

Predictive Tools to Assess Safety Margins for Heat Pipe-cooled Reactors

Hussam Zahlan

Objective:

Development of predictive tools to assess accident scenarios and claimed margins for heat pipe-cooled reactors

Federal Stakeholders: Natural Resources Canada, Canadian Nuclear Safety Commission

Results

1. State-of-the art literature review on:

- Heat pipe-cooled reactor design concepts including the AECL/CNL Nuclear Battery, Los Alamos National Laboratory Special Purpose Nuclear Reactor (SPNR), modified SPNR core designs and the Westinghouse e-Vinci micro reactor
- The Idaho National Laboratory (INL) report on SPNR assessment using Phenomena Identification and Ranking Table
- Previous experiments
- Heat pipe technology
- Failure mechanisms

2. Initiated a collaboration basis with Carleton University (Dr. Tarik Kaya)

Expected Outcomes

1. The final product will be a computational tool capable of analyzing heat pipe reactor safety concerns.
2. In the interim, the literature review summarizes the characteristics, and concerns about the proposed reactor conceptual designs and provides a knowledge base serving the future research.

Future Work

- Design of Test Facilities
- Work Plan for Next Years
- Heat Pipe Performance Parameters Study
- Numerical Code Review
- Participation in Conferences
- Neutron Leakage Study
- Procurement of Equipment & Materials
- Facility Installation & Commissioning
- Test Plan, Testing & Test Report
- Computational Tool Development & Validation