuel enriched at 93 wt. %.

Early analyses have shown that RHF would need a LEU fuel having a density of at least 7-9gU/cc to maintain performance at an acceptable level. With the development of the UMo dispersion fuel at 8gU/cc, ILL has thoroughly analyzed the possibility to convert with this fuel system. In 2010, in collaboration with Argonne National Laboratory (ANL), ILL identified a LEU fuel element design that would meet safety and performance criteria.

As new information become available regarding the fuel system and as tools and methods progress, analyses are continuously updated to verify that the proposed design is still a valid option. In addition, because the tools and methods used to perform these analyzes are different from the ones used historically to evaluate the performance and safety of the facility, it is critical to validate them against historical experiments and measurements.

The present paper will provide a status on the neutronic validation effort and will discuss the reference LEU design and the activities carried out to mitigate the identified risks associated to it.