>>> Jack Cushing 01/07/02 04:20PM >>>
Attached is a position paper from B&WOG on BAW-2374. Please provide me with your comments on whether this provides an acceptable path for resolution of BAW-2374. IF yes what will you need for additional information to complete the review. If no why is it not acceptable. I do not need pages of information, but I would like more than a yes or no.

Thanks

BAW-2374—GROUNDRULES FOR RESOLUTION OF REMAINING ISSUES

Framatome ANP believes the remaining two issues (specifically, long-term cooling and SG thermal load design basis) associated with the approval of BAW-2374 can be resolved to the satisfaction of all parties if we are able to clearly define the specific groundrules under which a reasonable evaluation can be conducted. Specifically, we need (1) to define the accident scenario to be evaluated and (2) to define what portions of the regulations apply to that scenario. Some of the previous discussions have involved a mixture of various, unrelated regulations, which may not be appropriate.

In general, we have agreed that we need to provide for long-term cooling of the core (under the requirements of 10CFR50.46) and that we need to comply with Part 100, which are different aspects of the same criterion.

What has not been agreed upon is the specific assumptions (specifically, the single failures) to be used to evaluate the scenario. For a LOCA evaluation, are the rules of 50.46 and App. K strictly applied; i.e., assuming a single failure that disables only ECCS equipment? If so, then no secondary side isolation failure is required as a part of the design basis analysis. Removing this secondary isolation "single failure" assumption would remove the primary challenge to long-term cooling.

The issue of failure of secondary side isolation was addressed in a different context in Framatome's submittal. The risk informed analysis presented in BAW-2374 went beyond the ECCS failure criterion in order to demonstrate the insignificant effect of a secondary side isolation failure on changes in the CDF (less than 8×10^{-10}) and the LERF (less than 4×10^{-11}). This hypothetical scenario caused a "very small" increase in risk as defined by RG 1.174. Therefore, we concluded that it is acceptable to base the limiting thermal loads for the SG tube, SG tube sheet, SG tube-to-tube sheet joint and associated SG tube repairs on a LOCA in the attached RCS piping or from a main steam line break, and not a large hot leg break.

In summary, for a LOCA under the requirements of 50.46, we need to :

- Apply all the usual LOCA rules.
- Apply the "most damaging single failure of ECCS equipment" (as mandated by App. K), which is typically loss of an emergency DG, but not assume a single failure of secondary isolation (such as an MSIV or MSSV).
- Consider all break sizes and locations for evaluation of the five LOCA criteria.

The remaining issue is to define which transient scenario should be used to define the steam generator design basis thermal load. The risk evaluation presented in BAW-2374 demonstrates that it is acceptable, under RG 1.174, to exclude the thermal load associated with the large hot leg break with a secondary side isolation failure in the SG design basis. Instead, the thermal loading should be based on the limiting attached RCS pipe break (i.e., the limiting SBLOCA, such as from the pressurizer surge line or decay heat

drop line) or a MSLB. This position is supported by the worst case analysis (see Appendix A of BAW-2374) of the maximum possible thermal load for the OTSG design assuming the maximum ECCS flow (that is, no single failure in the ECCS), skewed CFT (core flooding tank) initial conditions, minimum emergency feedwater flow rates, and minimum borated water storage tank temperatures. Use of more realistic assumptions for ECCS flows and temperatures, as well as nominal CFT conditions, would result in reduced tube-to-shell temperature differences, which reduces the number of potential tube failures and any RCS to secondary leakage.

JFM/JAK, 1/3/02, Revised 1/7/02

From: Steve LaVie
To: Chu-Yu Liang; Jack Cushing; James Tatum
Date: 1/7/02 9:26AM
Subject: BAW2374

Jim/Jack

Over the weekend, I read NUREG-0138 "staff discussion of fifteen technical issues....," that was identified to the "task force" as a basis for allowing credit for the turbine stop valves. In that document, I found:

"For loss-of-coolant accidents (LOCA) involving a spontaneous rupture of the primary system boundary, where significant damage to the fuel and a major release of fission products are potential consequences, the most stringent quality and design requirements, including seismic qualification, are imposed on those systems needed to prevent and cope with a LOCA. However, for accidents invvolving spontaneous failures of secondary system piping not part of the the primary system boundary, where the potential consequences are significantly lower, less stringent requirements are imposed on the quality and design of systems needed to cope with the secondary system ruptures."

It is important to note that the discussion in the NUREG was focused on the narrow application to preventing blowing down two steam generators during a MSLB inside containment:

"In evaluating a postulated steam line break accident, the staff assumes that certain "non-safety grade" valves operate when needed to limit both the resultant blowdown to a single steam generator and the consequences of the postulated accident"

Our concern here is not the overpressurization of the containment due to more than one SG blowing down, but rather the loss of ECCS water from the containment and the creation of a containment bypass pathway for the release of radioactive material.

The BAW 2374 issue involves a LOCA with a *consequential* failure of steam generator tubes. With this failure, we are dealing with the primary system boundary. The consequence of the turbine stop not working, is a potential for loss of ECCS and a large release of radioactivity. Also, the turbine stop cannot isolate all of the various penetrations between the MSIV and the turbine stop valves that would now form part of the containment boundary with regard to radioactive releases. For example, if the steam lines are filled with ECCS water, one would expect that the steam traps on the lines would operate as designed, and dump potentially contaminated water to turbine building sumps. These steam traps are simple mechanical devices that are not automatically isolated. I would expect this potential containment bypass leakage to exceed the technical specification containiment leakage. If so, part 100 would not likely be met.

The discussion ended with:

"Thus, the staff believes that it is acceptable to rely on these non-safety grade components in the steam and feedwater systems because their design and performance are compatible with the accident conditions for which they are called upon to function."

I don't believe that the design and performance of the SVs was evaluated to hold back ECCS water as opposed to steam, or to serve as a containment isolation valve to hold back radioactivity. Has an evaluation been done of the potential leakage from all of the components that connect to the steam line between the MSIV and SVs? Can the steam line support the quantity of ECCS water projected to fill the line?

Based on the above, I do not believe that the discussion in NUREG-0138, in of itself, provides a basis

for SPSB to ignore the potential containment bypass If SRXB needs to consider one of the MSIVs has failed open for the 50.46 analysis, I do not believe its appropriate for me to assume it's shut maintaining containment integrity. If it is not shut, then I need to consider leakage from the piping an components downstream of the MSIV. Shutting the SV may resolve the 50.46 concern, but it does little to address Part 100 concerns.

Jim
While I would be happy to meet with you and Chu-Yu on this, I believe that there is a need for the larger group to be in on this discussion.

CC: F. Mark Reinhart; Jay Lee; John Hayes; Kenneth Karwoski; Mark Blumberg; Matthew Mitchell; Michelle Hart; Sarah Colpo; Steven Long; Warren Lyon