ArevaEPRDCPEm Resource

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Subject: Draft - U.S. EPR Design Certification Application RAI No. 354 (4106,4107,4220), FSAR Ch. 3
Attachments: Draft RAI_354_SEB2_4106_4107_EMB2_4220.doc

Attached please find draft RAI No. 354 regarding your application for standard design certification of the U.S. EPR. If you have any question or need clarifications regarding this RAI, please let me know as soon as possible, I will have our technical Staff available to discuss them with you.

Please also review the RAI to ensure that we have not inadvertently included proprietary information. If there are any proprietary information, please let me know within the next ten days. If I do not hear from you within the next ten days, I will assume there are none and will make the draft RAI publicly available.

Thanks,
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Request for Additional Information No. 354(4106,4107,4220), Revision 0

1/8/2010

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.08.02 - Steel Containment
SRP Section: 03.08.05 - Foundations
SRP Section: 03.06.02 - Determination of Rupture Locations and Dynamic Effects Associated with the Postulated Rupture of Piping

Application Section: FSAR Ch 3

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

03.08.02-11

Follow-up to RAI 155, Question Nos. 03.08.02-1, 03.08.02-2, and 03.08.02-5

The containment structure is the most important structure for mitigating the consequences of an accident and protecting the public from radiation exposure. Of all the safety-related structures, the design of the containment structure is the most critical, and requires the highest level of staff review. For the staff to complete its assessment of the containment structure, the design details and design calculations for the equipment hatch, the air locks, the closure for the construction opening, and the high energy piping penetrations need to be completed. In addition, the preliminary design should be developed for the steel components of the fuel transfer tube and representative penetrations (electrical and mechanical) that fall within the jurisdictional boundary of ASME Section III, Subsection NE.

Since the responses to RAIs 03.08.02-1, -2, and -5 did not provide a sufficient description summarizing the design of penetrations, the staff requests that the applicant submit the following information for the equipment hatch, the air locks, the closure for the construction opening, and the high energy piping penetrations that fall within the jurisdictional boundary of ASME Section III, Subsection NE:

(1) material(s) of construction and detailed geometry;
(2) description of the design-basis analyses conducted;
(3) summary of the analysis results; and
(4) comparison of results to ASME Section III, Subsection NE acceptance criteria.

This information should also be included in FSAR Section 3.8.2. The applicable detailed calculations should be available for staff review at a future audit.

03.08.02-12

Follow-up to RAI 155, Question No. 03.08.02-3

The staff determined that the information provided in the applicant's RAI response for the fuel transfer tube is insufficient to complete a safety evaluation. The following additional information is needed to resolve this RAI:

1. Provide sufficient details for all components of the penetration closure within the jurisdictional boundary of the RCB. These details should include sufficient information to determine adequacy of the load path (e.g. key structural members in the load path, anchorage of key components to RCB, etc.).

2. FSAR Tier 2, Section 9.1.4.2.2 states: "The fuel transfer tube is provided with expansion joints on the RB and FB side to accommodate the differential movement and provide leak tight sealing." The staff cannot assess the adequacy of the design based on this statement alone. Provide sufficient description and details of the expansion joints to facilitate the staff's review of the design adequacy to accomplish the intended functions which were stated to be differential movement and leak-tightness. At a minimum, this should include material, geometry, and a summary of analyses performed, analysis results, and comparison to acceptance criteria.

This information should also be included in FSAR Section 3.8.2. The applicable detailed calculations should be available for staff review at a future audit.

03.08.02-13

Follow-up to RAI 155, Question No. 03.08.02-4

The staff requests that the applicant submit the following information related to buckling analysis of the equipment hatch, the air locks, the closure for the construction opening, and the high energy piping penetrations:

(1) a description of the design-basis analyses conducted;
(2) a summary of the analysis results; and
(3) a comparison of results to ASME Section III, Subsection NE-3130 and/or Code Case N-284 acceptance criteria.

This information should also be included in FSAR Section 3.8.2. The applicable detailed calculations should be available for staff review at a future audit.

03.08.02-14

Follow-up to RAI 155, Question No. 03.08.02-6

The staff reviewed the electrical penetration figures provided with the initial RAI response. They are acceptable to describe typical electrical penetrations. However, there is no information on the design of the sleeves that support the electrical penetrations. The staff requests that the applicant provide the following additional information:

(1) range of penetration diameters,
(2) sleeve material and thickness, and
(3) method of analysis used to demonstrate adequacy of the sleeve and its anchorage into concrete.

The staff also requests that the applicant confirm that the applicable procurement criteria will identify the required pressure resisting capability of the electric penetrations, and will include a requirementthat the vendor demonstrate design adequacy in accordance with SRP Section 3.10. If not, then explain what alternative method of qualification will be implemented.

03.08.02-15

Follow-up to RAI 155, Question No. 03.08.02-8

While the information provided in the initial RAI response is helpful to understand how AREVA plans to accommodate differential movement between the RCB and the RSB, the staff needs additional description and detail before it can complete its review of this design aspect. The staff's primary concern is the integrity of the containment pressure boundary. Therefore, the staff requests that AREVA describe the loads that are imposed on the containment penetrations due to differential movement between the RCB and the RSB, and also describe how these loads are considered in the design of the containment penetrations.

This information should also be included in FSAR Section 3.8.2. The applicable detailed calculations should be available for staff review at a future audit.

03.08.02-16

Follow-up to RAI 155, Question No. 03.08.02-10

For the staff to complete its assessment of the containment structure, the design details and methods of qualification for the seals on the equipment hatch and the air locks need to be reviewed. The staff requests that the applicant submit the following information for the seals of the equipment hatch and the airlocks:

(1) the material(s) of construction and detailed geometry;
(2) a description of the vendor qualification tests that will be conducted; and
(3) a description of the in-situ tests that will be conducted prior to operation.

This information should also be included in FSAR Section 3.8.2.

03.08.05-19

Follow-up to RAI 155, Question Nos. 03.08.05-2

The RAI responses indicates that the connection of the tendon gallery to the NI Common Basemat Structure allows for differential movement between the two concrete structures without immediate transfer of load. The staff finds that this is no longer valid in light of the response to

RAI 3.8.5-8, which states that: (a) a new SSI analysis of the NI Common Basemat Structure has been performed using fully embedded conditions to address sliding and overturning issues; and (b) the new analysis models the tendon gallery as a shear key (i.e. structurally connected to the NI Common Basemat Structure). Therefore, clarify and update the relevant sections of the FSAR so that they are consistent with the aforementioned new analysis assumptions. Since the tendon gallery is now considered to be structurally connected to the NI Common Basemat Structure, confirm that it is categorized as a Seismic Category I structure and provide a description of the tendon gallery configuration, analysis approach, and design comparable to the other Seismic Category I structures. In addition, include a summary of this information in the relevant sections of the FSAR.

In addition, since the RAI response states that groundwater infiltration into the tendon gallery is considered a maintenance issue to be minimized by the use of waterstops and water proofing below grade, then confirm whether a maintenance program in accordance with 10 CFR 50.65 will be implemented for the tendon gallery. The need for such a program is particularly important since the tendon gallery should now be classified as a Seismic Category I structure. Furthermore, the structural integrity of the RCB relies on the anchorage of the post-tensioning system, which could be subject to corrosion from moisture effects resulting from groundwater seepage into the tendon gallery.

03.08.05-20

Follow-up to RAI 155, Question Nos. 03.08.05-13

Regarding part (A) of the RAI, the staff notes that the FSAR generally requires that concrete exposed to aggressive environments will meet the applicable requirements of ACI 349-01, Chapter 4 "Durability Requirements" or ASME, Section III, Division 2, Article CC-2231.7 "Durability." However, FSAR Section 3.8.5.6.1 is not explicit about the need to follow specific durability requirements.

To resolve part (A) of the RAI, confirm whether the items listed below will be implemented.

1. Evaluation of aggressive environments will be determined in accordance with ACI 349-01 Chapter 4 or ASME Section III, Division 2, Article CC-2231.7, where applicable.
2. In the case of aggressive environments, and in addition to the use of epoxy rebar proposed by the FSAR in aggressive environments, the concrete durability requirements (special cement types, maximum water-to-cement ratios, minimum compressive strengths, etc.) of ACI 349-01 Chapter 4 or ASME Section III, Division 2, Article CC-2231.7 will be followed, where applicable.
3. This information will be incorporated into the relevant sections of the FSAR including FSAR Section 1.8, Table 1.8-2, COL Item 3.8-11.

Regarding part (B) of the RAI response, it states that "Dewatering systems, if used, mitigate potentially aggressive groundwater effects, minimize seepage, and decrease long-term structure maintenance. Dewatering systems perform no safety-related function and are not classified as Category 1." The staff requests that these statements be included in the FSAR. In addition, since the dewatering systems are not classified as seismic Category I, the staff also requests that the FSAR clearly explain that if dewatering systems are utilized, they should not be relied upon to lower existing groundwater levels to meet assumed design conditions (e.g., maintain water level below a certain elevation assumed in design). AREVA should be aware that if the dewatering systems are used to meet assumed design conditions, then these systems need to be classified as Seismic Category I or further technical justification needs to be provided to justify otherwise.

03.08.05-21

Follow-up to RAI 155, Question Nos. 03.08.05-14

The staff finds that the information provided in the response to Items 1 and 2 of this RAI is acceptable. However, the applicant is requested to incorporate the information for both items in FSAR Section 3.8.5.6.1.

The response to Item 3 of this RAI indicates that moisture alone does not necessarily cause structural concrete deterioration. It further states that COL applicants are required to identify aggressive environments, free moisture with sufficient hydraulic gradient to potentially erode or otherwise cause deterioration of the structure, and provide mitigating measures on a site-specific basis as provided by U.S. EPR FSAR Tier 2, Section 1.8, Table 1.8-2, Item 3.8-11. Finally, it is pointed out that a waterproofing membrane is not required where groundwater chemistry or hydraulic gradient do not warrant its use.

The staff notes that past operating plant experience has identified numerous cases of unexpected degradation of below grade foundations. In addition, past designs of seismic Category I foundations at nuclear power plants and other current licensing applicants provide some form of waterproofing systems to protect foundations. The use of waterproofing systems has always been recognized as a good engineering practice to prevent degradation of foundations. Therefore, the staff requests that AREVA explain why these considerations do not apply to the EPR and to demonstrate that omission of waterproofing systems is not detrimental to the structure for the entire life of the plant.

Also, the staff notes that Section 3.8.5.6.1 of the FSAR indicates that the waterproofing membrane will be required for sites with a high water table. This section implies that for a low water table, waterproofing may not be utilized. If waterproofing membranes will not be used for seismic Category I structures because of the assumed low water table, then AREVA is requested to describe the plant program that will monitor the ground water table for the entire 60 year period of the plant which will ensure that the initial low water table assumption is maintained. Identify the required elevation below all foundations that constitutes a sufficiently low ground water table. Also, discuss how potential aggressive chemicals that may occur in the soils above the low ground water level will be precluded from degrading the foundations due to rain infiltration and/or moisture in the soil.

03.08.05-22

Follow-up to RAI 155, Question Nos. 03.08.05-15

The RAI response states that control of the construction sequence of the NI basemat structures is not necessary for the U.S. EPR design. It adds that settlement control criteria are performance-based, and that these control criteria are sufficient to implement design and construction considerations.

The RAI response, however, implies that there is a construction sequence to be followed during the plant construction. Indeed, the statement that the "largest mass being placed at the center of the basemat early in construction" is equivalent to imposing a sequence on construction, although this is not explicitly stated in the FSAR. Consequently, describe this construction sequence in greater detail (e.g., which structure and to what elevation to be completed in which order), and include this information in the relevant sections of the FSAR so that it can be correctly followed by the COL applicants. In this regard, the staff notes that the purpose of defining a range of sequence of operations is to ensure that segmental cracking will not occur between as-built sections of the facility, particularly for softer soil sites, and that the design of the facility is such as to reduce the need for settlement control during construction.

In addition, as requested in the original RAI, provide details of studies (e.g., models, analysis approach, assumptions, and results) performed to determine the significance of the stresses imposed by the aforementioned construction sequence, as well as the corresponding design implications.

Finally, provide the steps to be taken by the COL applicants whenever measured settlements during construction exceed allowable values. This information should be added to the relevant sections of the FSAR. Also indicate which section of the FSAR sets “differential movement for ... global conditions (3.0 inch differential)” as a limit, and clarify what is meant by this.

03.08.05-23

Follow-up to RAI 155, Question Nos. 03.08.05-16

The RAI response identified the sections in the FSAR that describe the soil properties used in many of the various seismic analyses and designs of Seismic Category I structures. From the review of this information, it is not clear whether all of the key soil parameters have been included in these FSAR sections. In addition, the staff notes that the information contained in FSAR Tier 1, Table 5.0-1 “Site Parameters” and FSAR Tier 2, Table 2.1-1 “Site Design Envelope,” is not complete. Some of the soil parameters that are not included are the soil friction angle, the 3.0” global differential settlement criteria referred to in the response to RAI 3.8.5-15, and other key parameters that were relied upon in the design of the foundation walls and evaluations for foundation stability associated with FSAR Section 3.8. Therefore, AREVA is requested to ensure that FSAR Tier 1, Table 5.0-1 “Site Parameters” and FSAR Tier 2, Table 2.1-1, include all of the key soil parameters (e.g., soil angle of internal friction, global settlement criteria, properties used for soil backfill, and soil bearing capacity criteria with an appropriate factor of safety for all seismic Category I structures) which were used in the various analyses and design of the Seismic Category I structures. It should be noted that potentially additional soil parameters may become evident when the resolution of the other RAIs is achieved.

03.06.02-32

Follow-up to RAI 222, Question No. 03.06.02-20 and RAI 107, Question No. 03.06.02-2

The response from AREVA concerning RAI 222, 03.06.02-20 is not adequate. In the response, AREVA revised the EPR FSAR Tier 2 Section 3.6.2.1.1.4 to discuss how the US EPR design and the separation and redundancy method are used to mitigate the effects of pipe rupture of high energy lines.

(i) It is not clear to the staff how AREVA is intended to apply the method of separation and redundancy. The applicant is requested to clarify whether the separation and redundancy method is used

a) when the source of the postulated pipe failure is one of the essential systems that is separated and redundant

b) when the target of the postulated pipe failure is one of the essential systems that is separated and redundant

(ii) In particular, the revised FSAR indicated that "For outside containment, each redundant train is located in one of four separate Safeguard Buildings. For inside containment, this separation is **often** accomplished by separate compartments/rooms." It is not clear if there are cases where they are not separated by compartments inside the containment. AREVA should clarify what it meant by "often" or remove the word "often". AREVA should also clarify if these compartments and rooms are capable of resisting the effect of pipe whip and mitigating the extreme environmental effects resulting from a pipe break in the U.S. EPR. The applicant is requested to revise FSAR 3.6.2.1.1.4 to clarify aforementioned issues.

(iii) AREVA stated in its response that the system train redundancy and separation of trains of essential systems are key to mitigating the effects of pipe breaks. It also stated that **many** essential systems are designed with 4 redundant trains, with each train capable of performing the system's safety function. It is not clear to the staff whether each train is capable of performing 100 percent of the system's function when the separation and redundancy method is used. It is also not clear if there are still other essential systems, in addition to the "many essential systems", which may not have this separation/redundancy characteristic. The applicant is requested to address the above staff concerns.

03.06.02-33

Follow-up to RAI 222, Question No. 03.06.02-21 and RAI 107, Question No. 03.06.02-6

The response from AREVA concerning RAI 3.6.2-21 is not adequate. Specifically, AREVA is advised that the dynamic, oscillatory loads induced by impinging jets must be considered in their design process, along with the static loads described in their response to Question 3.6.2-21 (supplemental RAI to 3.6.2-6). Also, while assuming a 45 degree jet expansion angle may be conservative to model the early stages of jet blowdown, the angles at later stages may be much smaller as the supply pressure and temperature decrease.

(a) AREVA is requested to provide a conservative analysis/design procedure which addresses oscillatory impinging jet loads.

(b) AREVA is requested to explain how they will model conservatively the static and oscillatory jet loads during the later stages of blowdown, including a means of assessing the jet expansion angles.

03.06.02-34

Follow-up to RAI, 222, Question No. 03.06.02-22 and RAI 107, Question No. 03.06.02-7

The staff does not concur with AREVA's assertion that high energy jets do not impart significant oscillatory loads on large structures. Along with many studies conducted by the Short Takeoff and Vertical Landing community which shows significant ground erosion and sonic fatigue problems associated with impinging jets, the staff also offers Figure 7 in Isozaki and Miyazono, "Experimental study of jet discharging test results under BWR and PWR loss of coolant accident conditions," Nuclear Engineering and Design, 96, 1-9, 1986, which clearly shows strong oscillating loads imparted by jets during blowdown. It should be noted that even if a jet is non-resonant, its dynamic oscillatory loads must still be accounted for in AREVA's designs. Finally, further details on how the amplifying effects of structural resonances will be accounted for in their structural integrity analyses are needed for staff's evaluation.

(a) AREVA is requested to explain how dynamic oscillatory jet loads, whether resonant or non-resonant, will be evaluated on any sized structure (large or small). AREVA is also requested to provide a rigorous justification of the conservatism of the methodology(s) they plan to use. In their explanation, AREVA is requested to address how they will account for the effects of acoustic feedback and jet loading amplification at all conditions expected throughout a high energy jet blowdown event.

(b) AREVA is requested to explain how they will design jet shields for small targets, and how those shields will withstand dynamic oscillatory loads.

(c) AREVA is requested to explain specifically how consideration will be given to the possibility of resonance in any structural response calculations they plan to perform using oscillatory jet loads as inputs.

03.06.02-35

Follow-up to RAI 222, Question No. 03.06.02-23 and RAI 107, Question No. 03.06.02-8

In its RAI response to RAI 3.6.2-23, AREVA stated that to account for the dynamic loads caused by blast waves, Areva will use information in:

http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA446084&Location=U2&doc=GetTRDoc.pdf.

However, this manual is 1797 pages long and AREVA did not address how this manual will be used. Areva is therefore, requested to provide a summary of their planned evaluation approach, citing specific chapters, tables, and figures in the Army/Navy/Air Force manual, along with a demonstration calculation representative of a blast wave in the EPR design. AREVA is also requested to explain how they plan to account for the different fluid properties in an EPR blast (steam and/or water) compared to those of air considered in the Army/Navy/Air Force manual.

03.06.02-36

Follow-up to RAI 222, Question No. 03.06.02-25 and RAI 107, Question No. 03.06.02-10.

(a) In its response to part (a) of this RAI, AREVA explained that the spatial pressure distribution throughout a jet cross section is not used in their jet impingement loading calculations. Therefore, part (a) of the original RAI is now closed. However, AREVA also made several arguments stating that either (i) dynamic pressure loading may be ignored, or (ii) that their calculation approach somehow bounds dynamic pressure loading. The staff does not accept AREVA's arguments that oscillatory jet loading may be ignored, and that the oscillatory loading is bounded by AREVA's proposed static force calculations. AREVA is referred to Supplemental RAIs for 3.6.2-6 and 3.6.2-7 which request AREVA to address, how they will conservatively account for oscillatory jet loading.

(b) In its response to part (b) of this RAI, AREVA provided a partial table of jet initial conditions and postulated jet loads, but did not (i) associate the jet types with a calculation procedure, as requested, and (ii) did not associate the jet types with the postulated ruptures in their FSAR (table 3.6.1-2). AREVA is therefore, requested to associate entries in the partial table provided in their response to Question 3.6.2-25 (supplemental RAI to 3.6.2-10) with specific postulated ruptures in their FSAR. AREVA is also requested to associate each jet condition in the table with a calculation procedure.

03.06.02-37

Follow-up to RAI 222, Question No. 03.06.02-26 and RAI 107, Question No. 03.06.02-11

The response from AREVA concerning RAI 3.6.2-26 is not adequate. Specifically, AREVA is requested to address the following:

(b) In AREVA's response to part (b), it states that the primary vibrating frequencies of most essential SSCs are likely to be under 100 Hz. AREVA is advised that words like 'most' and 'likely' are not acceptable for a commercial nuclear power plant safety evaluation. AREVA is requested to be more rigorous in explaining how they will address jet feedback and resonance, along with the effects of structural resonances which may be close to any strong oscillatory jet loading frequencies.

(c) AREVA is requested to explain in detail how they plan to perform hand calculations or computer analyses to determine whether resonance with time varying jet pressures is possible, and specifically how target SSCs or jet shields will be modified should resonance occur.

03.06.02-38

Follow-up to RAI 222, Question No. 03.06.02-27 and RAI 107, Question No. 03.06.02-12

The response from AREVA concerning RAI 3.6.2-27 is not adequate. Specifically, AREVA is requested to address the following:

(a) AREVA is requested to explain how the propagation of liquid jets onto other structures will be considered (although liquid jets may propagate parallel to the surface impinged on, that surface may be connected or close to neighboring SSCs).

(b) AREVA's view of compressible supersonic jets assumes a pure reflection and ignores deflections of less than 180 degrees. Smaller deflections would only involve oblique shocks and could still contain significant momentum. AREVA is requested to address how they will account for deflections less than 180 degrees.

(c) For the incompressible subsonic jet deflections, AREVA is requested to explain in detail how they will consider those deflections.

03.06.02-39

Follow-up to RAI 222, Question No. 03.06.02-28 and RAI 107, Question No. 03.06.02-13

In its response to RAI 3.6.2-28, AREVA referred to the response to question 3.6.2-26(c) for which staff found not acceptable. Therefore, the applicant is requested to address issues raised by the staff in RAI 3.6.2-28. Specifically, AREVA is advised that the ANS 58.2 standard is no longer universally acceptable for specifying jet loads over barriers, shields, and enclosures in nuclear power plants, and that dynamic effects beyond those due to the initial transient assumed in ANS 58.2 may need to be considered in the US EPR design. AREVA is requested to consider realistic jet loads which include dynamic effects and possible resonant amplification in their response to this RAI.

03.06.02-40

Follow-up to RAI 222, Question No. 03.06.02-29 and RAI 107, Question No. 03.06.02-14

In its response to Question 03.06.02-29, AREVA provided analytical steps to demonstrate that the remaining essential structures, systems, and components (SSCs) maintain functional and operability capability after a postulated pipe break. However, the staff determined that the structural evaluation alone of the remaining essential connected and nearby piping does not ensure its functional capability. One acceptable method is that the piping must also satisfy all other conditions given in Section 3.5 of Topical Report ANP-10264NP-A (e.g., NUREG-1367) in order to demonstrate its functional capability. Additionally, the staff found that the evaluation of end loads and accelerations of in-line components does not ensure that they are functionally capable of performing their designed function (which the applicant equates to their operability). AREVA did not identify what criteria the design has to meet for ensuring the functional capability. The staff finds that the functional capability is not always the same as the operability of an in-line active component (e.g., valves, instrumentations). The operability of these components is established by demonstrating by test and/or analysis that they operate under the most extreme conditions (e.g., a pipe break) they are subjected to during their design life. Address the following:

1. Discuss the evaluation of the remaining essential piping systems (includes the NUREG-1367 recommendations) for ensuring its functional capability after the postulated pipe break.

2. Discuss the evaluation of in-line components in the remaining essential piping systems (including equipment qualification requirements, as applicable) for ensuring their operability after the postulated pipe break.

03.06.02-41

Follow-up to RAI 222, Question No. 03.06.02-30 and RAI 107, Question No. 03.06.02-15

In its response to Question 03.06.02-30, AREVA stated that the seismic loadings on the whip restraint structure from the piping are excluded because there are sufficient gaps between the pipe and the structure to preclude contact during a safe shutdown earthquake, and AREVA will include self-weight seismic excitation in the appropriate load combinations. The staff finds that AREVA did not define the appropriate load combinations. The staff also notes that the loads and load combinations appropriate for the design and analysis of these restraints should be similar to those applicable to Seismic Category I structures (i.e., SRP Section 3.8.4 for miscellaneous steel structures), since the whip restraint must survive all other loads and the environment to perform its one-time restraint action to the whipping pipe anything during its design life. The applicant is requested to provide the design and analysis of whip restraint, loads and load combinations, and the Codes and Standards to be used for maintaining its structural integrity prior to a pipe break event.

03.06.02-42

Follow-up to RAI 222, Question No. 03.06.02-31 and RAI 107, Question No. 03.06.02-17

The response from AREVA concerning RAI 3.6.2-31 is not adequate.

(a) In its response to part 1 of this question related to as-designed pipe break hazards analysis, the applicant stated that, in its response to RAI 132, Supplement 1, Question 14.03.02-11, AREVA moved the pipe break hazards analyses ITAAC to a structure ITAAC, EPR FSAR Tier 1, Table 2.1.1-4, Nuclear Island ITAAC. As discussed in the staff's RAI and the applicant's RAI response, the pipe break hazards analysis needed to be performed for applicable postulated pipe failures for all the piping systems which are within the scope of SRP Section 3.6.2. In addition, GDC 4 requires that all SSCs important to safety be designed to accommodate the effects of postulated piping failures, including appropriate protection against the dynamic and environmental effects of postulated failure. It should be noted that Nuclear Island (NI) as defined in EPR FSAR Tier 1, Section 2.1.1 consists of the structures supported by the NI common basemat and the NI common basemat itself. It is not piping system related. Therefore, the staff determines that it is not proper to include the pipe break hazards analysis ITAAC in the structure ITAAC, Table 2.1.1-4, Nuclear Island ITAAC. The applicant is requested to address this staff's concern.

(b) In its response to part 2 of this question related to as-built pipe break hazards analysis, the applicant stated that the inspection of the as-installed configuration of the pipe break analysis protection features will be performed against construction drawings such that they agree with the construction drawings. The staff found this not acceptable. It should be noted that as-built reconciliation is to be performed using the as-built information against as-designed pipe break hazards analysis report (as opposed to construction drawings). For an example, as a result of piping reanalysis caused by differences between the design configuration and the as-built configuration, or a change is required in pipe parameters, such as major differences in pipe size, wall thickness, and routing, the highest stress or CUF locations may be shifted. As a result, the initially determined break locations may be changed and therefore, the dynamic effects from the new (as-built) break locations are not mitigated by the original pipe whip restraints and jet shields. Therefore, an acceptable as-built pipe break hazards analysis reconciliation is to reconcile the as-built configuration against the as-designed pipe break hazards analysis and to confirm that all SSCs that are important to safety be designed to accommodate the dynamic and environmental effects of postulated pipe failures or are protected from these effects (e.g., by proper design of jet shields and pipe whip restraints) as required by the regulation. The applicant is required to address this staff's concern.

(c) In its response to Part 4 of this question related to the closure milestone of the as-designed pipe break hazards analysis report, the applicant referred to EPR FSAR, Tier 2, Table 1.8.2, COL Information Item 3.6-2. The applicant also stated that ITAAC for the pipe break hazards analysis has been established and COL applicant is responsible for the closure of the ITAAC as well as the closure milestone for the COL Information Item 3.6-2. The staff noted that COL Information Item 3.6-2 does not specifically refer to as-designed pipe break analysis. The applicant is therefore, requested to revise that COL Information Item to clearly refer to the as-designed pipe break analysis. In addition, the FSAR needs to make it clear that it is the COL applicant's responsibility to address whether it will follow the standard ITAAC closure schedule as set forth in NRC regulation, 10 CFR 52.99 or to propose a plant specific closure schedule that will make the final as-designed pipe break hazards analysis report available for NRC staff review.