NRC List of Items for Discussion at Working Meeting on Risk-Informed Alternative to 10 CFR 50.46

At the October 2, 2000 public workshop on efforts to risk inform the regulatory requirements of Part 50, the NRC agreed to a public meeting with the owner's groups to exchange more detailed information regarding potential changes to loss of coolant accident (LOCA)-related regulatory requirements. In preparation for the meeting, the NRC agreed to provide a list of topics of interest for discussion at the meeting, as would the owner's groups. The meeting is tentatively planned for November 14/15, 2000.

The NRC topics are presented below in the form of questions. The NRC is not requesting the owner's groups to respond to all of the listed questions at the planned meeting. Rather, the questions are being provided with the hope that they will facilitate open, useful, and effective information exchanges.

A. WESTINGHOUSE OWNER'S GROUP ANALYSES IN SUPPORT OF LOCA REDEFINITION

It is NRC's current understanding that the Westinghouse Owner's Group (WOG) intends to use fracture mechanics analyses to demonstrate that breaks in sufficiently large reactor coolant system (RCS) pipes can be excluded as design-basis events. The goal stated by WOG is to demonstrate this for lines greater than or equal to 6 inches in diameter.

Prior licensee analyses in support of the application of leak-before-break (LBB) to eliminate the need to design for dynamic effects were evaluated based on acceptance criteria in NUREG-1061, Volume 3. Research after the publication of NUREG-1061, Volume 3 has identified other factors that may influence the frequency of pipe ruptures.

Question 1: How does the WOG intend to demonstrate LBB behavior for all necessary piping systems for all facilities to which this elimination of the LBLOCA is to apply? The response should describe: (1) how all appropriate technical considerations documented in NUREG 1061, Volume 3 and NRC approvals to date of plant-specific and generic LBB analyses will be addressed, and (2) the mechanisms (plant-specific submittals, bounding topical reports, etc.) by which the WOG will obtain NRC staff approval of LBB analyses to cover any piping systems which have not been previously approved for LBB.

Question 2: How will the WOG synthesize all available supporting information in their overall evaluation to demonstrate specific, or threshold, values for the frequency of large bore piping rupture (including the assessment of uncertainty in the values)?

Background: The draft framework (Attachment 1 to SECY-00-0198) for risk-informing regulatory requirements under Option 3 classifies a set of initiating events as rare if their frequency is demonstrably less than 1E-6 per year. The necessity of considering uncertainties in making such a determination is discussed in Section 4.4.2 of the draft framework document. NRC presentations at prior public meetings have identified several methods that could potentially be used to characterize the current state of knowledge regarding RCS pipe rupture frequencies. These include methods based on:

- the observed frequency of throughwall cracks coupled with models of the probability of pipe rupture given a throughwall crack
- the number of pipe segments and welds (EPRI)
- fracture-mechanics analyses (NUREG-1061, Volume 3)

Question 3: What is the WOG schedule for submitting analyses for NRC review? Will the analyses contain proprietary information? If so, what information will be claimed as proprietary?

B. RISK-IMPACT OF LARGE BREAK LOCA REDEFINITION

Before a set of rare initiating events can be removed from the current set of design basis initiating events, the risk impact of the plant changes that may result needs to meet the criteria set in the framework document. It has been argued by some that new design-basis accidents (DBAs) may be required because the large break LOCA (LBLOCA) has traditionally been used to bound the impact of other potential accidents. Others argue that formal risk assessment methods should be applied to demonstrate acceptable impacts on risk measures such as core damage frequency (CDF) and large early release frequency (LERF).

Question 4: How are LOCAs resulting from failures other than pipe breaks considered, and what are these other failures?

Question 5: Is there a need for alternative design-basis accident(s) for ECCS (e.g. a draindown event), for containment, or for equipment qualification? Why or why not?

Question 6: If alternative DBAs are needed, should there be a different set of DBAs for ECCS, containment and EQ, or could there be a set applicable to all three? Why or why not?

Question 7: How would plant changes implemented as a result of LBLOCA redefinition impact external (e.g., seismic) risks?

Question 8: How would plant changes implemented as a result of LBLOCA redefinition impact low power and shutdown risks?

C. POTENTIAL BENEFITS (e.g., SAFETY) OF LBLOCA REDEFINITION

Question 9: What are the broadly applicable safety benefits of LBLOCA redefinition?

Background: Safety benefits associated with LBLOCA redefinition that would potentially be realized by all plants include:

- Reallocation of licensee and NRC resources from meeting LBLOCA requirements to better addressing risk-dominant accident types,
- Consistency with respect to the design-basis for dynamic effects, ECCS, containment, and equipment qualification,
- More realism in accident progression analyses. Conservative Appendix K calculations of design-basis LBLOCAs could be eliminated. Treatment of

remaining design-basis LOCAs could be based on realistic models. Residual attention to LBLOCAs would be in the context of risk assessments, and could also be based on realistic models but without the need for costly uncertainty quantification.

Question 10: What are the safety benefits of LBLOCA redefinition that may be realized by all or some specific plants? (Please explain/illustrate each benefit, indicating where the benefit would apply to specific NSSS or containment types.)

Background: Potential safety benefits associated with LBLOCA redefinition that might be realized by some but not all plants include:

- Lengthening the required emergency diesel start time would reduce wear associated with start testing and assist in preserving the reliability of the emergency diesel generators
- Lower ECCS set points might result in reliability improvements for other equipment
- Higher fuel peaking limits would permit fuel configurations that yield less radial neutron leakage thereby reducing the threat of pressurized thermal shock
- It may be possible to better optimize ECCS to deal with risk-dominant accident types (care should be taken to assure that the risk of draindown accidents is not increased).
- The increased time-window for switching to hot-leg injection or recirculation for design-basis accidents might lower failure probabilities associated with these switching actions for risk dominant accidents.

Question 11: How many plants would be expected to realize each of the potential safety benefits identified in response to the preceding question? (Where relevant, please provide a breakdown by NSSS and/or containment type.)

Question 12: What criteria are used by licensees to decide on barrel baffle bolt replacement?

Question 13: What impact would LBLOCA redefinition have on plant life extension?

Question 14: How many Westinghouse plants would be expected to realize each of the potential unnecessary burden reduction benefits listed in the May 18, 2000, WOG presentation?

Question 15: What are the potential unnecessary burden reduction benefits of LBLOCA redefinition for B&W and CE plants?

D. IMPACT OF LBLOCA REDEFINITION ON IMPLEMENTING DOCUMENTS & SAFETY ISSUES

At the public meeting on March 17, 2000, the WOG listed SRP/FSAR Sections, Regulatory Guides, Unresolved Safety Issues, and Generic Safety Issues that could potentially be affected by LBLOCA redefinition.

Question 16: How does the WOG envision the listed SRP/FSAR Sections, Regulatory Guides, Unresolved Safety Issues, and Generic Safety Issues would be affected by LBLOCA redefinition?

Question 17: Does the WOG believe that changes to the implementation guidance regarding leak detection (Regulatory Guide 1.145) will be required for LBLOCA redefinition?

E. LOCA-RELATED RISK DATA AND INSIGHTS

Question 18: Are there industry comments on the LOCA-related risk data (pipe break frequencies, LOCA-related CDF, conditional containment failure probability [CCFP], and LERF, etc.) and insights presented at the public workshop on October 2, 2000?

Question 19: Are there updated industry data on LOCA-related event frequencies and probabilities that industry would like to provide to the NRC? What are the nature and bases of this data?

F. OTHER ECCS-PERFORMANCE OPTIONS

Question 20: What is the feedback from industry, if any, on the need to address known non-conservatisms in 50.46 evaluation models?

Question 21: What is the feedback from industry, if any, on the NRC-suggested model selections and values for implementation of the 1979 ANS decay heat standard in Appendix K?

Question 22: What is the interest in industry, if any, in pursuing the option of propagating break size with other uncertainties in the 10 CFR 50.46 best estimate option?

Question 23: What is the feedback from industry, if any, on priorities for potential changes to the technical requirements of 10 CFR 50.46, GDC-35 and Appendix K?

Question 24: Are there any potential safety or economic benefits to BWRs from a revised risk-informed 10 CFR 50.46, GDC-35 and Appendix K, and what would be the nature of these revisions?