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Technical Bulletin

No. 1295-2

BWR MSIV LEAKAGE ASSESSMENT: NUREG-1465 vs MAAP 4.0.2

PART II: BWR MSIV LEAKAGE ASSESSMENT

In recognition of the advances made over the past 30 years in the field of reactor safety and severe accident analysis, the NRC has prepared revised accident source terms for regulatory use [NUREG-1465, "Accident Source Terms for Light-Water Reactor Nuclear Power Plants," (February, 1995)]. Although the revised source terms are primarily intended for application to the design of future LWRs, the NRC also allows that, "Current licensees may voluntarily propose applications based upon [the NUREG-1465 revised source term]. Alternatively, as discussed in *FAI Technical Bulletin 1295-1*, EPRI's integrated severe accident code MAAP 4.0.2 can be used to determine plant-specific revised source terms.

One application which is of current interest to licensees is the relaxation of Technical Specification limits by using the NUREG-1465 source terms as the basis for reducing 10CFR part 100 doses. A more specific example is the relaxation of MSIV allowable leakage limits in Boiling Water Reactors (BWRs) based on the revised source terms. The following discussion will present details of a MAAP 4.0.2 assessment of BWR MSIV leakage, including the calculation of 10CFR part 100 doses.

This analysis considers a DBA LOCA with failure of ECCS for a BWR plant with a MARK I containment design, and provides source terms up to the time of vessel failure. The MAAP Generalized Containment Model is used to model the main steam line leak path through the MSIV leakage control system depicted in Figure 1. As shown, fission products released from the core may travel to the primary containment building or leak past the MSIV and be subsequently released to the environment (via the standby gas treatment system and plant stack) or leaked into the control room via the HVAC duct work.

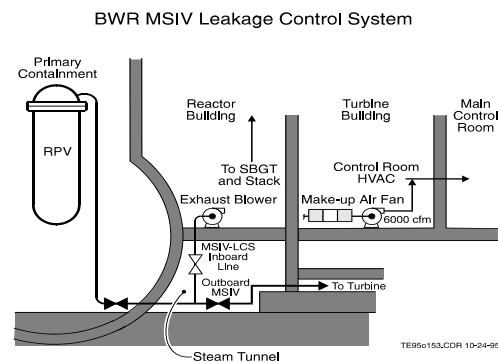


Figure 1 BWR MSIV Leakage Control System

Results of the MAAP calculation are presented in Figures 2 and 3. Figure 2 indicates that volatile fission products are initially released from the vessel around 45 minutes into the accident, and that up to the time of vessel failure, the majority of the released fission products (68%) are transported to the primary containment building. The remaining fission products are either retained in the vessel (32%) or leak past the MSIV (<< 0.1%). Figure 3 shows that the dose at the site boundary due to complete core melt and leakage past the MSIV will be less than 60 rem thyroid dose within 2 hours of accident initiation and within 175 rem at 4 hours. Both of these doses are within the 10CFR part 100 prescribed limits. Similar calculations were performed for fission product leakage into the main control room.

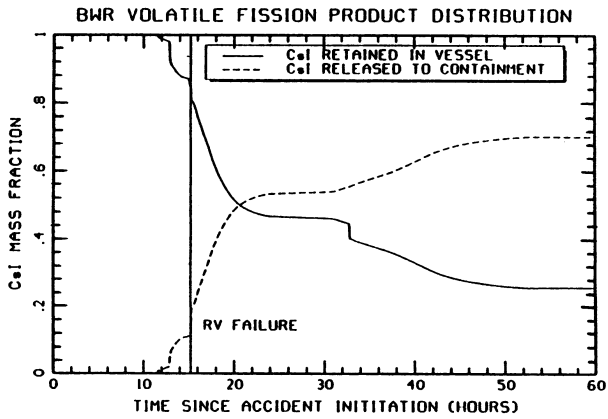


Figure 2 Fission Product Distribution Following a BWR LOCA with ECCS Failure

Please call to obtain additional information on the MAAP4/NUREG-1465 comparison, MAAP 4 benchmarking, and MAAP 4 analyses to support MSIV leakage or other Tech Spec applications.

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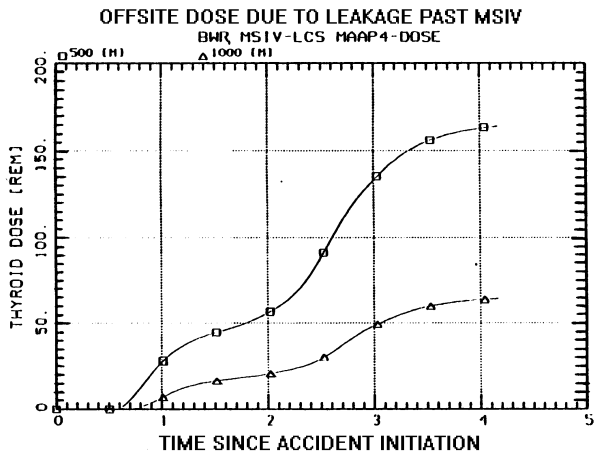


Figure 3 Offsite Dose Computed with MAAP4-DOSE