

## ArevaEPRDCPEm Resource

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**From:** Pederson Ronda M (AREVA NP INC) [Ronda.Pederson@areva.com]  
**Sent:** Monday, July 13, 2009 3:47 PM  
**To:** Tesfaye, Getachew  
**Cc:** BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); DUNCAN Leslie E (AREVA NP INC)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 230, FSARCh. 14  
**Attachments:** RAI 230 Response US EPR DC.pdf

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 230 Response US EPR DC.pdf," provides technically correct and complete responses to 4 of 28 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 230 Questions 14.03.02-16, 14.03.02-25, and 14.03.02-31.

The following table indicates the respective pages in the response document, "RAI 230 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

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A complete answer is not provided for 24 of the 28 questions. The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 230 — 14.03.02-13, Part a	October 30, 2009
RAI 230 — 14.03.02-13, Part b	September 30, 2009
RAI 230 — 14.03.02-14	September 30, 2009
RAI 230 — 14.03.02-15	September 30, 2009
RAI 230 — 14.03.02-17	September 30, 2009
RAI 230 — 14.03.02-19	September 30, 2009
RAI 230 — 14.03.02-20	September 30, 2009
RAI 230 — 14.03.02-21	September 30, 2009
RAI 230 — 14.03.02-22	October 30, 2009
RAI 230 — 14.03.02-23	October 30, 2009
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RAI 230 — 14.03.02-26	September 30, 2009
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RAI 230 — 14.03.02-30	October 30, 2009
RAI 230 — 14.03.02-32	September 30, 2009
RAI 230 — 14.03.02-33	September 30, 2009
RAI 230 — 14.03.02-34	October 30, 2009
RAI 230 — 14.03.02-35	October 30, 2009
RAI 230 — 14.03.02-36	October 30, 2009
RAI 230 — 14.03.02-38	September 30, 2009
RAI 230 — 14.03.02-39	October 30, 2009
RAI 230 — 14.03.02-40	October 30, 2009
RAI 230 — 14.03.02-41	October 30, 2009

Sincerely,

*Ronda Pederson*

[ronda.pederson@areva.com](mailto:ronda.pederson@areva.com)

Licensing Manager, U.S. EPR Design Certification

**AREVA NP Inc.**

An AREVA and Siemens company

3315 Old Forest Road

Lynchburg, VA 24506-0935

Phone: 434-832-3694

Cell: 434-841-8788

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**From:** Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]

**Sent:** Friday, June 12, 2009 3:56 PM

**To:** ZZ-DL-A-USEPR-DL

**Cc:** Jeng, David; Xu, Jim; Patel, Jay; Jennings, Jason; Miernicki, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource

**Subject:** U.S. EPR Design Certification Application RAI No. 230 (2794), FSARCh. 14

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on May 19, 2009, and discussed with your staff on June 9, 2009. Draft RAI Questions 14.03.02-14, 14.03.02-22, and 14.03.02-31 were modified as a result of that discussion. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,  
Getachew Tesfaye  
Sr. Project Manager  
NRO/DNRL/NARP  
(301) 415-3361

**Hearing Identifier:** AREVA\_EPR\_DC\_RAIs  
**Email Number:** 647

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**Created By:** Ronda.Pederson@areva.com

**Recipients:**

"BENNETT Kathy A (OFR) (AREVA NP INC)" <Kathy.Bennett@areva.com>  
Tracking Status: None  
"DELANO Karen V (AREVA NP INC)" <Karen.Delano@areva.com>  
Tracking Status: None  
"DUNCAN Leslie E (AREVA NP INC)" <Leslie.Duncan@areva.com>  
Tracking Status: None  
"Tesfaye, Getachew" <Getachew.Tesfaye@nrc.gov>  
Tracking Status: None

**Post Office:** AUSLYNCMX02.adom.ad.corp

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**Response to**

**Request for Additional Information No. 230 (2794), Revision 0**

**6/12/2009**

**U. S. EPR Standard Design Certification**

**AREVA NP Inc.**

**Docket No. 52-020**

**SRP Section: 14.03.02 - Structural and Systems Engineering - Inspections, Tests,  
Analyses, and Acceptance Criteria**

**Application Section: 14.3.2**

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

**Question 14.03.02-13:**

**Follow-up to RAI Question 14.03.02-11- 1**

The staff finds the revised Tier 1 design descriptions and ITAAC tables have been improved with the additional information and are consistent in the manner in which safety functions have been addressed. However the level of detail is not consistent with other design certifications. The applicant is requested to provide additional information to include the following:

- a. Some key dimensions have been provided for each of the structures. The bases for the selections should also be provided. As currently presented in the markup, it is not clear if all key dimensions have been included or what the safety significance is for the dimensions that have been provided.
- b. In its response the applicant stated that the U.S. EPR FSAR Tier 1, Section 2.1 will be revised to provide additional details regarding the basis for protection against pressurization effects associated with postulated rupture of pipes. This detail was not found in the referenced section. The applicant is requested to provide the information it identified in its response to item h of RAI 132, Question 14.03.02-11-1.

**Response to Question 14.03.02-13:**

- a. A response to this question will be provided by October 30, 2009.
- b. A response to this question will be provided by September 30, 2009.

**Question 14.03.02-14:**

Tier 1, Section 2.1 does not identify floor elevations. It is difficult to determine where a particular plan view belongs in each structure. The staff requests that floor elevations be added to the elevation views. Also in Figure 2.1.1-1 the designation for dimension D1 is missing in the figure and should be corrected.

**Response to Question 14.03.02-14:**

A response to this question will be provided by September 30, 2009.

**Question 14.03.02-15:**

In SRP 14.3.2, SAC-08, for internal flood, it states that ITAAC should require inspections to verify that penetrations in division walls are at least 2.5 M above the floor and safety-related electrical, instrumentation, and control equipment are located at least 20 cm above the floor surface. The staff requests inspections for these features be added to the ITAAC tables or provide justification for not doing so.

**Response to Question 14.03.02-15:**

A response to this question will be provided by September 30, 2009.

**Question 14.03.02-16:**

In ITAAC table 2.1.1-8, Item 2.7, under “Commitment Wording” it states the RBA is separated from the SBs and the FB by barriers, doors, dampers, and penetrations that have a minimum 3-hour fire rating, as indicated on Figure 2.1.1-20. However, there is no indication of fire barriers in this Figure. The staff is requesting that the Figure be corrected or the correct reference be provided.

**Response to Question 14.03.02-16:**

The Commitment Wording for U.S. EPR FSAR Tier 1, Section 2.1.1, Item 2.7 and Table 2.1.1-8, Item 2.7 will be revised to state that “the RBA is separated from the SBs and the FB by an internal hazard protection barrier that has a minimum 3-hour fire rating, as indicated on Figure 2.1.1-20.” The specific doors, dampers, and penetrations will be identified in the Inspection, Tests and Analysis items for fire protection analysis and inspections.

**FSAR Impact:**

U.S. EPR FSAR Tier 1, Section 2.1.1 and Table 2.1.1-8 will be revised as described in the response and indicated on the enclosed markup.

**Question 14.03.02-17:**

In ITAAC table 2.1.1.8, item 2.6 under Commitment Wording states that the RCB is a post-tensioned, pre-stressed concrete structure. Under Inspection Analysis or Test it states that inspection of the RCB will be performed, but does not state how this inspection is related to the commitment wording or what the purpose of the inspection is. The staff is requesting that the wording under Inspection Analysis or Test be revised to state what will be inspected and for what purpose it will be inspected and the Acceptance Criteria be revised accordingly. The staff further requests that the inspection involve more than confirming that the RCB is a post-tensioned structure.

**Response to Question 14.03.02-17:**

A response to this question will be provided by September 30, 2009.

**Question 14.03.02-19:**

In Tier 1, Section 2.1 no information has been provided for the Turbine Building. However the Turbine Building (TB) is adjacent to the Safeguards Buildings 2 and 3. The failure of the TB could impact the safety function of the two Safeguard Buildings. If the TB is designed so that it will not fail under earthquake load or tornado load and thus not collapse on adjacent safety related structures, then a Tier 1 description of this building needs to be provided along with appropriate ITAAC to verify it will not collapse. If it can collapse, then its collapse needs to be addressed as a design load on the adjacent safety-related structures in Tier 1, Section 2.1.1 and an ITAAC item added to Table 2.1-7. Provide the appropriate information in a revision to FSAR Section 2.1.

**Response to Question 14.03.02-19:**

A response to this question will be provided by September 30, 2009.

**Question 14.03.02-20:**

EPR FSAR Table 2.1.1-7—Nuclear Island Inspections, Tests, Analyses, and Acceptance Criteria states in item 4.3 under the Commitment Wording column the following:

The RCB as described in Section 2.1.1, and its penetrations as described in Section 3.5, Containment Isolation, retain pressure boundary integrity associated with the RCB design pressure.

This ITAAC item 4.3 should include specific approach for implementing the pressure testing requirements of RCB and its associated components per ASME Section III, Division 2, Section CC-6000. However, the specific wording used under the "Acceptance Criteria" column is very vague in terms of RCB pressure test requirements, and may be interpreted as only pertains to components identified in Table 3.5.1-1 which does not include RCB.

Provide a RCB specific ITAAC table committing that the RCB pressure boundary retains its structural integrity when subject to design pressure, and under Inspection, Analysis and Tests column state that a Structural Integrity Test (SIT) of the RCB is performed in accordance with Article CC-6000 of ASME Code Section III, Division 2 and Regulatory Guide 1.136, after completion of the RCB construction, and the first prototype RCB will be instrumented to measure strains per ASME Code Section III, Division 2, CC-6000.

Lastly, under the Acceptance Criteria column of the table, state that test report documents that the RCB pressure boundary retains its structural integrity when tested and evaluated in accordance with ASME Code Section III, Division 2 at a test pressure of at least 115% of the design pressure.

**Response to Question 14.03.02-20:**

A response to this question will be provided by September 30, 2009.

**Question 14.03.02-21:**

In Tier 1, FSAR Section 4.5, it states that the COL applicant will provide the design of the new and spent fuel storage racks. It also states that the COL applicant will demonstrate that the design satisfies the criticality analysis requirements and describe the results of the analyses for abnormal load conditions. The COL applicant will also describe the confirmatory structural dynamic analyses, stress analyses, and thermal-hydraulic cooling analyses. In Tier 1, FSAR Section 4.0 it states an applicant for a COL that references the Certified Design must provide design features or characteristics that comply with the interface requirements for the plant design and inspections, tests, analyses, and acceptance criteria (ITAAC) for the site-specific portion of the facility design, in accordance with 10 CFR 52.79(c) and that the intent is that the interface requirements in the Final Safety Analysis Report (FSAR) define key, safety-significant design attributes and performance characteristics of the site specific, out-of-scope portion of the plant which must be provided in order for the certified portions of the U.S. EPR standard design to comply with the design commitments in the FSAR. Although it is clear that the COL applicant is responsible for the design and analysis of the new and spent fuel racks it does not appear that the interface requirements defining the key, safety-significant design features and attributes the new and spent fuel pool racks must provide in order for the certified portions of the U.S. EPR standard design to comply with the design commitments in the FSAR have been stated. The staff is requesting that the interface requirements that the new and spent fuel racks must meet be provided in the FSAR.

**Response to Question 14.03.02-21:**

A response to this question will be provided by September 30, 2009.

**Question 14.03.02-22:****Follow-up to RAI Question 14.03.02-11- 2**

The level of detail provided in the enclosed markup is not consistent with other design certifications and does not meet the acceptance criteria of SRP 14.3, Appendix C or SRP 14.3., SAC-02. The Building Structures Checklist found in Appendix C of SRP 14.3 states that design descriptions should provide enough dimensions for a COL applicant to develop dynamic models for seismic analysis. Information meeting the acceptance criteria has not been provided in either the Tier 1 design descriptions for structures or in the accompanying ITAAC tables. In addition, SRP 14.3, SAC-02 states that key dimensions of structures be provided. As the safety functions of seismic Category I structures includes providing barriers for protection against missile impact, pipe whip, jet impingement, flooding, etc. the key dimensions of these safety-related features should be included in the design descriptions and referenced in the ITAAC tables. The approach should be similar to what was done for radiation barriers listed in Table 2.1.1-3. The staff is requesting that this information be included in the revision to U.S. EPR FSAR Tier 1, Section 2.1 not only for the NI Common Basemat Structures, but also for the EPGB and ESWB.

**Response to Question 14.03.02-22:**

A response to this question will be provided by October 30, 2009.

**Question 14.03.02-23:****Follow-up to RAI Question 14.03.02-11- 3**

The level of detail provided in the enclosed markup is not consistent with other design certifications and does not meet the acceptance criteria of SRP 14.3, Appendix C or SRP 14.3.2, SAC-02. The Building Structures Checklist found in Appendix C of SRP 14.3.2 states that design descriptions should provide enough dimensions for a COL applicant to develop dynamic models for seismic analysis. Information meeting the acceptance criteria has not been provided in either the Tier 1 design descriptions for structures or in the accompanying ITAAC tables. In addition, SRP 14.3.2, SAC-02 states that key dimensions of structures be provided. As the safety functions of seismic Category I structures includes providing barriers for protection against missile impact, pipe whip, jet impingement, flooding, etc. the key dimensions of these safety-related features should be included in the design descriptions and referenced in the ITAAC tables. The approach should be similar to what was done for radiation barriers listed in Table 2.1.1-3. The staff is requesting that this information be included in the revision to U.S. EPR FSAR Tier 1, Section 2.1 not only for the NI Common Basemat Structures, but also for the EPGB and ESWB.

**Response to Question 14.03.02-23:**

A response to this question will be provided by October 30, 2009.

**Question 14.03.02-24:****Follow-up to RAI Question 14.03.02-11- 5**

The level of detail provided in the enclosed markup is not consistent with other design certifications and does not meet the acceptance criteria of SRP 14.3, Appendix C or SRP 14.3.2, SAC-02. The Building Structures Checklist found in Appendix C of SRP 14.3.2 states that design descriptions should provide enough dimensions for a COL applicant to develop dynamic models for seismic analysis. Information meeting the acceptance criteria has not been provided in either the Tier 1 design descriptions for structures or in the accompanying ITAAC tables. In addition, SRP 14.3.2, SAC-02 states that key dimensions of structures be provided. As the safety functions of seismic Category I structures includes providing barriers for protection against missile impact, pipe whip, jet impingement, flooding, etc. the key dimensions of these safety-related features should be included in the design descriptions and referenced in the ITAAC tables. The approach should be similar to what was done for radiation barriers listed in Table 2.1.1-3. The staff is requesting that this information be included in the revision to U.S. EPR FSAR Tier 1, Section 2.1 not only for the NI Common Basemat Structures, but also for the EPGB and ESWB.

**Response to Question 14.03.02-24:**

A response to this question will be provided by October 30, 2009.

**Question 14.03.02-25:**

**Follow-up to RAI Question 14.03.02-11- 6**

Item 2.2 in Table 2.1.1-8 for the Reactor Building is intended for addressing prevention of water ingress into the core melt spreading area. Under "Acceptance Criteria" it references a water tight door shown in Figure 2.1.1-4. However, the door is not shown in the referenced figure. The staff is requesting that the figure be corrected.

**Response to Question 14.03.02-25:**

The water tight door identified in U.S. EPR FSAR Tier 1, Section 2.1.1, Item 2.2 and Table 2.1.1-8, Item 2.2 is not a safety-significant design feature and should not be included as part of the ITAAC item. Therefore, the reference to the water tight door will be removed from U.S. EPR FSAR Tier 1, Section 2.1.1, Item 2.2 and Table 2.1.1-8, Item 2.2.

**FSAR Impact:**

U.S. EPR FSAR Tier 1, Section 2.1.1 and Table 2.1.1-8 will be revised as described in the response and indicated on the enclosed markup.

**Question 14.03.02-26:****Follow-up to RAI Question 14.03.02-11- 7**

The staff has reviewed the revised markup and has determined that additional information is required. In reviewing U.S. EPR FSAR Table 3.3.1, item 1.0 there is no mention of pressure test requirements. In the revised markup the commitment wording for a pressure integrity test is found in Table 2.1.1.8 (Reactor Building ITAAC) under item 2.5. The Commitment Wording for this item should be revised to include the penetration assemblies. Under Inspection, Analysis or Test, item 2.5.a should be reworded to state that an analysis of the RCB including its liner and penetration assemblies will be performed against the applied design pressure per ASME Code Section III design requirements. This analysis will be reconciled against the final as-built installation. Item 2.5.b should be reworded to state that Inspections will be performed against the construction drawings to determine the final as-built installation. Item 2.5.c should be reworded to state that a test report documents that a Structural Integrity Test (SIT) of the containment structure is performed in accordance with Article CC-6000 of ASME Code Section III, Division 2 and Regulatory Guide 1.136. The first prototype containment structure will be instrumented to measure strains per ASME Code Section III, Division 2, CC-6221. Under Acceptance Criteria, item 2.5.a should be reworded to state that the analysis of the RCB including its liner and penetration assemblies has been reconciled with the as-built condition and ASME Code Section III stress reports exist and conclude the ASME III design code requirements have been met. Under item 2.5.b it should state that the RCB including its liner and penetrations has been inspected to the as-installed condition against the final construction drawings. Under item 2.5.c, it should state that a test report exists that documents the containment system pressure boundary retains its structural integrity when tested and evaluated in accordance with ASME Code Section III, Division 2 at a test pressure of at least 1.15 times the design pressure.

**Response to Question 14.03.02-26:**

A response to this question will be provided by September 30, 2009.

**Question 14.03.02-27:****Follow-up to RAI Question 14.03.02-11- 10**

The level of detail provided in the enclosed markup is not consistent with other design certifications and does not meet the acceptance criteria of SRP 14.3, Appendix C or SRP 14.3.2, SAC-02. The Building Structures Checklist found in Appendix C of SRP 14.3.2 states that design descriptions should provide enough dimensions for a COL applicant to develop dynamic models for seismic analysis. Information meeting the acceptance criteria has not been provided in either the Tier 1 design descriptions for structures or in the accompanying ITAAC tables. In addition, SRP 14.3.2, SAC-02 states that key dimensions of structures be provided. As the safety functions of seismic Category I structures includes providing barriers for protection against missile impact, pipe whip, jet impingement, flooding, etc. the key dimensions of these safety-related features should be included in the design descriptions and referenced in the ITAAC tables. The approach should be similar to what was done for radiation barriers listed in Table 2.1.1-3. The staff is requesting that this information be included in the revision to U.S. EPR FSAR Tier 1, Section 2.1 not only for the NI Common Basemat Structures, but also for the EPGB and ESWB.

**Response to Question 14.03.02-27:**

A response to this question will be provided by October 30, 2009.

**Question 14.03.02-28:**

**Follow-up to RAI Question 14.03.02-11- 11**

SRP 14.3, Appendix C, Building Structures Checklist states that the acceptance criteria for an ITAAC item verifying the structural capability of a building to withstand design basis loads should be the existence of a structural analysis report which concludes the as-built building is able to withstand design basis loads. The applicant is requested to add this language to the "Acceptance Criteria" for Items. This should be included in the applicant's markup under "Acceptance Criteria" for Item 2.4 in Table 2.1.1-8, Item 2.1 in Table 2.1.1-10, Item 2.1 in Table 2.1.1-11, Item 3.4 of Table 2.1.2-3, and Item 3.5 of Table 2.1.5-3.

**Response to Question 14.03.02-28:**

A response to this question will be provided by September 30, 2009.

**Question 14.03.02-29:**

**Follow-up to RAI Question 14.03.02-11- 13**

The FSAR markups for the referenced buildings now contain the appropriate design basis loads and are included in the ITAAC table for each structure. However, under the “Inspection, Analysis or Test” column there is no requirement for a final inspection and reconciliation of the as-built condition to the design basis loads. This should be done to address the cumulative effect of construction changes and to address the final loads and locations of these loads imposed by supported equipment and suspended systems. The applicant is requested to add this requirement under the “Inspection, Analysis or Test” column for each seismic Category I structure ITAAC table for the “Commitment Wording” item that addresses design basis loads. The need for a structural analysis report as part of the “Acceptance Criteria” is addressed in the staff assessment and supplementary RAI 14.03.02-11 –2 S1.

**Response to Question 14.03.02-29:**

A response to this question will be provided by September 30, 2009.

**Question 14.03.02-30:**

**Follow-up to RAI Question 14.03.02-11- 16**

The staff believes the barrier thicknesses are a key dimension and should be provided.

The level of detail provided in the enclosed markup is not consistent with other design certifications and does not meet the acceptance criteria of SRP 14.3, Appendix C or SRP 14.3.2, SAC-02. The Building Structures Checklist found in Appendix C of SRP 14.3.2 states that design descriptions should provide enough dimensions for a COL applicant to develop dynamic models for seismic analysis. Information meeting the acceptance criteria has not been provided in either the Tier 1 design descriptions for structures or in the accompanying ITAAC tables. In addition, SRP 14.3.2, SAC-02 states that key dimensions of structures be provided. As the safety functions of seismic Category I structures includes providing barriers for protection against missile impact, pipe whip, jet impingement, flooding, etc. the key dimensions of these safety-related features should be included in the design descriptions and referenced in the ITAAC tables. The approach should be similar to what was done for radiation barriers listed in Table 2.1.1-3. The staff is requesting that this information be included in the revision to U.S. EPR FSAR Tier 1, Section 2.1 not only for the NI Common Basemat Structures, but also for the EPGB and ESWB.

**Response to Question 14.03.02-30:**

A response to this question will be provided by October 30, 2009.

**Question 14.03.02-31:****Follow-up to RAI Question 14.03.02-11- 17**

The response and revised markups are acceptable except that for the following. Under “Inspection, Analysis or Test” for the RB in Table 2.1.1-8, Item 2.7 Part b it states that inspection of as-installed conditions of barriers, doors, dampers and penetrations as determined in the part (a) analysis [for fire protection] will be performed. However, in Item 2.2 in Table 2.1.1-10 for the SB, Item 2.2 in Table 2.1.1-11 for the FB, Item 3.3 in Table 2.1.2-3 for the EPGB and Item 3.4 in Table 2.1.5.3 for the ESWB, it states that inspection of the as-installed conditions of barriers, doors, dampers and penetrations will be performed. The Inspection Test or Analysis for these latter structures is not specific to fire protection of fire barriers, nor does it require, as it does for the RB that inspection specific to the part (a) analysis be performed. The staff is requesting that this be corrected in the tables for the SB, FB, EPGB and ESWB such that the item for fire protection is consistent with that of the RB.

**Response to Question 14.03.02-31:**

The following items in U.S. EPR FSAR Tier 1 will be revised to be consistent with Table 2.1.1-8, Item 2.7 Part b:

- Table 2.1.1-10, Item 2.2 for the Safeguards Buildings
- Table 2.1.1-11, Item 2.2 for the Fuel Building
- Table 2.1.2-3, Item 3.3 for the Emergency Power Generating Building
- Table 2.1.5-3, Item 3.4 for the Essential Service Water Building.

**FSAR Impact:**

U.S. EPR FSAR, Tier 1, Section 2.1 will be revised as described in the response and indicated on the enclosed markup.

**Question 14.03.02-32:**

**Follow-up to RAI Question 14.03.02-11- 18**

In the markup to U.S. EPR FSAR Tier 1, Section 2.1 for protection from the dynamic effects of pipe breaks, in Table 2.2.1-4 under "Inspection, Analysis, or Test" there is a disconnect between Item 3.5.a and 3.5.b in that the analysis performed in item 3.5.a does not state what the analysis is based on, while in Item 3.5.b the inspection of the as-installed protective features is done to the construction drawings. The staff is requesting that Item 3.5.a be revised to state that the analysis is performed to the final as-built construction drawings and Item 3.5.b be revised to state that instead of construction drawings, final as-built construction drawings should be used. The staff is also requesting that for Item 3.5.b under "Acceptance Criteria" instead of construction drawings, final as-built construction drawings be used.

**Response to Question 14.03.02-32:**

A response to this question will be provided by September 30, 2009.

**Question 14.03.02-33:**

Follow-up to RAI Question 14.03.02-11- 19

The response is not acceptable. In response to RAI 118, Question 03.04.01-7, which is provided as a reference for Question 14.03.02-19, changes were made to the FSAR which do not agree with the FSAR markup provided with the response to RAI 132, Supplement 1. For example in RAI 118, Question 03.04.01-7, reference is made to ITAAC Table 2.1.1-7 for changes to internal flooding responses for the FB and SB, while in the FSAR markup provided in response to RAI 132, Table 2.1.1-7 is a table of RBA penetrations that contain high energy pipes. In addition, the wording in the ITAAC tables for internal flooding for FB and SB are not consistent between the markups provided in RAI 118 and RAI 132. The applicant needs to provide a specific response to Question 14.03.02-11-19 without reference to RAI 118, Question 03.04.01-7.

**Response to Question 14.03.02-33:**

A response to this question will be provided by September 30, 2009.

**Question 14.03.02-34:****Follow-up to RAI Question 14.03.02-11- 20**

The level of detail provided in the enclosed markup is not consistent with other design certifications and does not meet the acceptance criteria of SRP 14.3, Appendix C or SRP 14.3.2, SAC-02. The Building Structures Checklist found in Appendix C of SRP 14.3.2 states that design descriptions should provide enough dimensions for a COL applicant to develop dynamic models for seismic analysis. Information meeting the acceptance criteria has not been provided in either the Tier 1 design descriptions for structures or in the accompanying ITAAC tables. In addition, SRP 14.3.2, SAC-02 states that key dimensions of structures be provided. As the safety functions of seismic Category I structures includes providing barriers for protection against missile impact, pipe whip, jet impingement, flooding, etc. the key dimensions of these safety-related features should be included in the design descriptions and referenced in the ITAAC tables. The approach should be similar to what was done for radiation barriers listed in Table 2.1.1-3. The staff is requesting that this information be included in the revision to U.S. EPR FSAR Tier 1, Section 2.1 not only for the NI Common Basemat Structures, but also for the EPGB and ESWB.

The FSAR markups for the referenced buildings now contain the appropriate design basis loads and are included in the ITAAC table for each structure. However, under the "Inspection, Analysis or Test" column there is no requirement for a final inspection and reconciliation of the as-built condition to the design basis loads. This should be done to address the cumulative effect of construction changes and to address the final loads and locations of these loads imposed by supported equipment and suspended systems. The applicant is requested to add this requirement under the "Inspection, Analysis or Test" column for each seismic Category I structure ITAAC table for the "Commitment Wording" item that addresses design basis loads. The need for a structural analysis report as part of the "Acceptance Criteria" is addressed in the staff assessment and supplementary RAI 14.03.02-11 –2 S1.

**Response to Question 14.03.02-34:**

A response to this question will be provided by October 30, 2009.

**Question 14.03.02-35:****Follow-up to RAI Question 14.03.02-11- 21**

The level of detail provided in the enclosed markup is not consistent with other design certifications and does not meet the acceptance criteria of SRP 14.3, Appendix C or SRP 14.3.2, SAC-02. The Building Structures Checklist found in Appendix C of SRP 14.3.2 states that design descriptions should provide enough dimensions for a COL applicant to develop dynamic models for seismic analysis. Information meeting the acceptance criteria has not been provided in either the Tier 1 design descriptions for structures or in the accompanying ITAAC tables. In addition, SRP 14.3.2, SAC-02 states that key dimensions of structures be provided. As the safety functions of seismic Category I structures includes providing barriers for protection against missile impact, pipe whip, jet impingement, flooding, etc. the key dimensions of these safety-related features should be included in the design descriptions and referenced in the ITAAC tables. The approach should be similar to what was done for radiation barriers listed in Table 2.1.1-3. The staff is requesting that this information be included in the revision to U.S. EPR FSAR Tier 1, Section 2.1 not only for the NI Common Basemat Structures, but also for the EPGB and ESWB.

**Response to Question 14.03.02-35:**

A response to this question will be provided by October 30, 2009.

**Question 14.03.02-36:****Follow-up to RAI Question 14.03.02-11- 22**

The level of detail provided in the enclosed markup is not consistent with other design certifications and does not meet the acceptance criteria of SRP 14.3, Appendix C or SRP 14.3.2, SAC-02. The Building Structures Checklist found in Appendix C of SRP 14.3.2 states that design descriptions should provide enough dimensions for a COL applicant to develop dynamic models for seismic analysis. Information meeting the acceptance criteria has not been provided in either the Tier 1 design descriptions for structures or in the accompanying ITAAC tables. In addition, SRP 14.3.2, SAC-02 states that key dimensions of structures be provided. As the safety functions of seismic Category I structures includes providing barriers for protection against missile impact, pipe whip, jet impingement, flooding, etc. the key dimensions of these safety-related features should be included in the design descriptions and referenced in the ITAAC tables. The approach should be similar to what was done for radiation barriers listed in Table 2.1.1-3. The staff is requesting that this information be included in the revision to U.S. EPR FSAR Tier 1, Section 2.1 not only for the NI Common Basemat Structures, but also for the EPGB and ESWB.

**Response to Question 14.03.02-36:**

A response to this question will be provided by October 30, 2009.

**Question 14.03.02-37:****Follow-up to RAI Question 14.03.02-11- 23**

In Tier 1 Tables 2.1.2-3 and 2.1.5-3 it states that the EPGB and ESWB grade level is located between 12 and 18 inches below finish floor elevation at ground surfaces (see items 3.2 and 3.3 respectively) It is not clear from either the design description or from the tables what the safety significance is of these dimensions. The applicant is requested to identify the safety significance of these dimensions and if for external flood protection, provide the height of the assumed probable maximum flood in the design descriptions and ITAAC tables.

**Response to Question 14.03.02-37:**

The safety significance of the ITAAC items in U.S. EPR FSAR Tier 1, Table 2.1.2-3, Item 3.2 and Table 2.1.5-3, Item 3.3 is that they determine the position of the building structures relative to site grade. This is important because it confirms the portion of the structure that is embedded below grade for soil loads and other dynamic loading effects. The maximum flood level is already addressed in U.S. EPR FSAR Tier 1, Table 5.0-1. The 12 to 18 inches between the site grade and ground finish floor elevation is an architectural design feature to prevent any localized water that has ponded from entering the building.

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

**Question 14.03.02-38:**

**Follow-up to RAI Question 14.03.02-11- 24**

In the revised ITAAC table under Commitment Wording for Item 3.1 it states that the NAB is designed to prevent failure on the adjacent FB or SB, Division 4. This is not adequate because it does not address the design basis loads for which the building must be designed. For the same item number, under "Inspection, Analysis or Test," for the second sentence which states that "During construction, deviations from the approved design will be analyzed," it should state that the "During construction, deviations from the approved design will be reconciled with the building analysis. The staff requests that these changes be made to ITAAC Table 2.1.3-1.

**Response to Question 14.03.02-38:**

A response to this question will be provided by September 30, 2009.

**Question 14.03.02-39:****Follow-up to RAI Question 14.03.02-11- 26**

The level of detail provided in the enclosed markup is not consistent with other design certifications and does not meet the acceptance criteria of SRP 14.3, Appendix C or SRP 14.3.2, SAC-02. The Building Structures Checklist found in Appendix C of SRP 14.3.2 states that design descriptions should provide enough dimensions for a COL applicant to develop dynamic models for seismic analysis. Information meeting the acceptance criteria has not been provided in either the Tier 1 design descriptions for structures or in the accompanying ITAAC tables. In addition, SRP 14.3.2, SAC-02 states that key dimensions of structures be provided. As the safety functions of seismic Category I structures includes providing barriers for protection against missile impact, pipe whip, jet impingement, flooding, etc. the key dimensions of these safety-related features should be included in the design descriptions and referenced in the ITAAC tables. The approach should be similar to what was done for radiation barriers listed in Table 2.1.1-3. The staff is requesting that this information be included in the revision to U.S. EPR FSAR Tier 1, Section 2.1 not only for the NI Common Basemat Structures, but also for the EPGB and ESWB.

**Response to Question 14.03.02-39:**

A response to this question will be provided by October 30, 2009.

**Question 14.03.02-40:**

**Follow-up to RAI Question 14.03.02-11- 27**

The barrier thicknesses are a key dimension and should be provided.

The level of detail provided in the enclosed markup is not consistent with other design certifications and does not meet the acceptance criteria of SRP 14.3, Appendix C or SRP 14.3.2, SAC-02. The Building Structures Checklist found in Appendix C of SRP 14.3.2 states that design descriptions should provide enough dimensions for a COL applicant to develop dynamic models for seismic analysis. Information meeting the acceptance criteria has not been provided in either the Tier 1 design descriptions for structures or in the accompanying ITAAC tables. In addition, SRP 14.3.2, SAC-02 states that key dimensions of structures be provided. As the safety functions of seismic Category I structures includes providing barriers for protection against missile impact, pipe whip, jet impingement, flooding, etc. the key dimensions of these safety-related features should be included in the design descriptions and referenced in the ITAAC tables. The approach should be similar to what was done for radiation barriers listed in Table 2.1.1-3. The staff is requesting that this information be included in the revision to U.S. EPR FSAR Tier 1, Section 2.1 not only for the NI Common Basemat Structures, but also for the EPGB and ESWB.

**Response to Question 14.03.02-40:**

A response to this question will be provided by October 30, 2009.

**Question 14.03.02-41:****Follow-up to RAI Question 14.03.02-11- 28**

The level of detail provided in the enclosed markup is not consistent with other design certifications and does not meet the acceptance criteria of SRP 14.3, Appendix C or SRP 14.3.2, SAC-02. The Building Structures Checklist found in Appendix C of SRP 14.3.2 states that design descriptions should provide enough dimensions for a COL applicant to develop dynamic models for seismic analysis. Information meeting the acceptance criteria has not been provided in either the Tier 1 design descriptions for structures or in the accompanying ITAAC tables. In addition, SRP 14.3.2, SAC-02 states that key dimensions of structures be provided. As the safety functions of seismic Category I structures includes providing barriers for protection against missile impact, pipe whip, jet impingement, flooding, etc. the key dimensions of these safety-related features should be included in the design descriptions and referenced in the ITAAC tables. The approach should be similar to what was done for radiation barriers listed in Table 2.1.1-3. The staff is requesting that this information be included in the revision to U.S. EPR FSAR Tier 1, Section 2.1 not only for the NI Common Basemat Structures, but also for the EPGB and ESWB.

**Response to Question 14.03.02-41:**

A response to this question will be provided by October 30, 2009.

# U.S. EPR Final Safety Analysis Report Markups

14.03.02-25

- 2.2 As shown on Figure 2.1.1-4, a flooding barrier ~~consisting of several walls~~ is provided to prevent ingress of water into the core melt spreading area. ~~This barrier includes a watertight door that provides entry to the venting shaft of the spreading area.~~
- 2.3 Core melt cannot relocate to the upper containment due to the existence of concrete barriers, as shown on Figure 2.1.1-9.
- 2.4 The RB structures are Seismic Category I and are designed and constructed to withstand design basis loads without loss of structural integrity and safety-related functions. The design basis loads are those loads associated with:
- Normal plant operation (including dead loads, live loads, lateral earth pressure loads, equipment loads, hydrostatic, hydrodynamic, and temperature loads).
  - Internal events (including internal flood loads, accident pressure loads, accident thermal loads, accident pipe reactions, and pipe break loads, including reaction loads, jet impingement loads, and missile impact loads).
  - External events (including rain, snow, flood, tornado, tornado-generated missiles and earthquake).
- 2.5 The RCB, including the liner plate, maintains its pressure boundary integrity at the design pressure.
- 2.6 The RCB is post-tensioned, pre-stressed concrete structure.
- 2.7 The RBA is separated from the SBs and the FB by an internal hazard protection barrier~~barriers, doors, dampers, and penetrations~~ that ~~have~~ has a minimum 3-hour fire rating, ~~as shown indicated~~ on Figure 2.1.1-20.
- 2.8 The following are provided for water flow to the in-containment refueling water storage tank (IRWST):
- As shown on Figure 2.1.1-4, RCB rooms which are adjacent to the IRWST contain wall openings slightly above the floor to allow water flow into the IRWST.
  - As shown on Figure 2.1.1-5, RCB rooms which are directly above the IRWST, contain trapezoidal-shaped openings in the floor to allow water flow into the IRWST. The floor openings are protected by weirs and trash racks to provide a barrier against material transport into the IRWST.
- 2.9 RBA penetrations that contain high-energy pipelines, as described in Table 2.1.1 7, have guard pipes.
- 2.10 Essential equipment required for plant shutdown located in the RB and RBA is located above the internal flood level or is designed to withstand flooding.
- 2.11 The reactor pressure vessel, reactor coolant pumps, pressurizer, steam generators, and interconnecting RCS piping are insulated with reflective metallic insulation.
- 2.12 The RB structures have key design dimensions that are confirmed after construction.

14.03.02-16

**Table 2.1.1-8—Reactor Building ITAAC (5-6 Sheets)**

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
2.1	Six rib support structures are provided at the bottom of the reactor cavity as shown on Figure 2.1.1-9.	Inspection of the reactor vessel cavity will be performed.	Six rib support structures are provided at the bottom of the reactor cavity as shown on Figure 2.1.1-9.
2.2	As shown on Figure 2.1.1-4, a flooding barrier <del>consisting of several walls</del> is provided to prevent ingress of water into the core melt spreading area. <del>This barrier includes a watertight door that provides entry to the venting shaft of the spreading area.</del>	Inspection of the RCB will be performed.	The RCB provides a spreading area water ingress barrier <del>consisting of flooding walls and a watertight door</del> as shown on Figure 2.1.1-4.
2.3	Core melt cannot relocate to upper containment due to the existence of concrete barriers as shown on Figure 2.1.1-9.	Inspection of the RCB will be performed.	Concrete barriers are located within the RCB as shown on Figure 2.1.1-9.
2.4	The RB structures are Seismic Category I and are designed and constructed to withstand design basis loads, as specified below, without loss of structural integrity and safety related functions. <ul style="list-style-type: none"> <li>• Normal plant operation (including dead loads, live loads, lateral earth pressure loads, equipment loads, hydrostatic, hydrodynamic, and temperature loads).</li> <li>• Internal events (including internal flood loads, accident pressure loads, accident thermal loads, accident pipe reactions, and pipe break loads, including reaction loads, jet impingement loads, and missile impact loads).</li> <li>• External events (including rain, snow, flood, tornado, tornado-generated</li> </ul>	<p>a. An analysis of the RB structures for the design basis loads will be performed.</p> <p>b. During construction, deviations from the approved design will be analyzed for design basis loads.</p>	<p>a. The design of the RB will withstand the design basis loads without loss of structural integrity and safety related functions.</p> <p>b. Deviations from the design during construction are reconciled.</p>

← 14.03.02-25 →

Table 2.1.1-8—Reactor Building ITAAC (5-6 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
2.7	<p>The RBA is separated from the SBs and the FB by <u>an internal hazard protection barrier</u><del>barriers, doors, dampers, and penetrations</del> that <del>have</del><u>has</u> a minimum 3-hour fire rating, as indicated on Figure 2.1.1-20.</p>	<p>a. A fire protection analysis will be performed.</p> <p style="text-align: center;">← <span style="border: 1px solid red; padding: 2px;">14.03.02-16</span></p> <p>b. Inspection of as-installed conditions of barriers, doors, dampers, and penetrations, which separate the RBA from the SBs and FB, versus construction drawings of barriers, doors, dampers and penetrations as determined in the part (a) analysis will be performed.</p> <p>c. Testing of dampers that separate the RBA from the SBs and FB will be performed.</p> <p>d. A post-fire safe shutdown analysis will be performed.</p>	<p>a. Completion of fire protection analysis that indicates barriers, doors, dampers, and penetrations that separate the RBA from the SBs and FB have a minimum 3-hour fire rating.</p> <p>b. The as-installed configuration of fire barriers, doors, dampers, and penetrations that separate the RBA from the SBs and FB agrees with the associated construction drawings.</p> <p>c. Dampers close.</p> <p>d. Completion of the post-fire safe shutdown analysis indicates that at least one success path comprised of the minimum set of SSC is available for safe shutdown.</p>

**Table 2.1.1-10—Safeguard Buildings ITAAC (3 Sheets)**

	<b>Commitment Wording</b>	<b>Inspections, Tests, Analyses</b>	<b>Acceptance Criteria</b>
2.2	<p>The as-installed basic configuration of the NI structures separates the four SBs by an internal hazards separation barrier so that the impact of internal hazards, including fire, flood, high energy line break and missile impact, is contained within the SB of hazard origination. Figure 2.1.1-20 through Figure 2.1.1-37 identify the internal hazards separation barrier.</p>	<p>a. An inspection of the as-installed basic configuration of the SBs structures will be performed. During construction, deviations from the approved design will be analyzed for design basis internal hazards.</p> <p>b. A fire protection analysis will be performed.</p> <p>c. Inspection of the as-installed conditions of barriers, doors, dampers, and penetrations existing within the internal hazards protective barriers separating the four SBs, <u>versus construction drawings of barriers, doors, dampers, and penetrations as determined in the part (b) analysis</u>, will be performed.</p> <p>d. Testing of dampers that separate the four SBs will be performed.</p> <p>e. A post-fire safe shutdown analysis will be performed.</p>	<p>a. The as-installed basic configuration of the SBs structures provides separation as indicated on Figure 2.1.1-20 through Figure 2.1.1-37.</p> <p>b. Completion of fire protection analysis that indicates barriers, doors, dampers, and penetrations providing separation have a minimum 3-hour fire rating and mitigate the propagation of smoke to the extent that safe shutdown is not adversely affected.</p> <p>c. The as-installed configuration of fire barriers, doors, dampers and penetrations that separate the four SBs agrees with the associated construction drawings.</p> <p>d. Dampers close.</p> <p>e. Completion of the post-fire safe shutdown analysis indicates that at least one success path comprised of the minimum set of SSC is available for safe shutdown.</p>

14.03.02-31 →

**Table 2.1.1-11—Fuel Building ITAAC (3 Sheets)**

	<b>Commitment Wording</b>	<b>Inspections, Tests, Analyses</b>	<b>Acceptance Criteria</b>
2.2	<p>The as-installed basic configuration of the NI structures provides internal separation between independent divisions within the FB and separates the FB from other NI structures by an internal hazards separation barrier so that the impact of internal hazards, including fire, flood, high line energy break and missile impact, is contained within the FB division of hazard origination. Figure 2.1.1-20 and Figure 2.1.1-38 through Figure 2.1.1-44 identify the internal hazards separation barrier.</p>	<p>a. An inspection of the as-installed basic configuration of the FB and surrounding NI structures will be performed. During construction, deviations from the approved design will be analyzed for design basis internal hazards.</p> <p>b. A fire protection analysis will be performed.</p> <p>c. Inspection of the as-installed conditions of barriers, doors, dampers, and penetrations that separate the FB from other NI structures, <u>versus construction drawings of barriers, doors, dampers, and penetrations as determined in the part (b) analysis</u>, will be performed.</p> <p>d. Testing of dampers that separate the FB from other NI structures will be performed.</p> <p>e. A post-fire safe shutdown analysis will be performed.</p>	<p>a. The as-installed basic configuration of the FB and surrounding NI structures provides separation as indicated on Figure 2.1.1-20 and Figure 2.1.1-38 through Figure 2.1.1-44.</p> <p>b. Completion of an analysis that indicates barriers, doors, dampers, and penetrations providing separation have a minimum 3-hour fire rating and mitigate the propagation of smoke to the extent that safe shutdown is not adversely affected.</p> <p>c. The as-installed configuration of barriers, doors, dampers, and penetrations providing separation agrees with the associated construction drawings.</p> <p>d. Dampers close.</p> <p>e. Completion of the post-fire safe shutdown analysis indicates that at least one success path comprised of the minimum set of SSC is available for safe shutdown.</p>

14.03.02-31 →

**Table 2.1.2-3—Emergency Power Generating Building  
ITAAC (3 Sheets)**

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
2.1	The as-installed location of the EPGBs is as shown on Figure 2.1.2-1.	An inspection of the EPGBs will be performed.	The as-installed location of the EPGBs is as shown on Figure 2.1.2-1.
3.1	Physical separation of the as-installed EPGBs by the NI complex is as shown on Figure 2.1.2-1.	An inspection of the EPGBs will be performed.	The as-installed EPGBs are separated by the NI complex as shown on Figure 2.1.2-1.
3.2	The EPGBs as-installed site grade level is located between 12 inches and 18 inches below finish floor elevation at ground entrances.	An inspection of EPGBs site grade level will be performed.	The as-installed EPGBs site grade level is located between 12 inches and 18 inches below finish floor elevation at ground entrances.
3.3	The as-installed basic configuration of the EPGB structures contains an internal hazards separation barrier so that the impact of internal hazards, including fire, flood, high-energy line break and missile impact, is contained within the EPGB of hazard origination. Figure 2.1.2-4 identifies the internal hazards separation barrier.	a. An inspection of the EPGBs will be performed.	a. The as-installed configuration of the EPGBs provides internal hazards barriers as shown on Figure 2.1.2-4.
		b. A fire protection analysis will be performed.	b. Completion of analysis that indicates that barriers, doors, dampers and penetrations providing separation have a minimum 3-hour fire rating and mitigate propagation of smoke to the extent that safe shutdown is not adversely affected.
		c. Inspections of as-installed conditions of <del>walls</del> <u>barriers</u> , doors, dampers, and penetrations through the barriers identified on Figure 2.1.2-4, <u>versus construction drawings of barriers, doors, dampers, and penetrations as determined in the part (b) analysis</u> , will be performed.	c. The as-installed configuration of walls, doors, dampers and penetrations through the barriers listed on Figure 2.1.2-4 agrees with the associated construction drawings.

14.03.02-31 →

**Table 2.1.5-3—Essential Service Water Building ITAAC  
(3 Sheets)**

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
	<p style="text-align: center;">14.03.02-31 →</p>	<p>c. Inspections of as-installed conditions of <del>walls</del><u>barriers</u>, doors, dampers, and penetrations through the barriers identified in Figure 2.1.5-6, <u>versus construction drawings of barriers, doors, dampers, and penetrations as determined in the part (b) analysis, will be performed.</u></p>	<p>c. The as-installed configuration of walls, doors, dampers and penetrations through the barriers listed in Figure 2.1.5-6 agrees with the associated construction drawings.</p>
<p>3.5</p>	<p>The ESWB structures are Seismic Category I and are designed and constructed to withstand design basis loads, as specified below, without loss of structural integrity and safety related functions.</p> <ul style="list-style-type: none"> <li>• Normal plant operation (including dead loads, live loads, lateral earth pressure loads, hydrostatic loads, hydrodynamic loads, and temperature loads).</li> <li>• Internal events (including internal flood loads, accident pressure loads, accident thermal loads, accident pipe reaction, and pipe break loads – including reaction loads, jet impingement loads, and missile impact loads).</li> <li>• External events (including rain, snow, flood, tornado, tornado-generated missiles, and earthquake).</li> </ul>	<p>a. An analysis of the ESWB structures for the design basis loads will be performed.</p> <p>b. During construction, deviations from the approved design will be analyzed for design basis loads.</p>	<p>a. The design of the ESWB will withstand the design basis loads without loss of structural integrity and safety related functions.</p> <p>b. Deviations from the design during construction are reconciled.</p>