

Oklo
Partnered with
Idaho National Laboratory (INL)

NE-24-33398 – Test Vehicle Development to Support Oklo's Advanced Fuels Roadmap

YEAR AWARDED: 2024

TOTAL PROJECT VALUE: \$200,000K (Oklo \$40K, DOE \$160K)

STATUS: Completed

PRINCIPAL LAB INVESTIGATORS: Ryan Webster (Oklo), Nicholas Woolstenhume (INL)

DESCRIPTION: Oklo Inc., a company based in Santa Clara, California, is designing and deploying the Aurora powerhouse, a fast reactor that can produce up to 75MW of power. At present, a test reactor does not exist within the United States for performing prototypic testing of sodium fast reactor fuels and materials. Although tests using the Advanced Test Reactor (ATR) at Idaho National Laboratory (INL) have been beneficial, there are limitations. These include a need for high-enriched uranium (HEU) to achieve prototypic burnups, the inability to test pilot-scale fuels and fabrication processes, and the inability to match the prototypic operating conditions of sodium fast reactors. Oklo intends to use its initial Aurora powerhouse at INL to support irradiation and testing of advanced fuel forms. The company is partnering with INL to determine the layout of a test facility and support completion of the preconceptual design of the experimental test vehicle that will be used to expand existing fuels data.

BENEFIT: As the Aurora-INL is sited less than three miles from INL's Materials & Fuels Complex (MFC), an immense opportunity exists for Oklo to have post-irradiation examination (PIE) performed on test fuel pins without requiring lengthy shipments of irradiated fuel on public roads. This effort initiated a collaboration with INL focusing on assessing options and determining a path forward to leverage MFC capabilities, especially PIE at the Hot Fuel Examination Facility (HFEF).

IMPACT: The work performed under this voucher focused on logistic and cask options for transporting test fuel assemblies and determined that straightforward modifications to the HFEF-14 carbon cask can be performed to enable this opportunity. The HFEF-14 cask modifications were conceptualized at an appreciable level of detail to inform planning estimates and get a head start on future formal engineering tasks. Reviews of past methods to dismantle fuel assemblies in HFEF, and cost estimates for PIE based on recent and similar exams, were also considered to provide planning estimates.

SIGNIFICANT CONCLUSIONS: The key finding of this work is that it should be feasible to transport test fuel assemblies from Aurora-INL to HFEF with reasonable modifications to existing equipment and processes, and then to perform PIE in support of Oklo's Advanced Fuels Roadmap.

NEXT STEPS: Oklo plans to harvest improvements with more advanced fuels and is implementing its advanced fuels roadmap to develop and deploy these technologies. Additional prototypic data is needed to fully capture the performance envelope of its fuel systems in order to meet regulatory requirements for fuel qualification.