

Oklo, Inc.
partnered with
Argonne National Laboratory and Idaho National Laboratory

GA- 17IN020107, Legacy Metal Fuel Data Exploration for Commercial Scale-Up

YEAR AWARDED: 2016

TOTAL PROJECT VALUE: \$338K (DOE funding, \$270K; awardee cost share, \$68K)

STATUS: Completed

PRINCIPAL LAB INVESTIGATORS: Abdellatif Yacout (yacout@anl.gov) and Steven Hayes (steven.hayes@inl.gov)

DESCRIPTION: Under this Gateway for Accelerated Innovation in Nuclear voucher, Oklo Inc. (Oklo) partnered with Argonne National Laboratory (ANL) and Idaho National Laboratory (INL) to accelerate the fuel manufacturing process to support Oklo's path to commercialization. The project involved compiling and assessing information about legacy metal fuel data and fabrication from EBR-II, the liquid-metal-cooled fast reactor that operated for 30 years at INL. ANL reviewed existing fuel irradiation data and identified and compiled data relevant to the Oklo fuel design. INL and ANL also provided technical support by participating in a pre-application meeting between Oklo and Nuclear Regulatory Commission staff. In addition, INL performed fuel modeling using BISON, a finite element-based nuclear fuel performance code, to provide insights on Oklo's innovative metal fuel design. As a result, Oklo applied for a BISON license. In addition to the BISON modeling efforts, INL successfully fabricated a series of metallic fuel prototypes to Oklo's specifications that were partially informed by the modeling efforts. This fabrication effort confirmed the manufacturability of Oklo's fuel within required tolerances and provided them with valuable experience to proceed with their reactor's overall design.

BENEFIT: The project helped develop processes and lessons learned and improved accessibility to legacy data to deploy today's advanced reactor concepts. Although the work performed under the Gateway for Accelerated Innovation in Nuclear initiative was specific to the Oklo reactor design, much of the work done has an industry-wide impact.

IMPACT: This is some of the most recent work to demonstrate the viability of metal fuel manufacturing to high specifications and with a relatively low-cost process. The work performed is not limited to Oklo and is applicable and accessible to the entire nuclear community. Oklo was able to take the information and data to support its licensing and manufacturing activities and help accelerate the overall commercialization effort for their reactor concept.

SIGNIFICANT CONCLUSIONS: Decades of successful work achieved within the DOE complex can be leveraged to help accelerate the deployment of a new generation of reactors by overcoming regulatory and technical hurdles. Access to this metal fuel data expertise, legacy data, and fabrication facilities dramatically reduces the commercialization burden on metal fuels.

NEXT STEPS: Oklo will use the assembled legacy data and manufacturing experience as a springboard to commercially scale up the metal fuel manufacturing process. The manufactured fuel will provide core loads for Oklo's first generation of reactors, reducing time to market.