ArevaEPRDCPEm Resource

From: Pederson Ronda M (AREVA NP INC) [Ronda.Pederson@areva.com]
Sent: Thursday, January 07, 2010 6:28 PM
To: Tesfaye, Getachew
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); HAMMOND Philip R (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 331, FSAR Ch. 3
Attachments: RAI 331 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 331 Response US EPR DC.pdf," provides the schedule for technically correct and complete responses to these questions.

The following table indicates the respective pages in the response document, "RAI 331 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 331 — 03.09.02-62	2	3
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The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 331 — 03.09.02-62	March 4, 2010
RAI 331 — 03.09.02-63	April 8, 2010
RAI 331 — 03.09.02-64	April 8, 2010
RAI 331 — 03.09.02-65	April 8, 2010
RAI 331 — 03.09.02-66	April 8, 2010
RAI 331 — 03.09.02-67	March 4, 2010
RAI 331 — 03.12-22	March 4, 2010

Sincerely,

Ronda Pederson

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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Monday, November 30, 2009 12:04 PM
To: ZZ-DL-A-USEPR-DL
Cc: Spicher, Terri; Hsu, Kaihwa; Dixon-Herrity, Jennifer; Patel, Jay; Miernicki, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 331 (4024, 4026),FSAR Ch. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on November 18, 2009, and on November 24, 2009, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. 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: 1075

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Response to

Request for Additional Information No. 331 (4024, 4026), Revision 0

11/30/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.09.02 - Dynamic Testing and Analysis of Systems Structures and Components
SRP Section: 03.12 - ASME Code Class 1, 2, and 3 Piping Systems and Piping Components and Their Associated Supports

Application Section: FSAR Chapter 3

QUESTIONS for Engineering Mechanics Branch 1 (AP1000/EPR Projects) (EMB1)

Question 03.09.02-62:

Follow-up to RAI Question 03.09.02-40:

Upon review of FSAR Tier 2, Section 3.9.2.1, the staff determined that the applicant did not provide a list of selected locations in the piping system at which visual inspections and measurements (as needed) will be performed during testing as recommended in SRP 3.9.2 subsection II.1 (Acceptance Criteria) C. In **RAI 03.09.02-12**, the staff requested the applicant to provide a list of selected locations in the piping system at which visual inspections and measurements (as needed) will be performed during testing. The applicant responded to **RAI 03.09.02-12** in their Response to Request for Additional Information No. 160, Revision 0, by stating that SRP 3.9.2, subsection II.1, Acceptance Criteria C states that an acceptable test program will include a list of selected locations in a piping system at which visual inspections and measurements will be performed during the tests. These locations will be at pipe supports, particularly supports with allowances for free thermal movements (e.g., spring and snubber supports). The criteria for determining these locations are described in U.S EPR FSAR Tier 2, Section 3.9.2.1. Additionally, this FSAR section states: “Specific information concerning the locations where visual inspection or measurements are to be taken is also addressed in the applicable test procedures.” The staff could not identify the locations in test procedures cited by the applicant. Based on the applicant’s response, the staff determined that a list of the selected locations as required and requested has not been provided. Therefore, the staff initiated follow-up **RAI 03.09.02-40** requesting the locations where visual inspections or measurements will be taken. The applicant responded to **RAI 03.09.02-40** in their Response to **Request for Additional Information No. 245 (2981, 3036), Revision 0** by stating that there are several tests that will require monitoring vibration, thermal expansion, and dynamic effects as part of the initial test program (ITP) (e.g., U.S. EPR FSAR Tier 2, Section 14.2, Tests 035, 164, 165, etc.). The ITP plan will include a list of locations in the specific piping systems that are selected for visual inspection and other measurements during the vibration, thermal expansion, and dynamic effects testing program, as recommended by SRP 3.9.2. This is consistent with SRP Acceptance Criteria 1 which states:

> “Relevant requirements of GDCs 1, 2, 4, 14, and 15 are met if vibration, thermal expansion, and dynamic effects testing are conducted during startup functional testing for specified high- and moderate-energy piping and their supports and restraints. The purposes of these tests are to confirm that the piping, components, restraints, and supports have been designed to withstand the dynamic loadings and operational transient conditions encountered during service as required by the code and to confirm that no unacceptable restraint of normal thermal motion occurs.”

SRP Acceptance Criteria Item 1.C notes that an acceptable test program includes a list of selected locations in the piping system where visual inspections and measurements (as needed) will be performed during the tests. In addition, the ITP plan will include acceptance criteria for the deflection, pressure, and/or other appropriate criteria to be obtained during the tests to determine if the stress and fatigue limits are within design levels. To clarify that the recommendations of SRP 3.9.2 are incorporated in the ITP plan, U.S. EPR FSAR Tier 2, Section 3.9.2.1 will be revised to state that the list of locations for visual inspection and other measurements, as well as acceptance criteria, are part of the ITP plan.

The staff reviewed the applicant’s response to **RAI 03.09.02-40** and the proposed revision to U.S. EPR FSAR Tier 2, Section 3.9.2.1 on page 3.9-25. The staff agrees that the proposed revision to U.S. EPR FSAR Tier 2, Section 3.9.2.1 is acceptable. However, based on the applicant's response that a list of locations for visual inspection and other measurements, as well as acceptance criteria, are part of the ITP plan described in U.S. EPR FSAR Tier 2, Section 14.2 for the required piping systems, the staff developed the following question:

The staff reviewed U.S. EPR FSAR Tier 2, Section 14.2 description of the proposed initial test program (ITP) to determine if the list of locations for visual inspection and other measurements, as well as acceptance criteria, are part of the ITP plan for the required piping systems to be tested. The applicant stated in U.S. EPR FSAR Tier 2, Section 3.9.2.1 that testing is performed on piping systems identified in U.S. EPR FSAR Tier 2, Table 3.2.2-1 and high and moderate energy piping systems listed in U.S. EPR FSAR Tier 2, Table 3.6.1-1 and Table 3.6.1-3. The staff noted that the ITP vibration, thermal expansion, and dynamic effects testing for piping systems described in U.S. EPR FSAR Tier 2, Section 14.2 is limited to Balance of Plant Piping Thermal Expansion Measurement (Test #034), BOP Piping Vibration Measurement (Test #035), and Pre–Core Reactor Coolant System Expansion Measurements (Test #165). The staff could not determine if the proposed ITP met the requirements of GDCs 1, 2, 4, 14, and 15 to perform vibration, thermal expansion, and dynamic effects testing during startup functional testing for specified high- and moderate-energy piping and their supports and restraints. Therefore, the staff requests the applicant to explain if all piping systems identified in U.S. EPR FSAR Tier 2, Tables 3.2.2-1, Table 3.6.1-1 and Table 3.6.1-3 are included in the ITP.

Response to Question 03.09.02-62:

A response to this question will be provided by March 4, 2010.

Question 03.09.02-63:

Follow-up to Question 03.09.02-41:

The applicant responded to **RAI 03.09.02-15** in their Response to Request for Additional Information No. 160, Revision 0, by stating that the vibration monitoring evaluation method VMG-2, as described in Reference 3 of U.S. EPR FSAR Tier 2, Section 3.9.2.7, is used to evaluate the Level A and Level B vibrations in the U.S. EPR piping systems. VMG-2 is the method by which the vibration is evaluated, involving beam calculations of the piping to develop conservative criteria for vibration velocity and displacement based on limiting the stress to the fatigue stress limit. As stated in U.S. EPR FSAR Tier 2, Section 3.9.2.1.1, in the event that vibrations arising from Level A or Level B loads in Phase I and Phase II tests are observed to be excessive when compared to those computed using the VMG-2 method, more detailed analyses based on VMG-1 methodology may be performed to demonstrate the acceptability of measured vibrations. If unacceptable results are obtained, appropriate corrective actions will be performed and included in the results of the comprehensive vibration assessment program, which is the responsibility of the COL holder as noted in U.S. EPR FSAR Tier 2, Table 1.8-2. The staff reviewed the applicant's response and could not determine if the applicant will perform additional testing after corrective action is taken. In addition, a reference to a comprehensive vibration program that includes piping vibration assessment was not identified in U.S. EPR FSAR Tier 2, Table 1.8-2. Therefore, the staff issued follow up **RAI 03.09.02-41** to request that further information be provided regarding additional testing after corrective action is taken. The applicant responded to **RAI 03.09.02-41** in their response to Request for Additional Information No. 245 (2981, 3036), Revision 0, by stating that if unacceptable results are obtained, corrective actions will be performed and included in the results of the comprehensive vibration assessment program for piping and steam generator upper internals, and additional testing will be performed after corrective action is taken. The staff accepts that the applicant's commitment to perform additional testing after corrective action is performed meets the recommendations of SRP 3.9.2. However, as stated in U.S. EPR FSAR Tier 2, Section 1.8.1 "COL Information Items", Table 1.8-2—U.S. EPR Combined License Information Items, lists the COL information items ***and the section where the information is discussed***. A COL applicant that references the U. S. EPR design certification will identify the FSAR section, or provide a list, that demonstrates how the COL information items have been addressed. The staff could not locate the FSAR section in U.S. EPR FSAR Tier 2, Table 1.8-2 that references a comprehensive vibration program or a list that demonstrates how the COL information items have been addressed for all piping systems specified in U.S. EPR FSAR Tier 2, Section 3.9.2.1. Therefore, AREVA is requested to address this issue.

Response to Question 03.09.02-63:

A response to this question will be provided by April 8, 2010.

Question 03.09.02-64:

Follow-up to Question 03.09.02-43

In response to **RAI 03.09.02- 17**, the applicant stated that pressure-flow oscillations travel through the entire affected piping system with little attenuation and the vibrations from acoustic resonances are readily identifiable throughout an affected piping system. This is a basis for monitoring only representative trains of piping systems.

In follow up to **RAI 03.09.02- 17,** the staff issued **RAI 03.09.02-43**, and asked the applicant for clarification of the following (2) areas with respect to monitoring only representative trains of piping systems during start up testing:

1. explain how the applicant will localize a problem area so that corrective action can be taken, and
2. because conditions just below and just above that range of conditions where resonant lock-in occurs may produce locally high response levels, describe how measuring representative piping systems will determine that excessive vibration is not occurring in non-instrumented piping systems.

In response, the applicant described the screening methodology for flow excited acoustic resonance in the design of the reactor coolant system (RCS) and attached piping. The staff noted that the description of the design screening methodology does not explain how the applicant will localize a problem area so that corrective action can be taken, or describe how measuring representative piping systems will determine that excessive vibration is not occurring in non-instrumented piping systems. Therefore, AREVA is requested to address this issue.

Response to Question 03.09.02-64:

A response to this question will be provided by April 8, 2010.

Question 03.09.02-65:

Follow-up to Question 03.09.02-58

In response to **RAI 03.09.02- 25**, the applicant states that excessive vibrations due to acoustic resonances as a result of flow in attached piping systems are eliminated by verifying that the piping systems are screened for this phenomenon in the design phase. In follow up to **RAI 03.09.02- 25,** the staff issued **RAI 03.09.02-58**, and requested that the applicant provide:

1. the methodology used in screening the U.S. EPR steam system design for potential flow-excited and structural resonances, and
2. the results of its implementation of the methodology for the U.S. EPR design, and
3. discuss the performance of scale model testing to confirm the validity of the methodology in predicting resonance in the U.S. EPR steam system, and
4. include the methodology and scale modeling testing information in DCD, Tier 2 Section 3.9.2.

The applicant responded as follows:

1. The methodology used in screening for sources of acoustic resonance in the U.S. EPR is
described ASME Journal of Pressure Vessel Technology, Volume 108/267, August 1986, titled “Flow-Induced Vibration in Safety Relief Valves,” by R.M. Baldwin and H.R. Simmons, (also see the Response to RAI 160, RAI **03.09.02-25**). The response to **RAI 03.09.02-43** expands on the design criteria described by R.M. Baldwin and H.R. Simmons to provide an overview of the methodology to be incorporated into the design criteria for the reactor coolant system (RCS) piping as well as the design of piping attached to the steam generator (SG). This design objective and its evaluation will be included in the comprehensive vibration assessment program for the steam generator (SG) and applicable piping systems (RCS, main steam system (MSS), and feedwater system (MFWS)).
2. Implementation of the methodology will be performed later in the design process.
3. The screening methodology provided in the Response to **RAI 03.09.02-43** is based on testing of 40 in-service valves and standoff branch lines and is the method typically followed by the industry when screening for this source of excitation.
4. Scale model testing was not a part of the confirming the validity of the methodology.

The staff reviewed the applicant’s response and noted that the methodology described in the response to **RAI 03.09.02-43** and the referenced ASME journal, is intended to prevent the possibility of vortex shedding over stand pipes, branch lines and cavities from coupling into acoustic and structural resonances of piping. The applicable systems are RCS, Main Steam, and Main Feedwater. The methodology outlined by the applicant follows that described in the referenced ASME journal by Baldwin and Simmons (1986). The applicant stated that the screening methodology is described in the response to **RAI 03.09.02-43** and that the approach to screen piping systems that may require corrective action is based upon Baldwin’s research. Piping systems that may require corrective action have a Strouhal number in the range between 0.3 and 0.6. The applicant further stated in the response to **RAI 03.09.02-43** that if standoff pipes are found to be susceptible to acoustic resonance, as determined by a Strouhal number between 0.3 and 0.6, through the entire operating range of flow, then measures will be taken to redesign the piping so that acoustic resonance will not occur.

The staff noted that other applicants for new plant design base their screening on more recent studies, such as Ziada and Shine (1999). The Ziada and Shine study indicates that there are piping system configurations for which the Strouhal number range should be expanded to between 0.3 and 0.63. The difference between the Ziada and Shine study and the Baldwin and Simmons is that Baldwin and Simmons examined the case of a single side branch located in a straight section of pipe, whereas Ziada and Shine extended the work to include the interactions between a small set of piping components and configurations. The Ziada and Shine study involved more detailed configurations that included a side branch just downstream of an elbow, two side branches on the same side of the pipe and two side branches opposite of each other. The Ziada and Shine study demonstrates that for conservative screening purposes, there are piping configurations for which an upper Strouhal number is 0.63.

The applicant is requested to justify why an upper Strouhal number of is 0.6 is used in the piping screening criteria for the basis of determining that flow excitation in cavities of safety relief valves, standoff pipes and branch lines cannot occur. It is suggested that the applicant review the Ziada and Shine study, especially Figure 14 (flow past a side branch downstream of an elbow) and determine the applicability of a higher Strouhal number for screening criteria.

Reference:

S. Ziada, S. Shine, “Strouhal Numbers Of Flow-Excited Acoustic Resonance Of Closed Side Branches,” Journal of Fluids and Structures, Volume 13, Issue 1, January 1999, Pages 127-142.

Response to Question 03.09.02-65:

A response to this question will be provided by April 8, 2010.

Question 03.09.02-66:

Follow-up to Question 03.09.02-60

In a follow up RAI to **03.09.02-26,** the staff issued RAI **03.09.02-60** requesting the applicant to provide the information previously requested in RAI **03.09.02-26**. "For example, AREVA did not address the consideration of sensitivities in the arrangement, design, size, and operating conditions of the U.S. EPR steam system that can influence flow-excited and structural resonances. Further, AREVA did not explain which U.S. EPR operating conditions could lead to resonance conditions in the steam generators, or discuss how the startup test plan will demonstrate that no flow-induced resonance effects will occur during the design life of the plant that could lead to excessive vibration and damage to components in the steam generation system. The NRC staff requests that AREVA address these considerations in its response to this RAI and include in DCD, Tier 2 Section 3.9.2."

The applicant stated that RAI **03.09.02-60** is addressed by their response to RAI **03.09.02-40** which states that the Initial Test Program (ITP) contains several tests that will require monitoring vibration and dynamic effects. The applicant further stated in their response to question **03.09.02-60** that the ITP "will demonstrate that no flow-induced resonance effects will occur during the design life of the plant that could lead to excessive vibration and damage to components in the steam generation system."

The staff reviewed the applicant's response and reference RAI **03.09.02-40** and U.S. EPR FSAR Tier 2, Section 14.2. The applicant cited tests 164 and 165 in U.S. EPR FSAR Tier 2, Section 14.2 as examples of the tests that apply to measurement of the steam system vibration response. The staff examined these referenced tests, as well as others located in U.S. EPR FSAR Tier 2, Section 14.2 and noted that they are presented as abstracts and not actual test procedures. Upon further review, the staff noted that detailed information requested in RAI **03.09.02-60,** such as sensitivities of the steam system components and operating points which could result in flow-induced resonance in the steam piping or steam generator could not be located. In addition, the staff could not locate where the applicant discussed how the startup test plan will demonstrate that no flow-induced resonance effects will occur during the design life of the plant that could lead to excessive vibration and damage to components in the steam generation system. Therefore, AREVA is requested to address this issue.

Response to Question 03.09.02-66:

A response to this question will be provided by April 8, 2010.

Question 03.09.02-67:

Follow-up to Question 03.09.02-61:

The staff reviewed the applicant's response to each issue identified in RAI 287, Question 03.09.02-61 and provided the following comments:

1. U.S. EPR FSAR Tier 2 Revision 1, Section 3A.2.2.1 Page 3A-2

The applicant stated that U.S. EPR FSAR Tier 2, Section 3A.2.2.1 will be revised to align the HVAC ductwork loads with Paragraph AA-4211 "Loads", and to clarify the following:

The seismic loads considered are only for safe shutdown earthquake (SSE) events, as operating basis earthquake (OBE) events are not a part of the U.S. EPR design basis.

SSE loads are included in Levels C and D, and Level B combinations will not include seismic loads.

The applicant provided clarification to U.S. EPR FSAR Tier 2, Section 3A.2.2.1 to address the use of OBE loads in the seismic load component. The staff also noted that the applicant revised U.S. EPR FSAR Tier 2, Section 3A.2.2.1 to address system operational pressure transient (SOPT) loads and normal loads (N) as defined by paragraph AA-4211 of ASME AG-1, 2003.

The staff reviewed the proposed U.S. EPR FSAR Tier 2, Section 3A.2.2.1 markup with respect to the commitment to align to paragraph AA-4211 and noted the following discrepancies that should be resolved by the applicant:

a. The description of Seismic Loads (SL) does not agree with paragraph AA-4211.
b. The clarification provided by the applicant for "SL" loads includes a reference to paragraph SA-4211(f). This appears to be an incorrect reference if the applicant is intending to comply with AA-4211.
c. The existing description of "FML" loads includes a reference to paragraph SA-4211. This appears to be an incorrect reference if the applicant is intending to comply with AA-4211.
d. The existing description of "ADL" loads does not include liquid slosh in tanks and vessels and mechanical shock loads as required by paragraph AA-4211.
e. The existing description of "L" loads is based on SA-4211, which includes the load requirement for a 250 lb construction or maintenance midspan man load over a 10 square inch area. The requirement for a 250 lb construction or maintenance midspan man load over a 10 square inch area is not required by paragraph AA-4211.
f. The applicant stated that "For ease of design, a duct system may be designed using one pressure value that envelops NOPD and SOPT." The applicant also stated that Normal loads (N) = NOPT + SOPT + DW + EL + FML The applicant is requested to clarify how Normal Loads will be determined if a duct system may be designed using one pressure value that envelops NOPD and SOPT.

2. U.S. EPR FSAR Tier 2 Revision 1, Section 3A.2.3.1 Page 3A-3

The applicant revised the load combinations defined in U.S. EPR FSAR Tier 2, Section 3A.2.3.1 to align with combinations required by AA-4321of ASME AG-1, 2003.

The staff noted that Article AA-4000 does not include separate HVAC support loading criteria comparable to those identified in SA-4216. Table AA-4212 defines the required load combinations for both components and their supporting elements. In addition, note (a) of Table AA-4212 addresses the need to evaluate fluid momentum loads (FML) associated with each service level. The applicant is requested to explain why FML is not included in the Normal Load (N) combination for support design.

3. U.S. EPR FSAR Tier 2 Revision 1, Section 3A.2.4.1 Page 3A-3

The applicant stated that as a result of the ASME response for ductwork stress allowables, U.S. EPR FSAR Tier 2, Section 3A.2.4.1 will be revised to show the combined membrane and bending stress allowable for Level C as 1.8 x 0.6Fy to be consistent with Table AA-4321 of ASME AG-1, 2003.

The applicant provided a markup to U.S. EPR FSAR Tier 2, Section 3A.2.4.1. The staff reviewed the proposed revision to U.S. EPR FSAR Tier 2, Section 3A.2.4.1 and identified the following issues:

A. The applicant has identified various references for ductwork stresses. For example, the applicant stated in U.S. EPR FSAR Tier 2, Section 3A.2 that safety related, seismic category I and II HVAC ductwork, supports and restraints meet the stress allowables provided in ASME AG-1-2003, Code on Nuclear Air and Gas Treatment, with 2004 Addenda (reference 2). The applicant also stated in U.S. EPR FSAR Tier 2, Section 3A.2.4.1 that ductwork stresses are based on Reference 4, (American Iron and Steel Institute (AISI), North American Specification for the Design of Cold-Formed Steel Structural Members, 2001 Edition with 2003 Errata), which is referenced in paragraph SA-4220 of ASME AG-1. However, the applicant stated in response to RAI 287 03.09.02-61 that ductwork stresses are based on paragraph AA-4300 of ASME AG-1. The applicant is requested to clarify what is the basis for ductwork stresses.

B. The applicant stated the ductwork allowable stress is consistent with Table AA-4321 of ASME AG-1, 2003. ASME AG-1 Table AA-4321 primary stress allowables are based on design stress (S). Design stress (S) for ASME materials is tabulated in various tables, such as Tables 1A and 1B of ASME Section II, Part D. The design stress (S) for the materials in each table is derived as described in mandatory appendices. For example, design stress (S) in Tables 1A and 1B is derived as described in Mandatory Appendix-1, “Basis for Establishing Stress values in Tables 1A and 1B” of ASME Section II, Part D. The design stress (S) includes affects of various factors such as factor of safety against yield, factor of safety against rupture, yield at at room temperature, yield at design temperature and others factors. The staff noted that allowable stress in American Iron and Steel Institute (AISI) is based on the term (F_y). The applicant is requested to reconcile the use of the term ($0.6F_y$) in place of the design stress (S) term in Table AA-4321 to derive the stress allowables for service levels A through D.

4. U.S. EPR FSAR Tier 2 Revision 1, Table 3A-1, and Table 3A-2 Page 3A-11

The applicant stated that as a result of the ASME response, load combinations for ductwork and ductwork supports shown in U.S. EPR FSAR Tier 2, Tables 3A-1 and 3A-2 will be revised to align with combinations defined in AA-4300 of ASME AG-1, 2003, as shown below. The applicant noted that AA-4300 references AA-4212 for load combinations for ductwork and supports, which in turn references Table AA-4212 of ASME AG-1, 2003.

The staff reviewed the applicant's proposed revisions to U.S. EPR FSAR Tier 2, Tables 3A-1 and 3A-2 as shown below with respect to AA-4300 of ASME AG-1, 2003. The revisions to the Load Combinations are in agreement with Table AA-4212 and are acceptable.

The staff noted that stress criteria referenced in Tables 3A-1 and 3A-2 are applicable to the service limits for levels A through D service defined in paragraph AA-4214.2 of ASME AG-1. The applicant has included "Category" to U.S. EPR FSAR Tier 2, Tables 3A-1 and 3A-2 and correlated each service level to a "Category" as follows:

- Service Level A is aligned with "Normal Condition"
- Service Level B is aligned with "Upset Condition"
- Service Level C is aligned with "Emergency Condition"
- Service Level D is aligned with "Faulted Condition"

The staff noted that normal, upset, emergency and faulted terminology is not used in ASME AG-1 but is common in ASME Section III. Normal and Upset conditions can be compared against Level A and B service limits. However, Level C and D service limits that allow large deformations and permit damage requiring repair do not correlate with ASME III Emergency and Faulted conditions.

The applicant is requested to:

A. Explain what is meant by "Category Column" and how it is used
B. Clarify that the Service Levels A, B, C and D indicated in the tables meet the definitions of the Service Limits provided in AA-4214.2 and

Clarify how the Service Levels A, B, C and D meet the corresponding definitions of Normal, Upset, Emergency and Faulted Conditions given in U.S. EPR FSAR Tier 2 Section 3.9.1.1.

Response to Question 03.09.02-67:

A response to this question will be provided by March 4, 2010.

Question 03.12-22:

In FSAR Section 3.12.6.11, AREVA referenced Section 6.11 of ANP-10264NP-A to address pipe support gaps and clearances used in the design of pipe supports. AREVA states that the normal design practice for the U.S.EPR will be to use a normal cold condition gap of one-sixteenth inch on each side of the pipe in the restrained direction.

SRP 3.12 states that this gap must account for the diameter expansion of the pipe due to temperature and pressure. The acceptance criteria for the minimum gap (total of opposing sides) between the pipe and the support will be reviewed on a case by case basis.

1. The staff noted that 1/16” cold condition gap on each side of pipe in the restrained direction may not provide sufficient radial expansion of the pipe in the restrained direction for Class 1&2 large bore piping. The staff requests AREVA to demonstrate that 1/16" gap has accounted for radial expansion.
2. The staff also noted that 1/16' cold gap indicates the pipe is not supported vertically during cold condition. The staff requests AREVA to demonstrate that the pipe support design with 1/16” cold gap is adequate during cold condition.

Response to Question 03.12-22:

A response to this question will be provided by March 4, 2010.