

ArevaEPRDCPEm Resource

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Sent: Friday, July 16, 2010 4:21 PM
To: Tesfaye, Getachew
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Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 376, FSAR Ch. 3, Question 3.8.1-47
Attachments: RAI 376 Question 03.08.01-47 Response - DRAFT.pdf

Getachew,

Attached is draft response for RAI 376 question 3.8.1-47. The final response date is August 17, 2010. Let me know if the staff has questions or if the response can be sent as final.

Thanks,

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Response to

Request for Additional Information No. 376

3/25/2010

U.S. EPR Standard Design Certification

AREVA NP Inc.

Docket No. 52-020

SRP Section: 03.08.01 - Concrete Containment

**SRP Section: 03.08.03 - Concrete and Steel Internal Structures of Steel or
Concrete Containments**

SRP Section: 03.08.05 - Foundations

Application Section: 3.8

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

DRAFT

Question 03.08.01-47:**Follow-up to RAI 155, Question 3.8.1-7**

The response to this RAI provided information related to load combinations described in FSAR Section 3.8.1.3.2. However, the staff has determined that the applicant's response has not fully addressed the two issues identified below. To determine if the load combinations utilized for the design of the U.S. EPR meet the acceptance criteria in SRP 3.8.1.II.3, the staff requests that the applicant address the following items:

1. There appears to be an inconsistency in Table 03.08.01-7-1 included in the RAI response. Explain why the load factor for soil/lateral earth pressure (H) in the fifth revised load combination listed in Table 03.08.01-7-1 is 1.0 and not 1.3 to match the load factor used for the live load, as indicated in Item 2 of the RAI response.
2. The RAI response indicated that for live load (L), multiple cases are considered where L is varied between zero and its maximum value. The varying live load, however, was not considered in the static model of the NI but was considered in local analysis and design. Since the static model of the NI is used to obtain member forces for design, explain why full live load and no live load were not considered in the static model.

Response to Question 03.08.01-47:

1. The load factor for soil load/lateral earth pressure (H) is matched to that of the live load (L). The fifth load combination has been modified to include a factor of 1.3 for soil load/lateral earth pressure (H) to match the factor of 1.3 applied to live load (L). U.S. EPR FSAR Tier 2, Section 3.8.1.3.2 will be revised to reflect the revision shown in Table 03.08.01-47-1, which was originally provided in the Response to RAI 155, Question 3.8.1-7.
2. Part 2 of this question was addressed in the Response to RAI 376, Question 03.08.03-22.

Table 03.08.01-47-1—Fifth Load Combinations

Current Load Combination	Updated Load Combination
$U_s = D + L + J + P_t + T_t$	$U_s = D + L + H + F + F_b + J + P_t + T_t$
$U_s = D + L + J + T_o + W$	$U_s = D + L + H + F + F_b + T_o + J + W$
$U_s = D + L + T_o + R_o + J + G + P_v$	$U_s = D + L + H + F + F_b + T_o + R_o + J + G + P_v$
$U_F = D + 1.3L + J + G + T_o + R_o + P_v$	Note 1
$U_F = D + 1.3L + J + G + T_o + R_o + P_v + 1.5W$	$U_F = D + 1.3L + 1.3H + F + F_b + J + G + T_o + R_o + P_v + 1.5W$
$U_F = D + L + J + G + T_o + R_o + P_v + E'$	$U_F = D + L + H + F + F_b + J + G + T_o + R_o + P_v + E'$
$U_F = D + L + J + G + T_o + R_o + P_v + W_t$	$U_F = D + L + H + F + F_b + J + G + T_o + R_o + P_v + W_t$
$U_F = D + L + J + G + 1.5P_a + T_a + R_a$	$U_F = D + L + H + F + F_b + J + G + 1.5P_a + T_a + R_a$
$U_F = D + L + J + G + P_a + T_a + 1.25R_a$	$U_F = D + L + H + F + F_b + J + G + P_a + T_a + 1.25R_a$
$U_F = D + L + J + 1.25G + 1.25P_a + T_a + R_a$	$U_F = D + L + H + F + F_b + J + 1.25G + 1.25P_a + T_a + R_a$
$U_F = D + L + J + G + 1.25P_a + T_a + R_a + 1.25W$	$U_F = D + L + H + F + F_b + J + G + 1.25W + 1.25P_a + T_a + R_a$
$U_F = D + L + J + G + T_o + F_a$	Note 1
$U_F = D + L + J + G + T_o + F_a + W$	$U_F = D + L + H + F + F_b + T_o + J + G + W + F_a$
$U_F = D + L + J + F_a$	Note 1
$U_F = D + L + J + G + P_a + T_a + R_a + R_r + E'$	$U_F = D + L + H + F + F_b + J + G + E' + P_a + T_a + R_a + R_r$

Note:

1. There are no operating basis earthquake (OBE) loads applicable to the overall Reactor Containment Building (RCB) design for the U.S. EPR because an OBE level of one-third the SSE has been selected (U.S. EPR Tier 2, Section 3.7.1 provides a description of the OBE). Therefore, this load combination has been eliminated.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 3.8.1.3.2 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

DRAFT

- Service load combinations (construction loads).

$$U_S = D + L + J + H + F + E_b \pm T_o + I \pm W$$

- Service load combinations (normal loads).

$$U_S = D + L + J + H + F + E_b \pm G \pm T_o + R_o + I + G \pm P_v$$

- Factored load combinations (severe environmental loads).

$$U_F = D + 1.3L + J + G + T_o + R_o + P_v \quad \boxed{03.08.01-47}$$

$$U_F = D + 1.3L + J + 1.3H + F + E_b \pm G \pm T_o + R_o + I + G \pm P_v + 1.5W$$

- Factored load combinations (extreme environmental loads).

$$U_F = D + L + J + H + F + E_b \pm G \pm T_o + R_o + I + G \pm P_v + E'$$

$$U_F = D + L + J + H + F + E_b \pm G \pm T_o + R_o + I + G \pm P_v + W_t$$

- Factored load combinations (abnormal loads).

$$U_F = D + L + J + H + F + E_b \pm I + G + 1.5P_a + T_a + R_a$$

$$U_F = D + L + J + H + F + E_b \pm I + G + P_a + T_a + 1.25R_a$$

$$U_F = D + L + J + H + F + E_b \pm I + 1.25G + 1.25P_a + T_a + R_a$$

- Factored load combinations (abnormal or severe environmental loads).

$$U_F = D + L + J + H + F + E_b \pm I + G + 1.25W + 1.25P_a + T_a + R_a + 1.25W$$

$$U_F = D + L + J + G + T_o + F_a$$

$$U_F = D + L + J + H + F + E_b \pm G \pm T_o + I + G + F_a + W$$

$$U_F = D + L + J + F_a$$

- Factored load combinations (abnormal or extreme environmental loads).

$$U_F = D + L + J + H + F + E_b \pm I + G + E' + P_a + T_a + R_a + R_r + E'$$

3.8.1.4 Design and Analysis Procedures

The analysis and design of the post-tensioned RCB comply with the requirements of Article CC-3300 of the ASME BPV Code, Section III, Division 2 and RG 1.136 (GDC 1 and GDC 16).