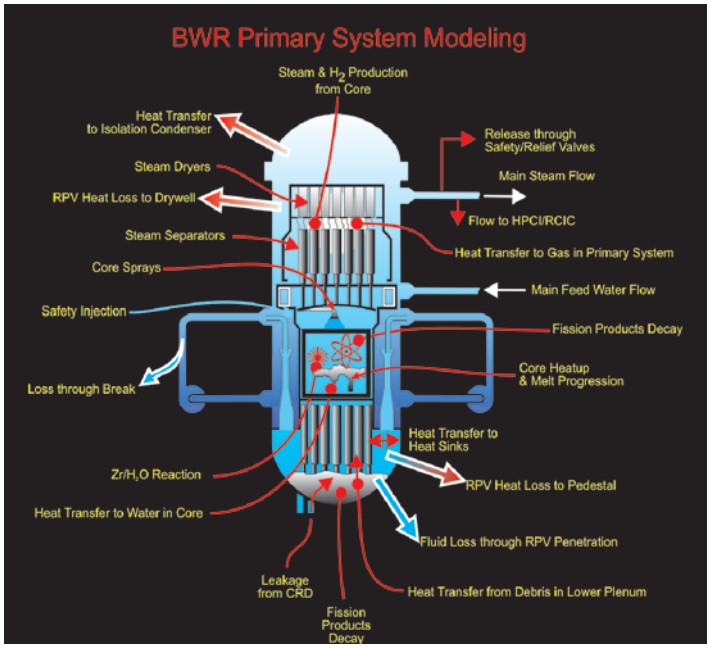
MAAP
(Modular Accident Accident Analysis Program)

The new MAAP4 computer code (including the MAAP4-GRAAPH graphical interface) provides a flexible, efficient, integrated tool for evaluating the in-plant effects of a wide range of postulated accidents and for examining the impact of operator actions on accident progressions.



Background

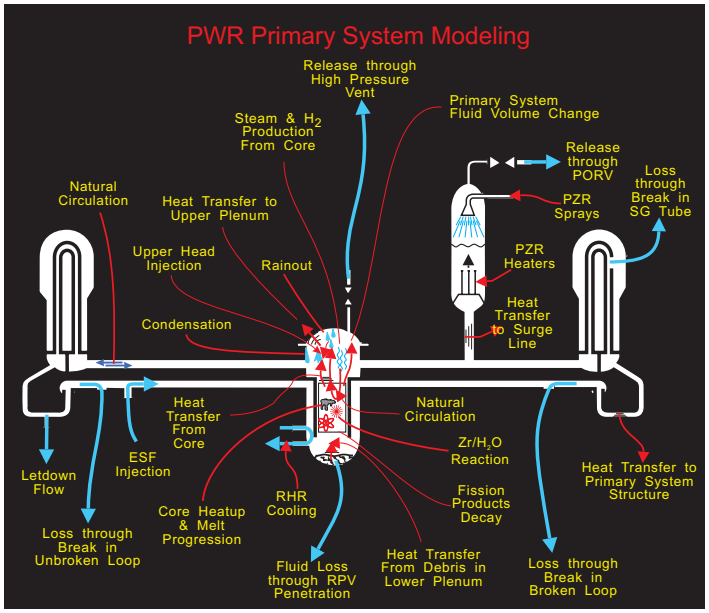
Following the accident at Three Mile Island, the nuclear power industry developed the MAAP computer code as part of the industry degraded core rulemaking (IDCOR) program. Upon dissolution of IDCOR, ownership of the modular code, which features one version for PWRs and one for BWRs, transferred to EPRI, and a period of enhancements began. MAAP has been developed and maintained by Fauske & Associates since the beginning of the code in 1981.

Objective

To provide a useful methodology for analyzing the in-plant effects of a wide range of postulated accidents and possible accident management actions for current design and ALWRs.

Approach

The project team revised the MAAP-3B code to include major model improvements in areas of core heat-up, lower plenum phenomenology, corium-concrete interactions, containment and auxiliary-building thermal hydraulics, and hydrogen combustion. Furthermore, models were added to characterize actions that could stop the accident, i.e., in-vessel cooling, external cooling of the reactor vessel, and ex-vessel cooling. Moreover, the team implemented mathematical solution techniques to maintain a quick-running code suitable for extensive accident screening and parameter sensitivity analysis applications. As part of the development, the code underwent a complete design review.



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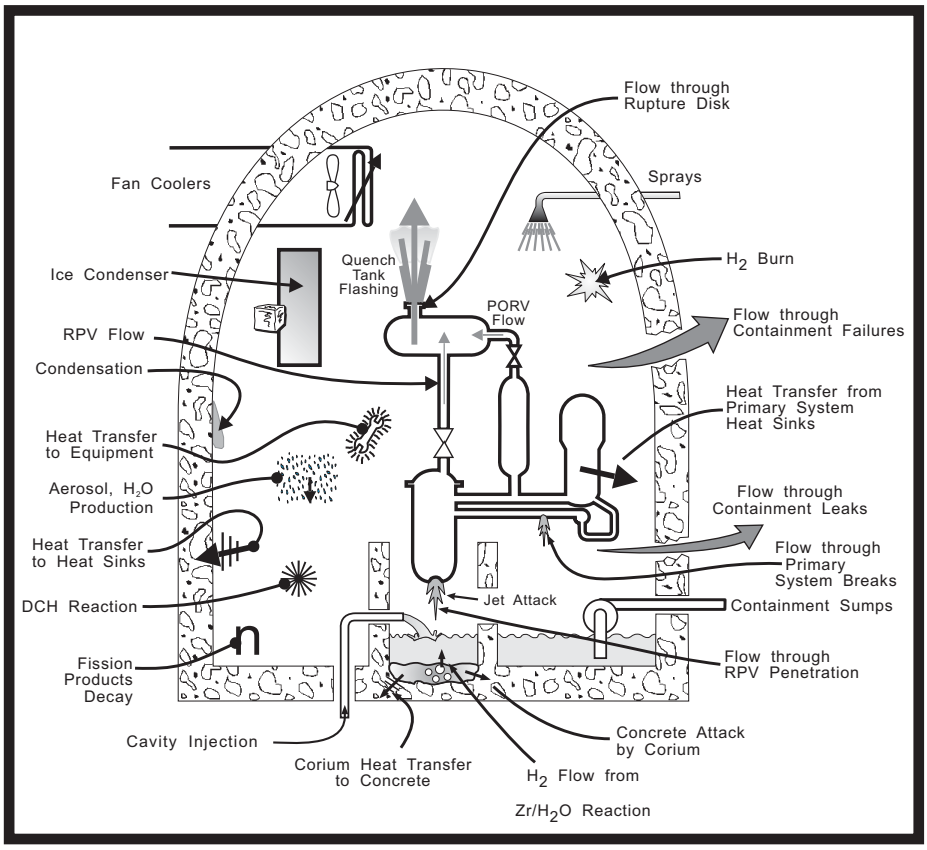
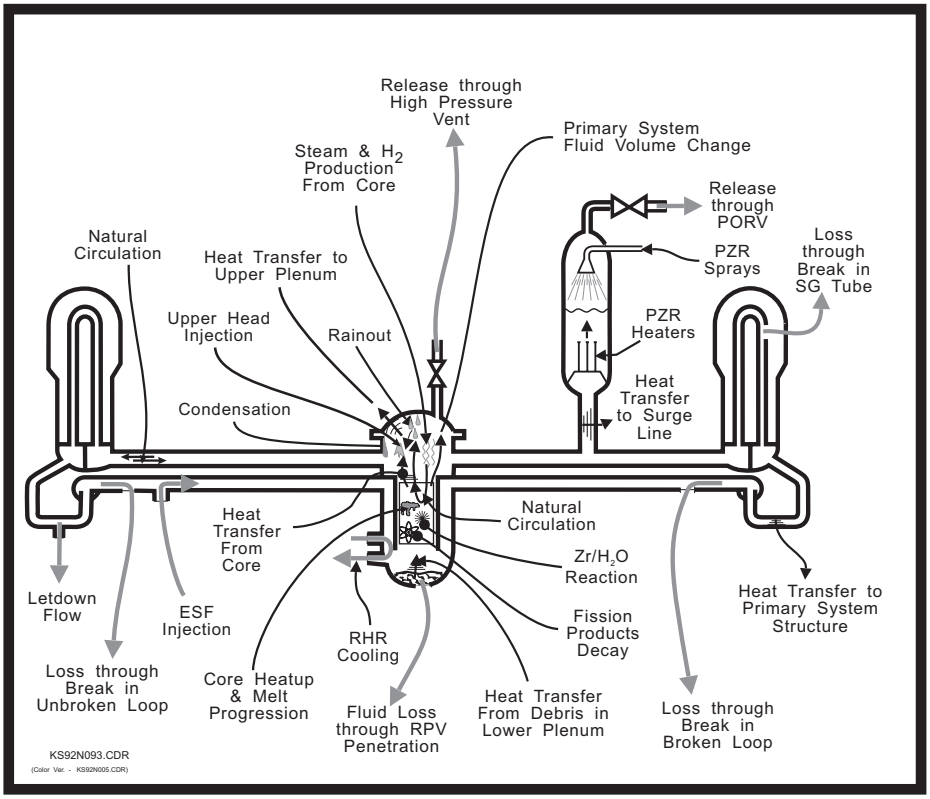
BWR Primary System Modeling



PWR Primary System Modeling



Results

Both PWR and BWR versions of the code can predict the progression of hypothetical accident sequences from a set of initiating events to either a safe, stable, coolable state or to an impaired containment and depressurization. The code, which features restart capability as well as the MAAP4-GRAAPH graphical interface to maximize input and output flexibility, evaluates a wide spectrum of phenomena including steam formation; core heat-up; cladding oxidation and hydrogen evolution; vessel failure; corium-concrete interactions; ignition of combustible gases; fluid entrainment by high-velocity gases; and fission-product release, transport, and deposition. The code also addresses important engineered safety systems and allows a user to model operator interventions. Code documentation consists of four volumes: volume 1 provides general user guidance; volume 2 treats in detail the code's structure, phenomenological modeling, and numerical algorithms, volume 3 documents the integral benchmarks, and volume 4 includes the user's manuals for MAAP4-GRAAPH and MAAP4-DOSE (where applicable).

For more information on the MAAP Code, please contact us:

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