AP1000DCDFileNPEm Resource

From: Loza, Paul G. [lozapg@westinghouse.com]
Sent: Sunday, April 26, 2009 1:08 PM
To: Bill Gleaves
Cc: Perry Buckberg; Rhonda Butler; Lindgren, Donald A.
Subject: Acknowledgement of RAI-SRP3.8.4-SEB1-01a
Attachments: AP1000 3.8 RAIs Rev WCG.doc

Hi Bill,

I acknowledge receipt for Westinghouse of RAI-SRP3.8.4-SEB1-01a. I will contact you if a call is required between the Westinghouse SME and your reviewer. The proposed response date is within 45 days of today.

Thanks,

Paul Loza

From: Bill Gleaves [mailto:Bill.Gleaves@nrc.gov]
Sent: Thursday, April 09, 2009 11:31 AM
To: Lindgren, Donald A.; Loza, Paul G.
Cc: Rhonda Butler; Pravin Patel; John Ma; Eileen McKenna
Subject: FW: AP1000 New RAI on RAI-SRP3.8.4-SEB1-01a

Don,

It seems that we don't have a response to the Attached RAI-SRP3.8.4-SEB1-01 (from my December 17, 2008 email). Now if you look into it you may notice that the RAI # is a duplicate of another previous RAI, then the fact that you didn't respond may be not surprising. Now to correct this, what I want to do is renumber the RAI (as "-01a") to be as follows:

RAI-SRP3.8.4-SEB1-01a

DCD Rev. 16, Section 3.8.4.4.1 describes the design and analysis procedures of seismic category I structures outside of containment. Several revisions were made in this section some of which are Tier 2* changes. Westinghouse is requested to explain why these revisions in DCD Section 3.8.4.4.1 have been made and to explain or demonstrate the design adequacy of these changes. DCD Section 3.8.4.4.1 describes the model of the shield building roof and passive containment cooling water storage tank. This DCD section indicates that the model is shown in Figure 3.8.4-3; however, the DCD revision for this figure states that “Figure 3.8.4-3 not used.” The staff notes that a cross sectional view showing structural details of the shield building roof and passive containment cooling water storage tank is shown in Figure 3.8.4-2. Westinghouse is requested to explain why the comparable figure showing the finite element model of this structure was removed.

Appendix 3H, which describes the auxiliary and shield building critical sections, has removed in numerous locations the results of the structural analyses (e.g., DCD Table 3.H.5-2 which previously provided the governing load combinations and required reinforcement) and removed several figures (e.g., Figure 3H.5-11 showing design details of the shield building roof). Westinghouse is requested to explain why these results and figures were removed while the results and figures for other seismic Category I structures remain in the DCD. Much of this information was identified as Tier 2* in the prior revision of the DCD.

Please provide the date at which the following Westinghouse reports will be revised to include the resolution of related RAIs: APP-GW-GLR-027 (Technical Report TR45), APP-GW-GLR-045 (Technical Report TR57), APP-GW-GLN-105 (Technical Report TR105) and APP-GW-GLN-112 (Technical Report TR112). If no revision is planned, so state.

Please let me know if you accept the RAI and the due date or if a conference call is desired.

Billy

From: Bill Gleaves
Sent: Wednesday, December 17, 2008 1:18 PM
To: Don Lindgren
Cc: Brian Thomas; John Ma (John.Ma@nrc.gov); Pravin Patel; Joe Braverman (Brookhaven National Laboratory); Eileen McKenna; Paul Loza; Don Behnke (behnkedh@westinghouse.com)
Subject: AP1000 New RAIs on SRP3.8.2, 3.8.3, 3.8.4, and 3.8.6

Hi all,

Attached are new RAIs on SRP 3.8.2:
RAI-SRP3.8.2-SEB1-01, -02, -03, -04, -05, and -06
RAI-SRP3.8.3-SEB1-01, -02, -03, -04, -05, -06, and -07
RAI-SRP3.8.4-SEB1-01
and
RAI-SRP3.8.6-SEB1-01, -02

Please respond that you have received these requests, and then at a later time, please respond either accepting these RAIs as "final" or requesting a conference call.

Billy

Hearing Identifier: AP1000_DCD_Review
Email Number: 196

Mail Envelope Properties (E501235702183E47BF44683A3B6A1929013AACE75EF2)

Subject: Acknowledgement of RAI-SRP3.8.4-SEB1-01a
Sent Date: 4/26/2009 1:08:02 PM
Received Date: 4/26/2009 1:08:06 PM
From: Loza, Paul G.

Created By: lozapg@westinghouse.com

Recipients:
"Perry Buckberg" <Perry.Buckberg@nrc.gov>
Tracking Status: None
"Rhonda Butler" <Rhonda.Butler@nrc.gov>
Tracking Status: None
"Lindgren, Donald A." <lindg1da@westinghouse.com>
Tracking Status: None
"Bill Gleaves" <Bill.Gleaves@nrc.gov>
Tracking Status: None

Post Office: SWEC9966.w-intra.net

Files	**Size**	**Date & Time**
MESSAGE	4032	4/26/2009 1:08:06 PM
AP1000 3.8 RAIs Rev WCG.doc	64576	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Requests for Additional Information (RAIs)

AP1000 - DCD Rev. 16 and TR134, "AP1000 DCD Impacts to Support COLA Standardization," Revisions 0 through 5

17 December 2008

RAI No.	RAI – Request for Additional Information
RAI-SRP-3.8.2-SEB1-01	Section 3.8.2.2 as well as other sections of the DCD state that the stability of the containment vessel and appurtenances is evaluated using ASME Code Case N-284-1, Metal Containment Shell Buckling Design Methods, Class MC, Section III, Division 1, as published in the 2001 Code Cases, 2001 Edition, July 1, 2001. Westinghouse is requested to explain whether the buckling evaluation performed for the design of the containment meets the provisions of ASME Code Case N-284-2 and the summary of items that needed to be corrected in N-284-1 (identified in Regulatory Guide 1.193, Rev. 2), or provide the technical basis why the design is still considered to be acceptable. If the design meets the provisions of ASME Code Case N-284-2 and the summary of items that needed to be corrected in N-284-1, then the DCD should be revised accordingly. As described in Regulatory Guide 1.193, Rev. 2, Code Case N-284-1 is unacceptable for use by licensees in their Section III design and construction programs. This occurred because of misprints and errors that were identified in Revision 1 of the Code Case. Furthermore, Regulatory Guide 1.57, Rev. 1, refers to the use of ASME Code Case N-284-2, pending endorsement in Regulatory Guide 1.84 of this code case. If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.
RAI-SRP-3.8.2-SEB1-02	Section 3.8.2.2, as well as other sections of the DCD related to structures, refers to DCD Section 1.9 for discussion of compliance with regulatory guides. The staff notes that for Regulatory Guides 1.7 and 1.57 the DCD complies with earlier revisions of the regulatory guides. For Regulatory Guide 1.160, the DCD indicates that it is not applicable to the AP1000 design certification and that Section 17.5 defines the responsibility for a plant maintenance program. Regulatory Guide 1.199 is not described at all in Section 1.9 of the DCD. In view of the extension of the AP1000 design to soil sites, reanalysis for updated seismic spectra, design changes made to structures, and to ensure that the AP1000 meets the safety requirements in current staff positions, the staff requests Westinghouse to indicate whether the design, construction, and inspection of the AP1000 plant comply with the current regulatory guides stated above or explain how following the existing versions of the regulatory guides or Section 17.5 (for the plant maintenance program), referred to in the DCD, provides an equivalent level of safety to the guidance in the current versions of the regulatory guides. Describe the basis for the use of each regulatory guide, or alternative, separately.

	In the case of Regulatory Guide 1.199, "Anchoring Components and Structural Supports in Concrete," what are the alternative requirements or criteria Westinghouse are using to meet the NRC's regulations in the design, evaluation, and quality assurance of anchors (steel embedments) used for component and structural supports on concrete structures as required by GDC 1, "Quality Standards and Records," GDC 2, "Design Bases for Protection Against Natural Phenomena," and GDC 4, "Environmental and Dynamic Effects Design Bases." If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.
RAI-SRP-3.8.2-SEB1-03	Table 3.8.2-1 of DCD Rev. 16, which provides the load combinations and service limits for the steel containment vessel, has been revised. Westinghouse is requested to explain the following items: Why were other load combinations identified in NUREG-0800, SRP 3.8.2, Acceptance Criteria and Regulatory Guide 1.57, Rev. 1, omitted? (e.g., SRP 3.8.2 II.3.B.iii.(1)(a); II.3.B.iii.(3)(b), (d), and (e); and II.3.B.iii.(5) for post flooding condition). Please provide the bases for omitting the load combinations and reference any necessary documents to support this action. A new load combination has been added in the DCD for Service Levels A and D, which includes the external pressure of 0.9 psid. Westinghouse is requested to provide the technical basis for this pressure load and provide the corresponding temperature value and the basis for this temperature. Clarify in the DCD what is meant by "loss of all AC in cold weather" used in Footnotes 3 and 5. Although load combinations with OBE are not required because the OBE is defined as less than or equal to 1/3 of the SSE, there is no indication that the OBE loading is considered in the appropriate load combinations for fatigue as described in SRP 3.8.2 acceptance criterion - II.3.B.iii.(2). If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.

RAI-SRP-3.8.2-SEB1-04	DCD Section 3.8.2.4.1.2, which describes the local analyses for the penetrations of the steel containment, has been revised. Westinghouse is requested to address the following items related to this section of the DCD: 1. This DCD section refers to Figure 3.7.2-7 which does not exist. This should be corrected. If the intended figure is 3.8.2-7, then Westinghouse is requested to provide a legible figure so that the information in the model can be reviewed and the legible figure should be placed in the DCD. 2. This DCD section indicates that the global seismic loads are applied as equivalent static accelerations using the maximum accelerations from the nuclear island stick model given in DCD Table 3.7.2-6. Westinghouse is requested to provide this table in the DCD because it can not be located. 3. Provide a more detailed explanation of (1) the new 3-D finite element model of the entire containment described in Section 3.8.2.4.1.2, used for the local evaluation near penetrations and (2) the axisymmetric model described in Section 3.8.2.4.1.1 and Appendix 3G which has not changed and is used for the analysis of the containment in regions away from penetrations. Since the axisymmetric model is not expected to be as detailed as the 3-D model and has some limitations for certain loads such as seismic, how do the results of the new and probably more accurate 3-D finite element model compare with the results of the axisymmetric model for the governing load combinations at the most critical locations of the containment? 4. Describe the “less refined dynamic model” and the analysis described in DCD Section 3.8.2.4.1.2, which was used in a time history analysis to determine the local amplified seismic response. Also, explain what is meant by the amplified local seismic responses are applied separately for each of the four penetrations. If the global analysis was performed separately for each of the four sets of penetration loads, then how were the containment responses combined from these four separate seismic analyses and how were these responses then combined with the other global containment responses due to all loads? If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.
RAI-SRP-3.8.2-SEB1-05	Section 3.8.2.7 of DCD Rev. 16 was revised to remove the requirement that the in-service inspection of the containment vessel will be performed in accordance with the ASME Code Section XI, Subsection IWE, and is the responsibility of the Combined License applicant. In order to complete the review of the design certification, and as specified in SRP 3.8.2, Westinghouse is requested to include in the DCD information which describes how the AP1000 containment complies with the 10CFR 50.55a requirements and ASME Section XI for the pre-service and in-service examination of the containment. This should include a discussion of the major elements of the program including the scope, examination methods, pressure tests, acceptance criteria, and evaluation of inaccessible areas. If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.

RAI-SRP-3.8.2-SEB1-06	DCD Figure 3.8.2-4, sheet 6 of 6, which presents a typical containment electrical penetration was revised in Technical Report TR134, Rev. 0. Westinghouse is requested to explain why wedge supports are utilized for this penetration on the outside of containment. If they provide support to the containment penetration in the vertical and/or horizontal directions, how is the containment deformation due to thermal and other loads accommodated or considered in the analysis? If this type of support is applied to any other penetration, then Westinghouse should also include an explanation for those penetrations. In addition, Westinghouse is requested to provide a legible figure for the penetration since most of the text and numerical values cannot be read. If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.
RAI-SRP-3.8.3-SEB1-01	DCD Sections 3.8.3.2 and 3.8.4.2 describe the codes, standards, and specifications used for structural components of AP1000. In view of the extension of the AP1000 design to soil sites, reanalysis for updated seismic spectra, design changes made to structures, and to ensure that the AP1000 meets the safety requirements in current staff positions, the staff requests Westinghouse identify whether the AP1000 plant meets industry standards listed below subject to any superseding provisions in NRC regulatory guidance documents. If not, then Westinghouse is requested to provide a detailed technical basis for concluding that the standards currently listed in DCD Section 3.8 provide sufficient conservatism or equivalent levels of safety. 1. AISC-N690-1994 including Supplement No. 2 (2004) versus AISC-N690-1994 currently in DCD Rev. 16. 2. More recent versions of applicable AWS standards than are currently listed in DCD Rev. 16. If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.
RAI-SRP-3.8.3-SEB1-02	DCD Section 3.8.3.2 indicates that the temperature transient for the ADS_2 loading is shown in DCD Figure 3.8.3-7. However, the DCD revision for this figure states that “Figure 3.8.3-7 not used.” Westinghouse is requested to explain this inconsistency and to place in the DCD the figure showing the temperature transient for ADS_2 which is referred to in DCD Section 3.8.3.2. If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.
RAI-SRP-3.8.3-SEB1-03	DCD Section 3.8.3.4.1 covers the seismic analyses of the containment internal structures (CIS). Subsection 3.8.3.4.1.1 describes the development of the 3D lumped-mass stick model of the CIS based on the structural properties obtained from a 3D finite element model using 3D shell elements. Subsection 3.8.3.4.1.2 describes the stiffness assumptions for local seismic analyses of the in-containment refueling water storage tank (IRWST). No description is provided for the model development and analysis, including the stiffness assumptions, for the global seismic analysis of the CIS. Prior revisions of the DCD did provide a description of this subject in a separate subsection; however, DCD Rev. 16 removed all of this information. Westinghouse is requested to provide a

	description of the CIS model, the stiffness assumptions utilized, and basis for the selection of the stiffness for the CIS and auxiliary building modules. In addition, DCD Table 3.8.3-2 was revised to utilize the "Monolithic Case 3" concrete stiffness representation of the CIS in the 3D finite element analysis using the equivalent static and response spectra analyses. Westinghouse is requested to explain why the CIS stiffness values were revised from the monolithic case 1 to monolithic case 3, and what is the technical basis for not evaluating the range of possible stiffness values between Cases 1 to 3. If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.
RAI-SRP-3.8.3-SEB1-04	Due to design changes, extension of the AP1000 design to soil sites, reanalysis for updated seismic spectra, and updates made to some critical sections, Westinghouse is requested to address a concern with the design details of the structural module connections to the reinforced concrete basemat. Section 3.8.3.5.3 of the DCD indicates that the steel plate modules are anchored to the reinforced concrete basemat by mechanical connections welded to the steel plate or by lap splices where the reinforcement overlays shear studs on the steel plate. Typical details of these two options are shown on DCD Figure 3.8.3-8, sheets 1 and 2. Westinghouse is requested to address the following two items: 1. The left side of Figure 3.8.3-8, sheet 2, shows that the mechanical connectors that are welded to a ¾ inch plate at the base of the module is identified as "CONT" (presumably meaning continuous) on one side of the module and on the other side the term "CONT" is struck out. Explain which detail is correct and revise the figure accordingly. Were the design detail calculations completed for this connection? Explain how the large loads coming from the CIS wall modules can be properly transferred from the module wall plate at a localized point to the embedded connectors. 2. The right side of Figure 3.8.3-8, sheet 2 shows #11 at 10 inch spacing span from the embedded basemat region into the wall module with about 3 inches of concrete cover. Since this type of connection is not addressed in ACI 349, describe how the loads from the module can be properly transferred from the module to the embedded bars in the basemat and how the design will be performed. When this detail was discussed with Westinghouse at an earlier audit this year, Westinghouse indicated that they would consider removing this second option. If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.
RAI-SRP-3.8.3-SEB1-05	DCD Section 3.8.3.5.8 describes the design summary of critical sections for the CIS. Westinghouse is requested to address the following items related to this revised section: <u>For DCD Section 3.8.3.5.8.1 – Structural Wall Modules</u> 1. The last paragraph, was revised to eliminate some Tier 2* information and criteria (denoted by italicized text, square bracket, and a superscript *). Westinghouse is requested to provide the basis for removing this information.

	The information removed relates to DCD Rev. 16 Tables 3.8.3-3 through 3.8.3-6. These tables have been substantially revised from the prior DCD tables to remove significant design information. Westinghouse is requested to provide the same or comparable information that was provided in prior revisions of the DCD. 2. The last two sentences in the referenced paragraph are italicized but are outside the square bracket with a star. These sentences should be placed inside the square brackets. 3. The last sentence states "See Appendix 3H for more detailed discussion." Westinghouse should explain why a reference for more detailed information of structural wall modules inside containment is made to Appendix 3H which addresses auxiliary and shield building critical sections. <u>For DCD Section 3.8.3.5.8.2 – IRWST Steel Wall</u> 4. Same issue discussed in item 3 above is also applicable to DCD Section 3.8.3.5.8.2. <u>For DCD Section 3.8.3.5.8.3 – Column Supporting Operating Floor</u> 5. Same issues as items 1 and 3 above are also applicable to DCD 3.8.3.5.8.3 <u>Updating of all analyses due to changes in seismic and other loads</u> 6. Westinghouse is requested to explain whether the information presented for all structures in DCD Rev. 16, Sections 3.8.1 through 3.8.5, and associated appendices reflect the latest set of updated analyses for the revised seismic loads (e.g., extension of design to soil sites and resolution of RAIs related to seismic) and revision of other loads which might have been updated from the prior version of the DCD. If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.
RAI-SRP-3.8.3-SEB1-06	DCD Section 3.8.3.6 was revised regarding the use of different steel materials for CIS structural modules. Westinghouse is requested to address the items listed below. 1. The required use of A36 steel plates and shapes for the modules was revised in DCD Rev. 16 to allow the use of carbon steel plates and shapes. Since it is unknown what types of steel material could be used and the analysis and design of the modules assumed certain specific properties (e.g., to meet allowable stresses), Westinghouse is requested to explain why the material designation was revised, identify the specific materials that are considered to be options, and demonstrate that the alternative materials are equivalent to or better than the properties used in the analysis and design of the modules. The specific materials should be included in the DCD. 2. The use of Nitronic 33, ASTM 240, designation S24000, Type XM-29, stainless steel plates for the modules was revised in DCD Rev. 16 to use Duplex 2101 ASTM 240, Designation S32101, stainless steel plates. Westinghouse is requested to explain why this material was revised, how the material properties compare, and demonstrate that the new material properties specified are

	equivalent to or better than the properties used in the analysis and design of these structures. If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.
RAI-SRP-3.8.3-SEB1-07	DCD Rev. 16 Tables 3.8.3-3 through 3.8.3-7 have been revised from the prior version of the DCD, which were identified as Tier 2*. The revised tables removed information which provided the required plate thicknesses and stress results which permit comparison to the plate thicknesses provided and allowable stress limits. Westinghouse is requested to provide the same equivalent information in DCD Rev. 16 for these tables as was provided in the prior DCD. Also, DCD Rev. 16, Table 3.8.3-7 replaced specific AISC interaction ratio values in the prior DCD with a notation that it is now less than 1.0 at all entries of the table. This is not enough information for NRC to review. Therefore, Westinghouse is likewise requested to present the actual interaction ratios as was done in the prior version of the DCD. If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.
RAI-SRP-3.8.4-SEB1-01	DCD Rev. 16, Section 3.8.4.4.1 describes the design and analysis procedures of seismic category I structures outside of containment. Several revisions were made in this section some of which are Tier 2* changes. Westinghouse is requested to explain why these revisions in DCD Section 3.8.4.4.1 have been made and to explain or demonstrate the design adequacy of these changes. DCD Section 3.8.4.4.1 describes the model of the shield building roof and passive containment cooling water storage tank. This DCD section indicates that the model is shown in Figure 3.8.4-3; however, the DCD revision for this figure states that “Figure 3.8.4-3 not used.” The staff notes that a cross sectional view showing structural details of the shield building roof and passive containment cooling water storage tank is shown in Figure 3.8.4-2. Westinghouse is requested to explain why the comparable figure showing the finite element model of this structure was removed. Appendix 3H, which describes the auxiliary and shield building critical sections, has removed in numerous locations the results of the structural analyses (e.g., DCD Table 3.H.5-2 which previously provided the governing load combinations and required reinforcement) and removed several figures (e.g., Figure 3H.5-11 showing design details of the shield building roof). Westinghouse is requested to explain why these results and figures were removed while the results and figures for other seismic Category I structures remain in the DCD. Much of this information was identified as Tier 2* in the prior revision of the DCD. Please provide the date at which the following Westinghouse reports will be revised to include the resolution of related RAIs: APP-GW-GLR-027 (Technical Report TR45), APP-GW-GLR-045 (Technical Report TR57), APP-GW-GLN-105 (Technical Report TR105) and APP-GW-GLN-112 (Technical Report TR112). If no revision is planned, so state.

	If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.
RAI-SRP-3.8.6-SEB1-01	DCD Rev. 16, Section 3.8.6.1 has been revised to remove the COL information previously included in this section based on APP-GW-GLR-005 (Technical Report TR9) and the changes incorporated into the DCD. Provide the date at which the Westinghouse report APP-GW-GLR-005 will be revised to include the resolution of RAIs related to that report. If no revision is planned, so state.
RAI-SRP-3.8.6-SEB1-02	DCD Rev. 16, Section 3.8.6.2 through 3.8.6.4 has been revised to remove the COL information requirements for the Passive Containment Cooling System Water Storage Tank Examination, As-Built Summary Report, and In-Service Inspection of Containment Vessel. Westinghouse has requested to place these items back in Section 3.8.6. Even if these items are identified elsewhere in the DCD, it is important to have a complete representation in DCD Section 3.8.6 “Combined License Information” which is intended to summarize the required information to be developed from the combined license applicant, that are discussed in the prior DCD Sections 3.8.1 through 3.8.5. If your response to this request for additional information will reference Revision 17 to the AP1000 DCD, please provide an exact reference.