

NE-20-23944, Thermophysical Property Measurements of NaCl-PuCl₃

TerraPower, a limited liability company and private nuclear energy technology company, located in Bellevue, Washington, is currently developing the Molten Chloride Reactor Experiment (MCRE), which is a zero-power fast reactor using molten sodium chloride and plutonium trichloride eutectic (NaCl-PuCl₃) salt as fuel. This reactor will be the world's first molten chloride fast reactor and directly supports development of the commercial Molten Chloride Fast Reactor, a liquid salt fuel fast reactor using molten salt coolant.

The need for high quality, traceable data that quantifies composition dependencies and measurement uncertainty and informs operating conditions is paramount for proper design in any reactor, especially a liquid fueled molten salt reactor. Completed in collaboration with Argonne National Laboratory, this work in support of the MCRE project will help provide substantial technology readiness benefits for the grid-scale molten chloride fast reactor commercialization project.

Data and experience from MCRE operation will support further development of computer models to be used for licensing of commercial reactors and ideally aid in the reduction of licensing costs. The MCRE project will not only engage industry, it will also provide information to the Nuclear Regulatory Commission to build institutional knowledge regarding fast spectrum, liquid fueled systems, thus of such systems with corresponding improvement in the efficiency of future application reviews.