From: Thomas Kevern
To: kathy.sedney@ge.com,william1.leonard@ge.com
Date: 02/06/2007 10:20:19 AM
Subject: Fwd: Comments re RAI Responses - Chapt 8 & PRA

Bill:
Attached are staff coomments re responses to RAIs - Chapter 19, severe accidents, and Chapter 8, electrical. I anticipate we will discuss several of the Chapt 19 comments during the containment fragility audit this week. Please contact me if you wish to discuss the attached in a telecon.
Thanks.
Tom

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From: Thomas Kevern
To: Cubbage, Amy; Shuaibi, Mohammed
Date: 01/30/2007 3:48:50 PM
Subject: Comments re RAI Responses - Chapt 8 & PRA

Mohammed & Amy:

FYI. Attached are staff comments on responses to RAIs (electrical 8.x series and PRA 19.x series). These comments were included in memos from G. Wilson & M. Rubin respectively. I"ve worked with individual reviewers to "finalize" - and intend to e-mail to GE this week for review/telecon.

Tom

NRC Staff Comments Regarding Responses to RAI Letter #65
(Reference GE letter MFN 06-484)

1. Response to RAI 8.4-6 (reference MFN 06-484)

   Comments: The response states that GL 80-35, "Effect of a DC Power Supply Failure on ECCS Performance," applies to the BWR 3 and 4 designs but not the ESBWR. Please explain why a DC power supply failure will not affect ESBWR ECCS performance described in DCD Section 6.3.

2. Response to RAI 8.4-7 (reference MFN 06-484)

   Comments: The response makes a commitment and concludes that the ESBWR meets the requirements in question 9 of GL 91-06. However, the conclusion appears premature. Please clarify the conclusion to track the commitment and review question 9 of GL 91-06.

3. Response to RAI 8.4-10 (reference MFN 06-484)

   Comments:

   A. The response lacks justification for not powering the safety-related batteries from a reliable power source. Since batteries are normally floating and the battery chargers are supplying power to the safety-related instrumentation and controls during normal and abnormal operating conditions, they should be powered from a reliable offsite power source so that batteries are not challenged unnecessarily. Please provide amplifying information to address this issue. Additionally, perform a failure modes and effects analysis on the elements in the power flow path from the switchyard and describe how the single source from the transmission network would be protected such that no single failure in the switchyard will fail the circuit.

   B. The response references SECY-95-132 as a basis to justify that active systems after the first 72 hours of an event can be nonsafety-related. However, SECY-95-132 outlines a process and analyses required to reach such a conclusion. Please provide the information pertaining to the SECY-95-132 process.

RAI Number	Comment
19.0.0-1 / 19.2-5	Reference MFN-06-313. The latest version of the ROAAM methodology was provided as an attachment to the response to RAI 19.2-5. Although the list of peer reviewers is identified in the response, this version of the ROAAM report still does not have the Peer Review results requested in the original RAI (19.0.0-1). These results would pertain to the assessment of direct containment heating, ex-vessel steam explosions, and core debris-concrete interactions for ESBWR. The experts' reports and authors' responses are essential to establishing the failure probability values assigned for these phenomena. Please provide these reports and responses.
19.0.0-3 / 19.2-29	Reference MFN 06-059. PRA Table 7.2-5, as modified in response to RAI 19.0.0-3, and Table A.8-1 provide only a qualitative description of the LDW water level, and not the computed water level. Provide the computed water level in the LDW at the time of reactor vessel breach for those sequences where supporting MAAP analyses are available, and for the MAAP cases discussed in PRA Section 8.3.2. Address the impact of the non-safety containment spray system, since the spray system may be operated after the operators have entered the severe accident guidelines, provided the water level in the LDW is less than 0.7m
19.0.0-5	Reference MFN-05-169. The response to RAI 19.0.0-5 refers to Revised Section 21.5.2, for a description of how the LDW sumps are protected. The description focuses on how the BiMAC cavity could accommodate the entire core inventory without the LDW liner being threatened. It does not address liner or penetration attack due to direct impingement or high temperatures during the ~40 seconds that the debris would be held up by the cover plate and the refractory material below it. Please provide an analysis to show that the liner and penetrations (including the LDW equipment hatch and personnel airlock) would not fail during this period.
19.1-8 (b)	Reference MFN 06-257. In sequences with dry CCI, the aerosol loading would be much higher than for wet CCI sequences considered in the RAI response. Address how aerosols would impact PCCS performance and the time to containment venting in dry CCI sequences.
19.1-10	Reference MFN 06-313. The response to RAI 19.1-10 asserts that, during an accident, pipes carrying noncondensable gases would not be subjected to significant loads, so that such events need not be considered in the PRA. The response does not address potential failure due to hydrodynamic or seismic loads. Without seeing a supporting analysis it is difficult to accept this conclusion. Please provide such an analysis.
19.1-18 and 19.2.4-1 / 19.2-2	Reference MFN 06-313. The response provided to RAI 19.1-18 discussed uncertainty and sensitivity analyses related to the EPRI BWR Applications Guidelines. This report only addressed thermal-hydraulic phenomena that are important to predicting severe accident sequences. It did not address severe accident-related model parameters, nor did the response to the RAI. Please document any analyses in which MAAP model parameters were varied, particularly those related to peak drywell pressure during a high-pressure scenario and to the potential for drywell liner failure in sequences where the BiMAC does not function.
19.2-4	Reference MFN 06-313. The response to the RAI does not provide the requested discussion based on the low CDF for ESBWR. The AC-independent fire water system was shown to be important for reducing the CCFP for the ABWR, by providing sufficient water to arrest core-melt progression in-vessel, and thus avert vessel breach. Discuss whether a similar approach would be used for the ESBWR. What would be the risk impact of using an AC-independent fire water system for in-vessel recovery of a damaged core for ESBWR?

19.2-6	Reference MFN 06-257. The response to the RAI provides additional information regarding the vacuum breakers; however, further discussion is needed as follows: (A) Describe the vacuum breaker design features that are provided for the purpose of preventing back-flooding of the suppression pool water into the drywell. Clarify whether these features will be addressed by ITAAC. (B) Figure 6.2-28 does not show the vacuum breaker isolation valve. Provide a figure showing the vacuum breaker and isolation valve. Describe any features provided to protect the isolation valves from pool swell loads (DCD Section 6.2.1.1.2 only discusses protection of vacuum breakers and not the isolation valves). (C) The revised description seems to imply that the ESBWR design has been modified to include automatic vacuum breaker isolation based on proximity sensor indication. Describe the actuation system. Address the potential for spurious isolation of multiple vacuum breaker penetrations and impact on containment response/integrity if all vacuum breakers isolate prior to or during an accident.
19.2-7	Reference MFN 07-013. The probability of vacuum breaker failure can be characterized as the probability of failure on the initial demand (due to failure modes such as maintenance errors, corrosion, embrittlement) plus the probability of failure on a subsequent demand (due to repeated cycling). Based on the response to RAI 19.2-7, the probability of vacuum breaker failure used in the ESBWR PRA (1.0E-4/demand) does not account for these various potential failure modes. The value is low relative to that used in the SBWR PRA (3E-4/demand based on Bayesian analysis of 3000 cycles without a failure), and could be much higher if the probability of failure on the initial demand and on the subsequent demands were explicitly treated (e.g., considering multiple cycles alone, the failure probability would be about 0.01 to 0.001.) Provide additional justification for the probability value. Explicitly consider the potential impact of maintenance errors, corrosion, and embrittlement, as well as the impact of repeated cycling. Consider any operating experience with valves similar to the ESBWR vacuum breaker design
19.2-10	Reference MFN 06-257. Explain the function of the proximity sensors that will be located at the open position. The description of the vacuum breaker isolation valves in Section 4.18.3.1 of the PRA (Revs. 0 and 1) indicates that the valves are motor-operated rather than solenoid operated, as indicated in the response to RAI 19.2-10. Please clarify this discrepancy.
19.2-15	Reference MFN 06-313. There were two parts of this RAI, and the response only addresses part (a). To repeat part (b): Provide a description of system design features, operating procedures, or administrative controls that reduce the likelihood of this operator action.
19.2-17 and 19.2-18	Reference MFN 06-441 & 06-257. Based on the response to RAIs 19.2-17 and -18, the design of the containment vent system has not been completed and is considered beyond the scope of the DCD. Given that containment venting is credited in the Level 2 analysis, sufficient information regarding the vent system should be provided to establish that the credit taken in the PRA is appropriate, e.g., pressure and flow capacity, containment vent valve design features and dependencies. Provide additional information regarding the vent system. In the absence of this information, this system should be removed from the design certification, and assessed for each plant-specific COL submittal.
19.2-19	Reference MFN 06-313. The RAI requested a description of how the deluge downcomers/headers are protected from being disabled by “corium splatter,” corium jets from an off-center head failure, or a missile consequent to RPV head failure. The response implies that there is no protection for these lines, and makes several statements about accident progression that warrant a supporting analysis. Please provide that analysis.

19.2-22	Reference MFN 06-323. The response to RAI 19.2-22 provides an incomplete description of the “final bounding state” of the core debris and heat loads as it would be represented in the BiMAC test program (e.g., mass, composition, temperature distributions). Provide additional details.
19.2-23	Reference MFN 06-313. The response to RAI 19.2-23 regarding BiMAC testing indicated that a conceptual design report would be issued by 10/1/2006, a final design report would be issued by 2/1/2007, and the final BiMAC test report was scheduled for 8/1/2007. Provide the status of the test program and documents. Discuss the role of the COL applicant and any COL action items related to the test program, if applicable.
19.2-24	Reference MFN 06-323. The response to RAI 19.2-24 did not describe any provisions to prevent normal reactor coolant system leakage from entering the BiMAC cavity. Describe any such provisions, as well as provisions for preventing core debris from entering the LDW sumps prior to melt-through of the cover plate.
19.2-25	Reference MFN 07-013. Based on the response to RAI 19.2-25, it appears that the detailed design of the LDW sumps and the specially-shaped piping jacket protecting the sumps, as well as the BiMAC piping configuration, remain to be completed. Describe the following: (a) the schedule for completing the detailed design of the BiMAC piping, (b) the respective responsibilities of the vendor and, if applicable, the COL applicant for completing the design, (c) any COL action items related to completion of the design, and (d) any ITAAC related to construction/verification of the BiMAC system.
19.2-32	Reference MFN 07-013. The response to the RAI provides results of analyses assuming the lower drywell is constructed of either basaltic or limestone concrete. However, the response does not indicate which concrete type will be used in the ESBWR. GE committed to the use of basaltic concrete in the floor of the lower drywell for ABWR. Confirm the use of a specific concrete type for ESBWR given the potential impact of concrete composition on basemat ablation (RAI 19.2-32) and the time of containment venting.