PMSTPCOL PEmails

From: Tai, Tom
Sent: Tuesday, July 06, 2010 3:24 PM
To: Price, John E
Cc: STPCOL; Mookhoek, William; Chappell, Coley
Subject: STP - Draft RAI 4832 for Chapter 3.8.1
Attachments: RAI 4832 03.08.01-xx.docx

John,

Attached for your information is a draft of RAI 4832 issued for Chapter 3.8.1. the (two) questions are linked to previously responded RAI 03.08.01-6 and -7.

Please let me know if you need a clarification phone call on or before Thursday. I'll be on leave starting Friday (7/9) and I'd like to issue this before I leave.

Regards

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Request for Additional Information No. 4832 Revision 3

South Texas Project Units 3 and 4
South Texas Project Nuclear Operating Co
Docket No. 52-012 and 52-013
SRP Section: 03.08.01 - Concrete Containment
Application Section: FSAR 3.8

QUESTIONS for Structural Engineering Branch 2 (ESBWR/ABWR Projects) (SEB2)

03.08.01-***

Follow-up to Question 03.08.01-6

In its response to Question 03.08.01-6, the applicant addressed some of the issues regarding the watertight doors. However, additional information is needed to completely address all of the issues pertaining to the design of the watertight doors. In order for the staff to complete its review, the applicant is requested to provide the following additional information:

1. In Section 2 of the response, the applicant provided a sketch that shows the location of the watertight door between the Control building and the Radwaste Building Access Corridor. However, the applicant did not include the sketch in the FSAR mark-up provided with the response. Therefore, the applicant is requested to include the sketch in the FSAR to clearly identify locations of all seismic category I watertight doors.
2. In Section 3(a) of the response, the applicant provided loadings and loading combinations for design of watertight doors considering flooding. The staff needs the following clarifications for the loads and load combinations provided in the response:

    a. Since ANSI/AISC N690 and ACI 349 do not specifically address flood loads, please explain how the flood loads and the loading combinations, including the load factors used in loading combinations involving flood load, were determined with reference to applicable industry codes and standards. Please include in FSAR Section 3H.6.4.3.3.4, “Extreme Environmental Flood (FL),” a description of the various components of flood load, e.g., hydrostatic load, hydrodynamic load, impact load from debris transported by flood water, etc., and the corresponding design values used.

    b. The applicant defined pressure load ‘P’ as hydrostatic or differential pressure, and used it in several loading combinations. Please explain why only pressure load ‘P’ need to be considered for design of watertight doors, and not the other components of FL, e.g., hydrodynamic load and load from debris transported by flood.

3. In Section 3(b) of the response, the applicant stated that the doors will be designed in accordance with AISC N690. Since it is not clear which version of

ANSI/AISC N690 was used by the applicant, please confirm that the version of the specification used is the same as that referenced in SRP 3.8.4 and update FSAR accordingly, or provide justification for using a different version.

4. In response to the staff's question regarding design and analysis procedure used for the watertight doors, the applicant stated in Section 3(c) of the response that "the design of the door will be performed in accordance with the requirements of SRP Section 3.8.4." SRP 3.8.4 provides general guidance and acceptance criteria for analysis and design procedure of concrete and steel category I structure. Merely referencing the SRP does not provide any information about the analysis and design procedure used by the applicant. Therefore, the applicant is requested to include in the FSAR a description of the analysis and design procedure including how seismic loads are determined for the watertight doors.

5. In response to the staff's question regarding testing and in-service inspection of the watertight doors, the applicant stated in Section 3(f) of the response, and the FSAR mark-up included in the response, that the watertight doors will allow slight seepage during an external flooding in accordance with criteria for Type 2 closures in U.S. Army Corps of Engineers (COE) EP 1165-2-314. The applicant also stated that this criterion will be met under hydrostatic loading of 12 inches of water above the design basis flood level. The applicant further stated that the water retaining capability of the doors will be demonstrated by qualification tests that shall not allow leakage more than 1/10 gallon per linear foot of gasket when subjected to the specified head pressure plus a 25% margin for one hour. The applicant did not provide in the response any information regarding in-service inspections of the watertight doors. In order for the staff to assess adequacy of the watertight doors and their availability when needed, please provide the following additional information:

    a. The allowable leakage of 1/10 gallon per linear foot of gasket per hour may potentially allow ingress of significant amount of water over time. Please provide justification why this leakage is considered to meet criterion for Type 2 closure, which is defined to form essentially dry barriers or seals, and the basis for the underlying assumption that such leakage will not compromise functionality of any safety related commodity or any other design basis.
    b. Since hydrostatic pressure on the door may help in providing a seal for the door, please explain why testing these doors against the maximum water pressure only is adequate, and will envelope performance of the seals during lower hydrostatic pressure.
    c. Since the applicant did not include in its response any information about the in-service surveillance programs for the watertight doors, and corresponding FSAR update, please explain how availability of the normally open watertight doors during a flooding event is ensured considering that these doors will need to be closed upon indication of an imminent flood.

6. In Section 6 of the response, the applicant states that the access doors between the Reactor Building (RB) and Control building (CB) are not required to be watertight since both buildings are separately protected from design basis flood, and the gap between the two buildings will be sealed using the detail shown in

Figure 03.08-04-15A, which is attached to the response to RAI 03.08.04-15 (see STPNOC letter U7-C-STP-NRC-090160 dated October 5, 2009). The above referenced Figure provides only a conceptual detail of a joint seal between the buried Reactor Service Water (RSW) tunnels, and the RSW Pump House and the Control Buildings. In its response to a subsequent follow-up question 03.08.04-25 for the above referenced joint seal, the applicant provided additional design criteria for the seals to accommodate differential movements across the seal, and explained that because of the low rate with which groundwater can flow through the seal if it were to fail in any particular location, the in-leakage of groundwater is a housekeeping issue and not a safety concern. Since the seals for the gaps between the RB and the CB are credited to prevent ingress of flood water into these buildings and provide protection to safety related commodities against flooding, reference to the joint seals used for the RSW tunnels does not adequately address the issue of ingress of flood water and potential damage to safety related components. Therefore, the applicant is requested to include in the FSAR a description of the seal between the RB and the CB including information about seismic classification, performance demand, qualification, and in-service inspection of the seal to demonstrate that the seals will be capable of preventing flood water from entering these buildings under all postulated design basis loading conditions.

The staff needs the above information to conclude that the watertight doors are designed for appropriate loads and load combinations, pertinent design information per guidance provided in SRP 3.8.4 are included in the FSAR, and there is reasonable assurance that the normally open watertight doors will be available during a flooding event.

03.08.01-***

Follow-up to Question 03.08.01-7

In response to Question 03.08.01-7, Section (1), the applicant provided details of how the out-of-plane shear and moment demands for flood and seismic loads were determined. The staff notes that the applicant in its response did not consider loading due to floating debris for computing shear and moment demands for flood. Also, the applicant implicitly used the loading combination for flood load as shown in FSAR Section 3H.6.4.3.4.3. This loading combination is not included in ACI 349, “Code Requirements for Nuclear Safety Related Concrete Structures,” as referenced in SRP 3.8.4. Further, computations of shear and moment demands due to flood loading for the RB and CB walls appear to be incorrect for the assumed boundary conditions for the wall sections. Therefore, in order for the staff to be able to conclude that the ABWR standard plant structures are capable of withstanding the site-specific flood load, the applicant is requested to provide the following additional information:

1. Please include the effect of debris in flood water in the evaluation of representative wall elements of the Reactor Building (RB) and the Control Building (CB) for design basis flood. The staff notes that in its response to Question 03.08.04-22, the applicant had considered loading due to debris in flood water by considering the unit weight of flood water to be 80 pounds per

cubic foot (pcf). Please provide justification for assumed debris loading with reference to industry standards and codes, as applicable.

2. Please provide the basis for the loading combination used for flood loading with reference to applicable industry codes and standards.
3. Please review the computations for shear and moment demands due to flood for RB and CB wall sections included in the response, and correct them, as needed.