

## The Phenomena Identification and Ranking Table for APR-1400 Main Steam Line Break

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### Abstract

A Phenomena Identification and Ranking Table (PIRT) was developed for the Main Steam Line Break (MSLB) event of APR-1400 (Advanced Power Reactor-1400). A team of experts from research institute, industries, and regulatory body contributed to the development. The selected event was double-ended steam line break at full power with reactor coolant pump running. The panels selected the fuel performance as the primary safety criterion for ranking. The plant design data, the results of APR-1400 safety analysis, additional best estimate analysis results by MARS2.1 were utilized. Three phases of pre-trip, rapid cool-down, and safety injection phase are identified. Then, the ranking of a system, components, phenomenon/process based on the relative importance to the primary evaluation criterion are followed for each time phase. Finally, the knowledge-level for each important process in the component is ranked in terms of the existing knowledge.

The highly ranked phenomena identified for APR-1440 MSLB are the tube wall heat transfer at steam generator shell, void distribution at steam generator shell, liquid entrainment in the separators, mixture level in the separators, boron mixing in the upper down comer, boron transport and thermal mixing in the lower plenum, stored energy release in the upper head, and flow to and/from upper head. The PIRT developed in this study will be used as a guide to planning cost effective experimental programs and code development efforts, especially for the quantification of process and/or phenomena, which have high importance but low knowledge level.