

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

RFA-17-14606, Risk-Informed Mechanistic Source Term Calculations for a Compact Fast Reactor

YEAR AWARDED: 2017

TOTAL PROJECT VALUE: \$710K (DOE funds, \$568K; awardee cost share, \$142K)

STATUS: Completed

PRINCIPAL LAB INVESTIGATORS: Dave Grabaskas (dgrabaskas@anl.gov) and Andrew Clark (ajclark@sandia.gov)

DESCRIPTION: Under this Gateway for Accelerated Innovation in Nuclear (GAIN) voucher, Oklo Inc. (Oklo) partnered with Argonne National Laboratory (ANL) and Sandia National Laboratory (SNL). The ANL-led portion of the Oklo GAIN voucher focused on the coupling of three high fidelity analysis codes for detailed core analysis, an analysis of the Oklo reactor design to assesses the potential for radionuclide release to the environment during accident scenarios, and an assessment and provision of relevant metal fuel data through inspection of post-irradiation examination data from past metal fuel testing. The SNL-led portion of the Oklo GAIN voucher had two primary tasks, the experimental characterization of liquid metal heat pipe performance, failure behavior, and phenomena and the testing of generic heat pipes beyond their design limits, providing original data and insights. These included SNL-developed computer codes, heat pipe design, construction, and filling operations.

BENEFIT: Project results provided wide-ranging impacts for Oklo, from benefitting ongoing design work to informing siting considerations. The results are particularly relevant for locations where Oklo reactor users would benefit from the reactor being located nearby, creating new market opportunities.

IMPACT: Mechanistic source term calculations have quantified unique characteristics of the Oklo reactor, such as small core inventory, low burnup, no coolant inventory, etc., providing insights to design decisions and data that will enable Oklo to get to market quickly.

LESSONS LEARNED: The work done here has been a fundamental step in defining safety by design and will be used to inform a continued focus on safety throughout future design processes.

SIGNIFICANT CONCLUSIONS: Enabling design-specific mechanistic source term calculations for the Oklo powerhouse could serve as a test case for a new mechanistic source term methodology, proving a process to enable the commercialization efforts for Oklo and other advanced reactors.

NEXT STEPS: Oklo will utilize these improved source term analysis methods to enable the design, licensing, and deployment of new products in new markets.

