ArevaEPRDCPEm Resource

From: WELLS Russell D (AREVA NP INC) [Russell.Wells@areva.com]
Sent: Thursday, June 18, 2009 4:14 PM
To: Tesfaye, Getachew
Cc: Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 215, FSAR Ch 3
Attachments: RAI 215 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 215 Response US EPR DC.pdf" provides technically correct and complete responses to 2 of the 24 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 215 Question 03.07.03-31.

The following table indicates the respective pages in the response document, "RAI 215 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 215 — 03.07.01-20	2	2
RAI 215 — 03.07.01-21	3	3
RAI 215 — 03.07.01-22	4	4
RAI 215 — 03.07.01-23	5	6
RAI 215 — 03.07.01-24	7	7
RAI 215 — 03.07.02-38	8	8
RAI 215 — 03.07.02-39	9	9
RAI 215 — 03.07.02-40	10	10
RAI 215 — 03.07.02-41	11	11
RAI 215 — 03.07.02-42	12	12
RAI 215 — 03.07.03-22	13	13
RAI 215 — 03.07.03-23	14	14
RAI 215 — 03.07.03-24	15	15
RAI 215 — 03.07.03-25	16	16
RAI 215 — 03.07.03-26	17	17
RAI 215 — 03.07.03-27	18	18
RAI 215 — 03.07.03-28	19	19
RAI 215 — 03.07.03-29	20	20
RAI 215 — 03.07.03-30	21	21
RAI 215 — 03.07.03-31	22	22
RAI 215 — 03.07.03-32	23	23
RAI 215 — 03.07.03-33	24	24
RAI 215 — 03.07.03-34	25	25
RAI 215 — 03.12-17	26	27

A complete answer is not provided for 22 of the 24 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date

RAI 215 — 03.07.01-20	August 19, 2009
RAI 215 — 03.07.01-21	September 18, 2009
RAI 215 — 03.07.01-22	September 18, 2009
RAI 215 — 03.07.01-23	September 29, 2009
RAI 215 — 03.07.01-24	August 19, 2009
RAI 215 — 03.07.02-38	August 19, 2009
RAI 215 — 03.07.02-39	September 29, 2009
RAI 215 — 03.07.02-40	September 29, 2009
RAI 215 — 03.07.02-41	August 19, 2009
RAI 215 — 03.07.02-42	August 19, 2009
RAI 215 — 03.07.03-22	September 18, 2009
RAI 215 — 03.07.03-23	August 19, 2009
RAI 215 — 03.07.03-24	September 18, 2009
RAI 215 — 03.07.03-25	September 18, 2009
RAI 215 — 03.07.03-26	September 18, 2009
RAI 215 — 03.07.03-27	September 18, 2009
RAI 215 — 03.07.03-28	August 19, 2009
RAI 215 — 03.07.03-29	August 19, 2009
RAI 215 — 03.07.03-30	August 19, 2009
RAI 215 — 03.07.03-32	September 29, 2009
RAI 215 — 03.07.03-33	September 29, 2009
RAI 215 — 03.07.03-34	September 29, 2009

Sincerely,

(Russ Wells on behalf of)

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From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Tuesday, May 19, 2009 9:33 PM
To: ZZ-DL-A-USEPR-DL
Cc: Manas Chakravorty; Jim Xu; Sujit Samaddar; Kaihwa Hsu; Anthony Hsia; Michael Miernicki; Jay Patel; Joseph Colaccino; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 215 (2560, 2561,2565, 2588), FSAR Ch. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on April 14, 2009, and on May 19, 2009, you informed us that the RAI is clear but you needed clarification for Questions 3.7.3-26 and 3.7.3-31. To support the review schedule, we have decided to issue the RAI as is and conduct the clarification telecon at a later time. 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: 588

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Response to

Request for Additional Information No. 215 (2560, 2561, 2565, 2588), Revision 0

5/19/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.07.01 - Seismic Design Parameters
SRP Section: 03.07.02 - Seismic System Analysis
SRP Section: 03.07.03 - Seismic Subsystem Analysis
SRP Section: 03.12 - ASME Code Class 1, 2, and 3 Piping Systems and Piping Components and Their Associated Supports
Application FSAR Ch. 3

QUESTIONS for Structural Engineering Branch 2 (ESBWR/ABWR Projects) (SEB2)
QUESTIONS for AP1000 Projects Branch 1 (NWE1)

Question 03.07.01-20:

Follow-Up RAI to Question 02.05.02-2 and 03.07.01-3

The site soil profiles presented in the U.S. EPR FSAR are assumed to be strain compatible profiles. Guideline 5 in U.S. EPR FSAR Section 2.5.2.6 states that applicant will demonstrate that the idealized site soil profile is similar to or bounded by the 10 generic soil profiles used for the U.S.EPR but does not contain the requirement that the site soil profile used in the comparison needs to be a strain compatible profile. The applicant is requested to add to Guideline 5 of U.S.EPR FSAR Section 2.5.2.6, the requirement that the site soil profile that is compared to the U.S. EPR soil profile needs to be a strain compatible soil profile.

Response to Question 03.07.01-20:

The response to this question will be provided on August 19, 2009.

Question 03.07.01-21:

Follow-Up RAI to Question 03.07.01-4:

In its response to **Question 03.07.01-4,** the applicant states that the COL applicant is required to compare the final iterated soil parameters with the standard plant generic soil parameters, as required by COL Information Item 2.5-3. The applicant also states that this COL item is further clarified in U.S. EPR FSAR Section 2.5.4.7 and 2.5.2.6, Step 5. COL Information Item 2.5-3 does not require the COL applicant to compare the final iterated soil parameters with the standard plant generic soil parameters nor is it required in either U.S. EPR FSAR Section 2.5.4.7 or Section 2.5.2.6, Step 5. The applicant is requested to add this requirement to COL Information Item 2.5-3 and to include reference to U.S. EPR FSAR Sections 2.5.4.7 in addition to the existing reference to U.S. EPR FSAR Section 2.5.2.6. The applicant is also requested to add to Guideline 5 of U.S.EPR FSAR Section 2.5.2.6, the requirement that the site soil profile that is compared to the U.S. EPR soil profile needs to be a strain-compatible soil profile.

Response to Question 03.07.01-21:

The response to this question will be provided on September 18, 2009.

Question 03.07.01-22:

Follow-Up RAI to Question 03.07.01-14:

In the computation of the magnitude of Rayleigh mass and stiffness weighted damping appropriate for a given analysis, the behavior over a given frequency range is typically evaluated to generate an effective damping to use in the numerical calculations. The magnitude of the assumed effective damping modulus impacts the magnitude of the computed responses. As the nonlinear analysis does not specifically calculate system frequencies, it is not clear how the Rayleigh mass and stiffness weighted damping matrix was computed for numerical computation. The applicant is requested to describe in the FSAR the computation method, equation, damping values, and assumptions used in determining the Rayleigh mass and stiffness weighting damping coefficients which are applied in the direct step-by-step integration analysis.

Response to Question 03.07.01-22:

The response to this question will be provided on September 18, 2009.

Question 03.07.01-23:

Follow-Up RAI to Question 03.07.01-15:

The response provided to **Question 03.07.01-15** refers to a proprietary report which provided the results of a test program that demonstrated that certain cable tray systems achieved damping values as high as 20 to 25 percent under dynamic loads. This report is the basis for allowing up to 20 percent damping for flexible supported cable tray systems. In reviewing a summary of the report, it appeared that for those systems achieving higher damping the response was nonlinear and could include yielding of the cable tray support system. The report also states that the resonant frequency of the cable tray system was dependent on the input level of the support excitation. Higher input levels resulted in lower resonant frequencies. Response spectrum analysis methods are often used for suspended systems and are based on an assumption of a linear response in the system being analyzed. The load applied to the system is a function of the system modal frequencies used in combination with a design response spectrum curve. It is not clear how the nonlinear behavior of the cable tray systems and dependence of natural frequencies on excitation level that were documented in the test report are applied in analysis methods that calculate the response of a system by linear elastic methods.

Although not accepted by the NRC, the recommendations of ASCE 43-05 stipulate a maximum damping value of 15 percent for cable tray systems wherein the total elastic demand exceeds the code capacity. For cable tray systems where the elastic demand is equal to or less than the code capacity, a maximum of 10 percent damping is specified for cable trays that are 50 percent or more full and 7 percent for trays that are empty. This is consistent with the R.G. 1.61 damping values which for full cable trays is 10 percent and for empty trays is 7 percent. The ANCO report is not a reference to the Regulatory Guide. NUREG/CR-6919, which does reference the ANCO report, recommends in Section 5.2.1 damping values for cable trays which are identical to those in the current version of the Regulatory Guide.

The markup to 3A.3.5 of the U.S. EPR FSAR appears to provide additional criteria for selecting damping values beyond what is specified in FSAR table 3.7.1-1 and states “The damping values [of] cable tray systems with less than 50 percent loading may be determined from Figure 3.7.1-16, which is dependent on the flexibility of the cable tray system, including both the cable tray and its supports for an input ground motion ZPA up to and exceeding 0.35g.” However, if Figure 3.7.1-16 is dependent on the flexibility of the cable tray system, it does not provide any additional guidance or limitation on its use in this regard.

In its markup of the FSAR the applicant has added a note to Table 3.7.1-1 that limits the use of higher damping values to flexibly supported rod and strut-hung trapeze systems, and strut-type cantilever and braced-cantilever cable tray systems loaded to greater than 50 percent of the maximum rated loading. The staff believes the information provided is insufficient to support the use of higher damping values in seismic Category I cable tray systems with flexible supports. To justify the higher damping, the applicant needs to submit on a case-by-case basis the following information:

a. The applicable design code and design allowables for the cable tray system including the anchor system;

b. The method of analysis, how natural frequencies are determined, how the loads are determined, and the ratio of actual demand in the cable tray system and loads in the anchors to the code allowables;

c. The design methods and design procedures that are used to implement the test results from the ANCO report;

d. A correlation and applicability of the cable tray configuration (support system, percent filled, use of ties, anchor system, etc.) to the test configurations and results from the ANCO test report; and

e. The technical basis for Figure 3.7.1-16 and how the flexibility of the cable tray system is accounted for in the use of this figure and what configurations are covered under the definition of a flexible support system.

For the damping values of the empty trays provided in Table 3.7-1, there is a note D, which does not appear to apply to an empty tray. This should be corrected in the markup to the FSAR.

Response to Question 03.07.01-23:

The response to this question will be provided on September 29, 2009.

Question 03.07.01-24:

Follow-Up RAI to Question 03.07.01-18:

To meet the regulation requirements of Appendix S of 10 CFR Part 50, the applicant is requested to provide in the U.S. EPR FSAR the response spectra used to meet the minimum horizontal response spectra required in the free field at the foundation levels of the EPGB and ESWB structures.

Response to Question 03.07.01-24:

The response to this question will be provided on August 19, 2009.

Question 03.07.02-38:

Follow-Up RAI to Question 03.07.02-2:

In response to **Question 03.07.02-2** it is stated that a presentation by R. Kennedy and F. Ostadan, at a workshop entitled “Consistent Site-Response/Soil-Structure Interaction Calculations”, that took place at EPRI Palo Alto, California, in September 25-26, 2008 will be used as a reference (Reference 10) for some of the methods used to calculate soil motions in SSI analysis. The applicant should identify the technical information contained in Reference 10 and how this information supports the SSI analysis methods described in the FSAR. In addition, although the reference is to be added to the list of references, the text of the FSAR does not indicate where this reference is used. This needs to be identified.

Response to Question 03.07.02-38:

The response to this question will be provided on August 19, 2009.

Question 03.07.02-39:

Follow-Up RAI to Question 03.07.02-8:

With regard to the stability analysis performed for the NI common basemat structures the staff requests the following additional information:

a. In the SASSI model, the "stiffness/damping" transfer functions are frequency dependent. For layered sites, the transfer functions can be expected to be strongly frequency dependent. As such, describe the methodology and assumptions that were used to obtain the constant soil values applied in the time domain calculations from the frequency dependent parameters utilized in the SASSI analysis.

b. As indicated in SRP 3.7.1, SAC-1.B, when performing calculations associated with nonlinear evaluations, multiple time histories should be used to assess how strong motion duration, magnitudes, shape of energy growth, etc. will impact the results of the nonlinear calculation. Please provide information to show that the use of the three EUR motions satisfies the SRP acceptance criteria.

c. Provide information on the relationship between generic site parameters and values of soil springs and damping selected for the particular analyses performed, including the potential effects of the uncertainty in these values on the results of the analysis.

d. Since the SASSI analyses do not consider the effects of sliding and uplift in determining the seismic response (both displacements and accelerations) and the floor response spectra of the EPR NI common basemat structures, information should be provided that shows the assumption of a linear SASSI analysis to obtain these results is conservative relative to the results that would be obtained if the non linear effects of sliding and liftoff were included.

Response to Question 03.07.02-39:

The response to this question will be provided on September 29, 2009.

Question 03.07.02-40:

Follow-Up RAI to Question 03.07.02-22:

The applicant is requested to reconcile the coefficient of friction of 0.7 provided in its response to **Question 03.07.02-22** with the information provided in its response to **Question 03.04.02-1** contained in RAI 162 which states that the stability calculation is carried out using a coefficient of friction of 0.7 and 0.5.

The staff will evaluate the response to overturning and sliding in AREVA's response to RAI 155, **Question 03.08.05-8** for the Nuclear Island and the Response to RAI 155, **Questions 03.08.05-9** and **03.08.05-12** for the EPGB and ESWB once the response is received.

Response to Question 03.07.02-40:

The response to this question will be provided on September 29, 2009.

Question 03.07.02-41:

Follow-Up RAI to Question 03.07.02-32:

Specific to the Nuclear Island Common Basemat Structures, the dynamic model is a lumped mass model while the static model is a FEM. Describe how the results from the lumped mass model are distributed to the finite element model and include in your response the following information:

a. How accelerations are distributed between elevations of the lumped mass model.
b. How accelerations are distributed within the same elevation when more than one lumped mass has been provided at that elevation.
c. How the loads on the circular walls are determined, (both in-plane and out-of-plane) from the results of a lumped mass model that are given in three orthogonal directions.

This information should also be included in the FSAR.

Response to Question 03.07.02-41:

The response to this question will be provided on August 19, 2009.

Question 03.07.02-42:

Follow-Up RAI to Question 03.07.02-33:

The applicant is requested to provide the information contained in its response to **Question 03.07.02-33** in the FSAR.

Response to Question 03.07.02-42:

The response to this question will be provided on August 19, 2009.

Question 03.07.03-22:

Follow-Up RAI to Question 03.07.03-1

The piping topical report referenced in AREVA's response to **Question 03.07.03-1** has been accepted by the staff. However, at this time the approval to use the peak shifting method is applicable only to piping systems. The applicant should describe the applicability of the methodology to other subsystems in the U.S.EPR standard design and define the context in which application to other subsystems would be used. Backup support for this information should be provided in the FSAR from the WRC Bulletin 300 or from the ASME Boiler and Pressure Vessel Code. In addition it should be noted that the markup provided on Section 3.7.3.14 does not appear to be applicable to the response to Question 03.07.03-1.

Response to Question 03.07.03-22:

The response to this question will be provided on September 18, 2009.

Question 03.07.03-23:

Follow-Up RAI to Question 03.07.03-3:

Although the first method described in the response to **Question 03.07.03-3** to account for uncertainties in the seismic analysis of structures is an acceptable approach, the applicant is requested to describe in the FSAR how the multiple sets of time histories are considered in the code qualification of a subsystem , i.e. how the 12 sets of time histories for the NI common basemat structures and 10 sets of time histories applicable to the EPGB and ESWB are accounted for in the subsystem design and how the seismic support loads for these subsystems are determined.

The use of the second method is not covered by the topical report and its use has not been accepted by the staff. The applicant is requested to describe how the development of such a synthetic time history will meet SRP 3.7.1, SAC-1.B for design time histories and provide a comparison of the time history response spectra with the ISRS at sample locations within the NI common basemat structures, the EPGB, and the ESWB. In addition, for systems supported at points having different ISRS, and therefore different synthetic time histories, the phase relationship between the time histories would be lost and should not be used for these types of applications.

Response to Question 03.07.03-23:

The response to this question will be provided on August 19, 2009.

Question 03.07.03-24:

Follow-Up RAI to Question 03.07.03-4:

The staff finds the response to **Question 03.07.03-4** to be acceptable, but the applicant is requested to revise the FSAR markup to be consistent with the response provided and include in the FSAR the method of ASCE 4-98 Section 3.2.2.1 (c).

Response to Question 03.07.03-24:

The response to this question will be provided on September 18, 2009.

Question 03.07.03-25:

Follow-Up RAI to Question 03.07.03-5:

To assist the staff in completing its review of the response to **Question 03.07.03-5**, the applicant should provide the following:

a. Describe how a MMF < 1.5 will be determined and provide examples of specific applications.

b. Describe the limits placed on the model configuration. Describe how differential anchor motion between support points is treated.

c. The process described requires that there not be any cross coupling of dynamic response. What criteria are used to assure that a subsystem selected for the equivalent static method does not respond to out-of-plane motion due to in-plane excitation?

d. Provide the design procedures that implement the methods described.

e. Provide the portions of the references that support the methods used in the response.

f. Provide examples of the type of configurations for which these methods will be used and describe how the methods will be implemented for each. Include in your response the studies on simple frame-type piping models contained in References 1 and 2.

Response to Question 03.07.03-25:

The response to this question will be provided on September 18, 2009.

Question 03.07.03-26:

Follow-Up RAI to Question 03.07.03-6:

The response to **Question 03.07.03-6** requires additional information. Linear, frame-type subsystems, such as piping, HVAC, cable tray, and conduit are likely to have horizontal bends, changes in elevation and, in the case of piping and conduit, contain branch connections. These types of sub-systems are usually modeled seismically from anchor-point to anchor-point, which normally do not lie in straight line. The applicant is requested to provide the criteria and procedures used in neglecting some of the degrees of freedom, including the rotational degrees of freedom, in seismic analysis and provide examples of applications to various types of subsystems.

Response to Question 03.07.03-26:

The response to this question will be provided on September 18, 2009.

Question 03.07.03-27:

Follow-Up RAI to Question 03.07.03-9:

The FSAR markup provided with the response (second bullet, page 3.7-299) states that when the indicated mass ratio is satisfied, decoupling criteria can be done if R_f is less than or equal to 0.8 or R_f is greater than or equal to 1.25. This is in agreement with the acceptance criteria of SRP 3.7.2, SAC-3.B.ii. However the following sentence in the same bullet states that when R_f is greater or equal to 1.25, the mass of the subsystem is included in the supporting system model. The applicant should clarify whether a separate analysis of the supported subsystem is still done for the case where R_f is greater or equal to 1.25 and provide a technical justification if a separate analysis is not performed.

Response to Question 03.07.03-27:

The response to this question will be provided on September 18, 2009.

Question 03.07.03-28:

Follow-Up RAI to Question 03.07.03-10:

The staff has asked in the Follow-Up RAI to **Question 3.07.03-3** how the floor time history results from each soil condition are used in the design of supported subsystems. However, the applicant in its response to Question 03.07.03-10 provided two references for the time history generation from ISRS; FSAR Section 3.9 and Section 3.2.4. There is no FSAR Section 3.2.4 and no description of the method for time history generation could be found in FSAR Section 3.9. The applicant is requested to correct or revise the references provided for this response.

Response to Question 03.07.03-28:

The response to this question will be provided on August 19, 2009.

Question 03.07.03-29:

Follow-Up RAI to Question 03.07.03-12:

In its response to **Question 03.07.03-12**, the applicant is requested to correct the revision to R.G. 1.92 provided on page 3.7-305 to Revision 2 from Revision 3.

Response to Question 03.07.03-29:

The response to this question will be provided on August 19, 2009.

Question 03.07.03-30:

Follow-Up RAI to Question 03.07.03-13:

The applicant is requested to change the definition in the FSAR of the {r} vector appearing on page 3.7-304 to make it consistent with the other terms in the equation that appears at the bottom of the page.

Response to Question 03.07.03-30:

The response to this question will be provided on August 19, 2009.

Question 03.07.03-31:

Follow-Up RAI to Question 03.07.03-14:

The description provided in the response to **Question 03.07.03-14** states that non seismic subsystems attached to seismic subsystems are analyzed up to the first brace beyond the interface using the same methods and design criteria for seismic Category I subsystems. The applicant is requested to revise the response to define the first brace in its response as the first anchor or sets of braces acting as an effective anchor, as the first brace may provide support in only one direction for the non seismic Category II subsystem. In addition, the applicant in its response states that attached non-seismic subsystems up to the first brace [anchor] beyond the interface are analyzed and designed using the same methods and design criteria for seismic Category I subsystems. The applicant is requested to include these criteria in the FSAR.

Response to Question 03.07.03-31:

Topical Report ANP-10264NP-A, "U.S. EPR Piping Analysis and Pipe Support Design," Section 5.4, describes Seismic Category I piping to non-Category I piping interface design requirements. The NRC has approved Topical Report ANP-10264NP-A for this use.

Seismic Category I subsystem design requirements extend to the first seismic restraint beyond the system boundary with non-seismic subsystems. Non-seismic subsystems and supports beyond this point that affect a Seismic Category I subsystem dynamic analysis are classified Seismic Category II and are included in the analysis model.

If the first seismic restraint beyond a system boundary is an anchor that restrains the subject pipe in all six degrees of freedom, the analysis model includes only the subsystem up to the anchor. These anchors are designed to support loads from both analyzed and unanalyzed portions of the subsystem.

If the first seismic restraint is not an anchor, a series of restraints is employed to isolate non-seismic subsystem seismic response from the Category I subsystem. This isolation zone includes four seismic restraints in each of the three orthogonal directions beyond the Seismic Category I subsystem boundary and includes at least one change in direction.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 3.7.3.8 will be revised as described in the response and indicated on the enclosed markup.

Question 03.07.03-32:

Follow-Up RAI to Question 03.07.03-15:

The applicant is requested to include in the FSAR the acceptance criteria of SRP 3.7.2, SAC-8.B which states that for those situations where the collapse of a non Category I structure could impair the integrity of a Category I structure the technical basis for the determination that the collapse of the non Category I structure is acceptable should be provided. It should also include a description of the additional loads imposed due to the collapse of the non Category I structure and the methods used to conclude that these loads are not damaging.

Response to Question 03.07.03-32:

The response to this question will be provided on September 29, 2009.

Question 03.07.03-33:

Follow-Up RAI to Question 03.07.03-16:

In its response to **Question 03.07.03-16**, the applicant states that relative displacements may be obtained from the dynamic analysis of the supporting structure. The applicant is requested to describe how the relative displacements are obtained from the dynamic analysis and include how the 12 soil cases for the NI Common Basemat Structures and the 10 soil cases for the EPGB and ESWB are accounted for in this calculation. The applicant also needs to describe how these are imposed (in-phase/out-of-phase) at the support points to determine the stresses in a multi-supported system. In addition, the FSAR markup is not clear as a word or words are missing in the revised write-up (First paragraph within the boxes on Pages 3.7-310 and 3.7-311 of the mark-up). The applicant is requested to correct the markup in its response to this RAI.

Response to Question 03.07.03-33:

The response to this question will be provided on September 29, 2009.

Question 03.07.03-34:

Follow-Up RAI to Question 03.07.03-19:

In its response to **Question 03.07.03-19**, the applicant did not provide a specific comparison of the differences between the 1987 version of IEEE Standard 344 and the 2004 version as it relates to equipment fatigue nor is this comparison found in U.S. EPR FSAR, Tier 2, Section 3.11.2.3.4. As a result, the staff is asking the applicant to provide reconciliation between the two versions of the Standard as it applies to fatigue evaluation.

Response to Question 03.07.03-34:

The response to this question will be provided on September 29, 2009.

Question 03.12-17:

Section 3.12.5.10.1 of FSAR states that the pressurizer surge line temperatures will be monitored during the first cycle of the first U.S. EPR initial plant operation to verify that the design transients for the surge line are representative of actual plant operation.

The staff noted that plant heatup and cooldown methods will control the system ΔT (pressurizer temperature – Coolant Loop temperature). In order to use the first U.S. EPR initial plant operation to verify that the design transients for the SL are representative, the applicant has to assure that all U.S. EPR plants have to use the same heatup and cooldown methods.

How does the applicant ensure that all U.S. EPR plants will use the same heatup and cooldown methods?

Response to Question 03.12-17:

At the request of the NRC, in the response to RAI 211, Question 03.12-12, AREVA NP revised U.S. EPR FSAR Tier 2, Section 3.12.5.10.1 regarding monitoring the pressurizer surge line temperature during the first cycle of the first U.S. EPR initial plant operation to make this a COL information item. In revised U.S. EPR FSAR Tier 2, Table 1.8-2 that accompanied AREVA NP's response to RAI 211, Question 03.12-12, this new COL Information Item was identified as an action required by the COL holder (see COL Information Item 3.12-4). Therefore, methods to implement this COL item are the responsibility of the COL holder. Additionally, as noted in U.S. EPR FSAR Tier 2, Section 3.12.5.10.1 the monitoring program only applies to the first U.S. EPR plant. The NRC accepted a similar position regarding applicability of the monitoring program in Section 3.12.5.10 of NUREG-1793. Specific heatup and cooldown methods also will be prescribed in plant operating procedures, which are the COL applicant's responsibility as noted in U.S. EPR FSAR Tier 2, Section 13.5.

The pressurizer surge line temperature is monitored during initial reactor coolant system (RCS) hot functional testing (HFT) heatup and cooldown as described in U.S. EPR FSAR Tier 2, Section 14.2 (Test #168). The heatup and cooldown operating procedures used during HFT are the same as that of normal operation in accordance with U.S. EPR FSAR Tier 2, Section 14.2.9. During heatup, RCS temperature is raised by reactor coolant pump operation to reach no-load temperature. After the pressurizer steam bubble is generated, pressure is increased gradually by the pressurizer heaters. During cooldown, the RCS is first cooled down by using turbine bypass valves then, using the residual heat removal (RHR) system, pressure is decreased gradually by using pressurizer spray. At the termination of pressurizer steam bubble, RCS pressure is maintained by the letdown subsystem. Equipment used during these operations is the same as those used during normal plant heatup and cooldown.

Additionally, the U.S. EPR design addresses pressurizer surge line thermal stratification due to heatup/cooldown limits through the following design and operating provisions:

- During a plant heatup and part of the cooldown, outsurge conditions are maintained to minimize thermal stratification.
- As the solid pressurizer cooldown begins, the surge line piping temperatures will change from hot leg to pressurizer temperature due to insurges. The resulting stratification and the influence of the vortex penetration are eliminated due to the insurge flows in the surge line.

- During normal at-power operations, the U.S. EPR FSAR Tier 2, Section 3.12.5.10.1, states: “a continuous bypass spray flow of sufficient magnitude is maintained to further suppress turbulent penetration from the hot leg flow.” During hot-standby, the temperature difference between the pressurizer and the hot leg at hot standby is maintained within a range to prevent thermal stratification.

FSAR Impact:

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

U.S. EPR Final Safety Analysis Report Markups

For non-seismic subsystems attached to seismic subsystems, the dynamic effects of the non-seismic subsystem are accounted for in the modeling of the seismic subsystem. The attached non-seismic subsystem, classified as Seismic Category II, is designed to preclude the effect of causing failure of the seismic subsystem during a seismic event. Section 3.7.3.3 describes decoupling criteria used to determine if the flexibility of the non-seismic subsystem is included in the subsystem model.

03.07.03-31

Seismic Category I subsystem design requirements extend to the first seismic restraint beyond the system boundary with non-seismic subsystems.

If the first seismic restraint beyond the seismic subsystem boundary is an anchor, restraining the subsystem in all six degrees of freedom, the analysis model includes only the subsystem up to the anchor. The anchor is designed for the loads from the analyzed portion of the subsystem and loads from the non-seismic subsystem.

If the first seismic restraint cannot be an anchor, the non-seismic subsystem and supports beyond this location that impact the dynamic analysis of the Seismic Category I subsystem are classified Seismic Category II and included in the model. In this case, a series of restraints may be utilized to isolate the seismic response of the non-seismic subsystem from the seismic subsystem. This isolation zone must include four seismic restraints in each of the three orthogonal directions beyond the Seismic Category I subsystem boundary and include at least one change in direction.

3.7.3.8.1 Isolation of Seismic and Non-Seismic Systems

Isolation of seismic and non-seismic subsystems is provided by either geographical separation or by the use of physical barriers. Isolation minimizes the interaction effects that must be considered for the seismic systems and minimizes the number of non-seismic subsystems requiring more rigorous analysis.

Several routing considerations are used to isolate seismic and non-seismic subsystems. When possible, non-seismic SSC are not routed in rooms containing safety-related SSC. Non-seismic SSC that can not be completely separated from seismic SSC must be shown to have no interaction with the seismic systems based on separation distance or an intermediate barrier, or be classified as Seismic Category II. To the extent possible, non-seismic systems are not routed close to any safety-related components.

3.7.3.8.2 Interaction Evaluation

Non-seismic SSC may be located in the vicinity of safety-related SSC without being qualified as Seismic Category II, provided an impact evaluation is performed to verify that no possible adverse impacts occur. In this evaluation, the non-seismic components are assumed to fall or overturn as a result of a seismic event. Any safety-related subsystem or component which may be impacted by the non-seismic