

# International Nuclear Energy Research Initiative

## U.S. DEPARTMENT OF ENERGY INTERNATIONAL NUCLEAR ENERGY RESEARCH INITIATIVE DOE/ROK

### ABSTRACT

---

#### Screening of Gas-Cooled Reactor Thermal-Hydraulics and Safety Analysis Tools and Experiment Data Base

**Principal Investigator (U.S.):** T.U.C. Wei, Argonne  
National Laboratory

**Project Number:** 2004-001-K

**Project Start Date:** June 2004

**Principal Investigator (Republic of Korea):** W.J.  
Lee, Korea Atomic Energy Research Institute (KAERI)

**Project End Date:** May 2007

---

Advanced thermal-hydraulic and safety analysis software will have a pivotal role in the design and licensing of advanced reactors—beginning with the Next Generation Nuclear Plant (NGNP)—since it is the first Generation IV system that is likely to be constructed. Consequently, the selection of the tools to be used for advanced reactor thermal-hydraulic analysis and the validation of the selected tools is of crucial importance.

Software with the required capability for analyzing advanced gas-cooled reactor behavior include the ATHENA/RELAP5-3D<sup>©</sup> systems analysis code and the commercial computational fluid dynamics (CFD) codes. In addition, other software tools are also available that have the capability to analyze the behavior of some gas-cooled system configurations for some transients. Hence an effort to evaluate the software that may be used for the various portions of the relevant calculation envelope must be performed. Once the software tools are selected, the software must be validated for all the plant operational and postulated accident regions that will require analysis.

This International-Nuclear Engineering Research Initiative proposal is aimed at: (i) identifying the qualification methodology and the means for defining required thermal-hydraulic experiments for high temperature gas-cooled reactors, (ii) defining a high-level scoping phenomena identification and ranking criteria to identify the dominant phenomena for the NGNP scenarios of interest, (iii) performing initial scaling analyses, (iv) screening the applicability of the existing experimental data base, and (v) performing scoping calculations.

---