



U.S. Department of Energy

Validation Experiments for Spent Fuel Pool and Dry Cask Natural Convection

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Program: Used Nuclear Fuel Disposition

ABSTRACT

In this work, we will perform high-fidelity experiments on natural convection in air in a fuel-rod geometry to be used as Computational Fluid Dynamics (CFD) validation data. *Validation of CFD and other codes using these data will provide the necessary confidence to use such codes for nuclear safety and design, reducing cost compared to full-scale tests.* Validation experiments require that all quantities that are input to a CFD code be measured, and that their uncertainty be quantified.

The experimental data will be compared to Computation Fluid Dynamics (CFD) simulations, (performed by both the USU and SNL) also performed as part of this work. We will assess the CFD model's performance for steady and mixed convection for cases with the flow with and against gravity using our unique facility.

All data generated in the proposed work will be deposited in a new validation database under development at INL (NE-KAMS), making them available to a wide range of numerical researchers. Along with the data, all details of the experiment, including all velocity and thermal boundary conditions, inflow conditions, and as-built geometries, will be submitted to the database.

Experiments will be performed in the USU Transient Mixed Convection Wind Tunnel. This unique facility was created specifically for the task of providing flow and thermal validation data for Computation Fluid Dynamics (CFD) for transient and steady mixed convection as well as natural convection.