

Monthly Highlights

for

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Application of RAMONA-3B to BWR ATWS\*  
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## Application of RAMONA-3B to BWR ATWS

This project provides detailed, best-estimate, BWR ATWS analyses for the NRC Severe Accident Sequence Analysis (SASA) Program. In particular, several Browns Ferry Unit 1 MSIV closure ATWS analyses are being performed using the RAMONA-3B code with three-dimensional neutron kinetics. These calculations will not only improve understanding of the BWR behavior during an ATWS, but they can also be used for benchmarking similar calculations performed elsewhere by using the point kinetics codes such as RELAP5 and BWR-LACP.

The major activities performed during February 1985 are noted below.

### 1. Presentation at SASA Review Meeting (P. Saha, G. C. Slovik, L. Neymotin and H. R. Connell)

A Detailed presentation of the BNL work on the Browns Ferry MSIV closure ATWS study was made at the NRC SASA Review Meeting on February 20-21, 1985. A RAMONA-3B calculation (Transient No. 1) performed at BNL showed that the reactor power during an MSIV closure ATWS would be in the range of 21% (at 900 psia) to 17% (at 500 psia) when the downcomer water level is maintained at the top of active fuel (TAF) and the reactor vessel is depressurized according to the pressure suppression pool (PSP) heat capacity temperature limit curve as per the new emergency procedure guidelines (EPGs). Also, the PSP bulk water temperature would reach 190°F (potential HPCI failure temperature) at approximately 20 minutes. Thus, other mitigative features such as manual rod insertion (MRI) and boron injection would be required for the safe reactor shutdown.

A second RAMONA-3B calculation assuming the recirculation pump trip failure during the MSIV closure ATWS showed that the reactor vessel pressure would stay below the failure pressure. However, the downcomer water level would drop rapidly. Thus, a quick mitigative action such as recirculation pump trip (manually, if necessary) is required to avoid core damage.

### 2. MSIV Closure ATWS Calculation (L. Neymotin)

In order to close the issue of condensation on HPCI and RCIC water, Transient No. 1 has been recalculated up to 500 seconds including condensation on the falling film of water. The new results are very close to those presented at the above SASA review meeting.

Another calculation with complete condensation, i.e., zero core inlet subcooling, will also be performed as the upper bound of condensation.

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