AREVAEPRDCPEm Resource

From: Tesfaye, Getachew
Sent: Monday, March 22, 2010 7:44 AM
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Subject: Draft - U.S. EPR Design Certification Application RAI No. 382 (4539), FSAR Ch. 19 - PHASE 4 RAI
Attachments: Draft RAI_382_SPLB_4539.doc

Attached please find draft RAI No. 382 regarding your application for standard design certification of the U.S. EPR. If you have any question or need clarifications regarding this RAI, please let me know as soon as possible, I will have our technical Staff available to discuss them with you.

Please also review the RAI to ensure that we have not inadvertently included proprietary information. If there are any proprietary information, please let me know within the next ten days. If I do not hear from you within the next ten days, I will assume there are none and will make the draft RAI publicly available.

Thanks,
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Request for Additional Information No. 382(4539), Revision 1

3/22/2010

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation
Application Section: Chapter 19

QUESTIONS for PRA Licensing, Operations Support and Maintenance Branch 2 (ESBWR/ABWR Projects) (SPLB)

19-336

Follow-up to RAI 133, Question 19-243 (OPEN ITEM)

The response to RAI 133, Question 19-243, includes as Appendix A the OSSA Methodology Technical Basis report. The staff has reviewed this document. In order to complete its review, however, the staff needs some additional information as follows:

a) In Section 1 of the OSSA report, reference is made to an “optimized approach” to severe accident management guidelines. Please clarify the specifics of how this optimization was performed and achieved.

b) In Section 2.1, early containment failure is defined to be most consequential in terms of public dose. However, containment bypass states are of a greater potential consequence to public dose than early containment failure. Please discuss any measures that are contemplated to manage steam generator tube rupture or other containment bypass states.

c) How are the other initiators (e.g., external flooding, fires, and seismic events) included in the current OSSA process?

d) Please discuss the reasons for not providing an additional indicator/measured parameter, besides core exit temperature, as a basis for entry into the ECHUR OSSA domain.

e) A correlation between primary system pressure, core outlet temperature, and maximum clad temperature, to determine entry into OSSA is mentioned in Section 4.3.1. Please provide details of the correlation, and define its limits of applicability.

f) In ECHUR, the main accident management action includes RCS depressurization by the opening of PDS valves. Please discuss the rationale for not using the steam generator depressurization system, especially if secondary heat sink is available. If both modes of depressurization were available, which one would be preferred and why?

g) The SAMG termination phase is stated to be based on following trends rather than monitoring a specific parameter. It is recognized that the instrumentation and their associated qualification and set point requirements are planned as part of the OSSA guidance development and implementation. Please discuss what sensors and/or measured parameters will be used to follow the trends/indicators of achieving a stable configuration, given that core exit temperature thermocouples are either not available or not useful.

h) The OSSA methodology addresses all plant operating states, including shutdown and refueling conditions. Section 2.4 outlines actions that would be considered for three categories of shutdown scenarios. Please clarify, for each scenario, the logic presented, particularly as pertinent to accumulator and LHSI injection.

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i) Section 2.4.2 of the OSSA Methodology Technical Basis report states that a list of instrumentation required, and corresponding set points, will be documented during the OSSA development process. The staff needs to review this list to assure that the Technical Basis is truly established. Please either provide the list or propose a COL information item.

j) Please explain why heatup of hot legs, the surge line, and steam generator tubes would be addressed in the core melting phase (Section 3.1.3) and not in the core heatup phase (Section 3.1.2).

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k) Please describe the accident management strategies that would be adopted to cope with possible relocation of core debris after vessel breach into steam generator compartments, pump rooms, and other containment compartments. What are the major issues associated with instrumentation and other equipment in these compartments, given the presence of relocated core debris?

l) Please discuss the provisions that exist to enable the operators to diagnose the potential for reduced effectiveness of Passive Autocatalytic Recombiners (PARs) due to coking, fission product aerosol poisoning, and/or removal of PARs for repairs (under shutdown/refueling modes). In Table 3-1, venting is listed as a potential mitigation strategy, and is again discussed in Section 3.4.6. Please elaborate on the strategies for using other hydrogen control measures under degraded PAR conditions to circumvent potential challenges due to hydrogen combustion. Furthermore, Table 3-1 also lists "Shut down heat sinks." Please explain what structures are being referred to, and show how they can be effective.

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m) Please discuss the AM implications of any degradation in the behavior of the engineering systems (PDS, CGCS, CMSS, SAHRS) designed to mitigate the consequences of severe accidents in the U.S. EPR. For each system, explain how serious system degradation could influence planned OSSA strategies, including use of available instruments and other procedural alternatives.

n) Timely operation of the depressurization valves is part of the accident management strategy and is very important to avert possible induced creep ruptures of hot legs or damaged SG tubes. The response to RAI 133, Question 19-240 showed the amount of time available between when the core exit temperature reaches 1,200°F and when induced SGTR might be expected for varying degrees of tube damage. The results showed that 18 to 20 minutes would be available (assuming a hot leg would not fail first). These results establish the importance of prompt depressurization and the need for a good Human Reliability Assessment (HRA) assessment of the probability of failing to depressurize in time. Please describe how possible delays in primary system depressurization will be addressed in OSSA, and how HRA methods will be utilized in this regard.

o) Table 3-1 does not list ex-vessel steam explosions as a potential challenge. Please explain why this is not considered a challenge. If it is a significant challenge, what actions, if any, would be considered to mitigate the consequences.

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p) Please discuss any downside associated with potential accident management strategies (e.g., shattering of a hot core due to flooding, enhanced oxidation beyond the capacity of PARs resulting in build-up of detonable mixtures in some containment regions, etc.), and how these may influence the implementation of SAMGs.

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q) Regarding the information that the operators need to know (Section 3.4.3), please describe the reasons why the potential "downsides" of particular actions are not listed.

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r) Please explain why the guidance to the TSC director does not provide, at every decision step, an explicit assessment of both the pluses and minuses of the various outcomes related to the situation as it is perceived to actually exist at the time to help the decision-making process.