

NE-20-23491, Addressing Gaps in Legacy Data on Fuel Steel Interactions

Oklo Inc. (Oklo) is a privately funded nuclear technology developer of Aurora, a MW-scale commercial reactor. Aurora will provide off-grid electric power, satisfying the demand of customers that are currently forced to rely on diesel generators, a 600 GW global market.

Fuel-clad chemical interactions (FCCI) between metallic fuel (e.g., U-10Zr) and stainless-steel claddings at relatively high temperatures pose one of the major limits to allowable peak temperatures and burnups in fast reactors using these materials. Currently, the most viable path for licensing a design using this material system is to take significant conservatisms and stay within the operating conditions for which legacy data exists. The current state of the art of fuel performance modeling cannot separate the entangled effects of temperature ranges, burnups, materials, and geometries. The proposed solution is to conduct additional experiments and provide targeted data to support the licensing of new reactor designs, which will allow reactor developers to reduce significant conservatisms they must now take to avoid FCCI.

Oklo will partner with Idaho National Laboratory (INL) to conduct an out-of-pile experimental investigation into FCCI behavior that addresses each of these variables in order to include operating envelopes more aligned with the Aurora reactor as well as other advanced concepts. A complete test matrix and summary of key interest conditions will be developed in conjunction with the metal fuel experts at INL.