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Your ref: Docket No. 52-006
Our ref: DCP_NRC_002887

May 21, 2010

Subject: AP1000 Response to Proposed Open Item (Chapter 3)

Westinghouse is submitting the following responses to the NRC open item (OI) on Chapter 3. These proposed open item responses are submitted in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in these responses is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

Enclosure 1 provides the response for the following proposed Open Item(s):

OI-SRP3.2.1-EMB2-03 R1
OI-SRP3.2.2-EMB2-01 R1

Questions or requests for additional information related to the content and preparation of this response should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

A handwritten signature in black ink, appearing to read 'Robert Sisk'.

Robert Sisk, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Enclosure

1. Response to Proposed Open Item (Chapter 3)

DD63
NRD

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ENCLOSURE 1

AP1000 Response to Proposed Open Item (Chapter 3)

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Response to SER Open Item (RAI)

RAI Response Number: OI-SRP3.2.1-EMB2-03
Revision: 1

Question:

In Revision 16 of the DCD Subsection 3.2.1.1.2 was revised to reference DCD Section 17.5, "Combined License Information Items," rather than 17.4, "Design Reliability Assurance Program," for the combined license Quality Assurance (QA) requirements for seismic Category II SSCs. During the review of Revision 16, the staff determined that DCD Table 3.2-3 included in Revision 16 did not identify specific augmented QA requirements that apply to seismic Category II SSCs. The staff was concerned that DCD Section 3.2, DCD Table 3.2-3 or DCD Chapter 17 do not adequately define specific augmented QA requirements of Appendix B for seismic Category II SSCs. It was not clear if the COL applicant is to provide these requirements for the procurement of non-site-specific SSCs. In RAI-SRP3.2.1-EMB2-03 the applicant was requested to clarify to what extent the pertinent QA requirements of Appendix B to 10 CFR Part 50, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," apply to non-site-specific seismic Category II SSCs and to identify the DCD subsection or other document that describes those requirements.

The RAI response restated the DCD Subsection 3.2.1.1.2 statement that pertinent portions of 10 CFR 50 Appendix B apply to seismic Category II SSCs and that pertinent portions are those required to provide that unacceptable structural failure or interaction with seismic Category I items does not occur. The response further clarified that seismic Category II SSCs are covered by the same quality programs and procedures as seismic Category I and the extent of design activities are determined by the responsible engineers and are identified in the design specifications and design criteria documents.

The staff reviewed the changes included in Revision 17 to the DCD and determined that neither DCD Section 3.2, Table 3.2-3 nor Section 17.5 has been revised to identify specific augmented QA requirements for seismic Category II SSCs.

Additional Question (Revision 1):

- a) This staff concern is primarily a compliance with RG 1.29 Position C.4 issue. Staff concurs that the SSCs that are classified as seismic Category II should have augmented QA (graded controls) consistent with the QA plan, RG 1.29 and the RTNSS process. However, neither DCD Table 3.2-1 nor Table 3.2-3 identify that seismic Category II SSCs have 10 CFR 50 Appendix B applied. As indicated in the response, the DCD is to be revised to reference the quality plan ~~described~~ described in DCD Section 17.3. A minor clarification is needed, since the response refers only to the quality plan in DCD Section 17.3, but the augmented design and QA requirements for seismic category II RTNSS SSCs should also be established by the D-RAP that is described in DCD Section 17.4. Therefore, staff believes that the correct reference for augmented QA for RTNSS SSCs should include the D-RAP described in DCD 17.4.
- b) Also, a clarification is needed concerning DCD subsection 3.2.2.6 that still identifies 10 CFR 50 Appendix B does not apply to Equipment Class D. Since Equipment Class D includes

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RTNSS and seismic category II SSCs it is not clear that 10 CFR 50 Appendix B applies to these SSCs, to at least some extent, as stated in DCD subsection 3.2.1.1.2. Therefore, DCD subsection 3.2.2.6 and/or classification Table 3.2-3 should be revised to signify this special treatment to distinguish seismic category II SSCs including RTNSS SSCs from other nonsafety-related SSCs so that ~~pertinent~~ pertinent requirements of 10 CFR 50 Appendix B apply to all seismic Category II SSCs to be consistent with RG 1.29. For example, the AP1000 Equipment Class D, RTNSS ancillary diesel generators with SCII anchorage should have graded QA controls (10 CFR 50 Appendix B) applied to the extent required by the D-RAP.

Westinghouse Response:

Westinghouse has reviewed the staff's comments concerning the identification of augmented QA requirements applicable to AP1000 seismic Category II SSCs. However, Westinghouse respectfully does not agree with the staff's position that specific QA requirements for seismic Category II SSCs should be included in the DCD.

As described in the AP1000 DCD, Section 3.2.1, seismic Category II is applied to "...plant structures, systems, and components which perform no safety-related function, and the continued function of which is not required. ... Structures, systems and components are classified as seismic Category II to preclude their structural failure during a safe shutdown earthquake or interaction with seismic Category I items which could degrade the functioning of a safety-related structure, system, or component to an unacceptable level, or could result in incapacitating injury to occupants of the main control room."

Based upon the definition of seismic Category II and the AP1000 safety classification requirements in DCD Table 3.2-1; seismic Category II SSCs are non-safety related items that are subjected to seismic analysis to verify integrity in the event of a seismic event. Therefore, the application of seismic Category II is limited to the analysis and design of affected SSCs. For the AP1000, seismic Category II is applied in three different approaches:

- 1) SSCs which are defined as Seismic Category II in the design phase and are identified in design specifications
- 2) SSCs that are identified as a result of plant layout review, which require seismic analysis of supports and/or anchorages for incidents of unacceptable interaction
- 3) SSCs that are identified as a result of programmatic requirements, which require seismic analysis of supports and/or anchorages for post-72 hour support

For those SSCs that are designated as Seismic Category II in the design phase, SSC design requirements are conveyed to suppliers through the use of design specifications developed in accordance with approved Westinghouse policies and procedures. Additionally, procurement of these SSCs is also applicable to approved policies and procedures, in accordance with the Westinghouse AP1000 quality plan as described in DCD Section 17.3.

The remaining seismic Category II SSCs represent applications subject to seismic analysis to confirm SSC integrity is maintained by means of supports and/or anchorages. These SSCs do not specify seismic Category II criteria through design specifications and procurement. Instead,

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these SSCs are subjected to seismic analysis in accordance with Westinghouse policies and procedures.

Augmented quality assurance, in accordance with DCD Table 17-1, is applicable to those SSCs that are contained within the Investment Protection Short Term Availability Controls in DCD Section 16.3. These SSCs, and any applicable seismic requirements, have been identified as a function of the AP1000 Regulatory Treatment of Nonsafety Systems (RTNSS) evaluation. These SSCs will apply augmented quality assurance to these SSCs independent of their seismic classification, in accordance with the scope of the RTNSS process.

In conclusion, AP1000 seismic Category II SSCs are subject to the Westinghouse AP1000 quality plan as described in DCD Section 17.3. The analysis and design of AP1000 seismic Category II SSCs implement applicable portions of 10 CFR 50 Appendix B through the application of approved policies and procedures. Furthermore, Westinghouse has concluded that the Westinghouse AP1000 quality plan is the appropriate mechanism for identification of those portions of 10 CFR 50 Appendix B that are applicable to the analysis and design of AP1000 seismic Category II SSCs.

For clarification of these comments, a suggested markup to the AP1000 DCD is attached to this response.

Additional Westinghouse Response (Revision 1):

1. Those SSCs identified as part of the RTNSS process and contained within the Investment Protection Short-Term Availability Controls (DCD Section 16.3) apply augmented quality assurance in accordance with DCD Table 17-1. Application of this augmented quality assurance as is a function of the RTNSS assessment, not the seismic categorization.
2. As described in the response to RAI-SRP3.2.2-EMB2-01, Revision 1, the RTNSS and D-RAP are independent processes. Therefore, the application of augmented QA associated with RTNSS-important SSCs is not applicable to those SSCs identified in the D-RAP scope. Furthermore, as described in DCD Subsection 17.4, the D-RAP does not impose augmented design or quality requirements on SSCs, so inclusion of a D-RAP reference would not be appropriate.
3. In DCD Table 3.2-1, Note 9 is referenced for the Regulatory Guide 1.29 seismic design of safety class D SSCs. This note references DCD Subsection 3.2.1 "...for cases when seismic Category II requirements are applicable for Class D structures, systems, and components." Therefore, Westinghouse has concluded that DCD Table 3.2-1 contains adequate reference to seismic Category II design and quality requirements.
4. Westinghouse recognizes that DCD Subsection 3.2.2.6 does not specifically allow for the use of pertinent portions of 10CFR50 Appendix B to seismic Category II applications. Therefore, a proposed DCD revision is included to provide additional clarity.

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Design Control Document (DCD) Revision: (Revision 0, 1)

3.2.1.1.2 Seismic Category II (C-II)

Pertinent portions of 10 CFR 50, Appendix B apply to **the analysis and design of** seismic Category II structures, systems, and components. The quality assurance requirements for **the analysis and design of** seismic Category II structures, systems, and components **are performed in accordance with the Westinghouse AP1000 quality plan as described in Section 17.3 and** are sufficient to provide that these components will meet the requirement to not cause unacceptable structural failure of or interaction with seismic Category I items. See Section 17.5 for the Combined License applicant quality assurance program requirement.

3.2.2.6 Equipment Class D

Standard industrial quality assurance standards are applied to Class D structures, systems, and components to provide appropriate integrity and function although 10 CFR 50, Appendix B and 10 CFR 21 do not apply. 10 CFR 50, Appendix B and 10 CFR 21 do apply to Class D structures, systems, and components that are seismic Category I. **Pertinent portions of 10 CFR 50, Appendix B are applied to seismic Category II applications as described in Subsection 3.2.1.1.2.** These industrial quality assurance standards are consistent with the guidelines for NRC Quality Group D. The industry standards used for Class D structures, systems and components are widely used industry standards. Typical industrial standards used for Class D systems and components are provided as follows:

PRA Revision:

None

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RAI Response Number: OI-SRP3.2.2-EMB2-01

Revision: 1

Question:

The staff reviewed the applicant's response to RAI-SRP3.2.2-EMB2-01 and determined that the response partially, but not entirely, resolves the staff's concerns. Although the PRA and RTNSS process did not apparently identify any supplemental requirements for passive components, the staff is concerned that supplemental requirements may be appropriate, especially where there is an insufficient operating history. For example, where high density polyethylene (HDPE) piping is to be used for underground plant service water piping that is considered a risk-significant, defense-in-depth RTNSS system, additional special treatment should be imposed on design and QA requirements to ensure its integrity consistent with the system's safety function. Special treatment is appropriate for buried non-metallic piping that does not have a sufficient operating history in similar applications where failures are possible, unless special precautions are taken during design, fabrication, installation and testing. Examples of supplemental requirements applied to important to safety HDPE piping are addressed in ASME Code Cases and relief requests. Although the plant service water piping is not considered safety-related, it does have an importance to safety and GDC 1 requires that, where generally recognized codes and standards are used, they shall be supplemented or modified as necessary to assure a quality product in keeping with the required safety function. Therefore, the Staff believes that passive SSCs used in risk-significant RTNSS systems such as the PSWS piping should have supplemental requirements applied.

Additional Question (Revision 1):

This staff concern is primarily a compliance with GDC 1 issue related to quality group for RTNSS SSCs. The response identified, in regard to HDPE materials used in RTNSS systems such as the plant service water, that this material would be limited to strainer backwash and blowdown isolable flow paths that are not required to support the important to safety function of heat removal. Therefore, the specific example for HDPE used in the RAI is no longer a staff concern, but the development of supplemental requirements for other risk-significant SSCs was not addressed in the response. It is the staff's understanding that the D-RAP will be used to establish any supplemental requirements to satisfy GDC 1 for nonsafety-related SSCs that are considered important to safety. The applicant should clarify if the D-RAP will be applied to develop appropriate supplemental design requirements for RTNSS SSCs to ensure their reliability and identify the specific ITAAC in DCD Section 14.3 or COL item that will be applied during the detailed design to accomplish this.

Westinghouse Response:

Westinghouse has reviewed the staff's concern and understands how the lack of sufficient operating experience can increase concern over the application of alternate materials in an application important to safety. Furthermore, after reviewing the staff comments, it has been identified that the request for supplemental requirements for application to passive SSCs used

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in risk significant RTNSS systems has been specifically directed towards the AP1000 application of alternate pipe materials in the plant service water system (SWS).

It should be observed that the use of alternate materials has not been applied to the process flow paths required to satisfy the function of decay heat removal, which has been evaluated as important to safety. High density polyethylene (HDPE) piping has been used in the SWS strainer backwash and blowdown flow paths. The SWS suction and discharge lines from the SWS mechanical draft cooling towers are designed to be carbon steel in accordance with the ASME B31.1 "Power Piping" code as described in AP1000 DCD Subsection 3.2.2.6.

The SWS strainer backwash and blowdown flow paths represent isolable flow paths that are not required to support the important to safety function of decay heat removal. Therefore, the application of HDPE, although classified as AP1000 Class D, is not a contributor to the RTNSS-important function of decay heat removal. Therefore, Westinghouse has concluded that supplementary requirements are not required in the application of HDPE piping in the SWS.

Additional Westinghouse Response (Revision 1):

Westinghouse would like to clarify that the RTNSS process is independent from the D-RAP. As these are independent processes, all supplemental RTNSS design requirements are contained in WCAP-15985, Revision 2.

Furthermore, the D-RAP does not impose supplemental design requirements. As documented in Section 17.4 of the AP1000 DCD, the D-RAP is utilized to identify risk-significant SSCs and to provide confidence that reliability assumptions made in the AP1000 PRA are maintained throughout plant life. The population of risk-significant SSCs contained in DCD Table 17.4-1 shall be included in various operational phase reliability assurance activities, as documented in DCD Subsection 17.4.4, to support this goal.

With respect to the application of GDC 1, all AP1000 RTNSS SSCs are safety class D and nonsafety-related. Therefore, application of industry recognized codes and standards are utilized to assure product quality in accordance with the AP1000 safety classification documented in Section 3.2 of the AP1000 DCD. Additionally, those RTNSS SSCs included in the Investment Protection Short Term Availability Controls apply augmented quality assurance in accordance with DCD Table 17-1. Westinghouse has concluded that the AP1000 RTNSS SSCs apply quality standards commensurate with the importance of their safety functions in accordance with the certified AP1000 design.

It should be noted that the amendment of the AP1000 design certification has not affected the RTNSS process as documented in the AP1000 DCD. The application of RTNSS, and the supplemental requirements associated with those functions identified as RTNSS-important, was included in Revision 15 of the AP1000 DCD in accordance with the conclusions of WCAP-15985, Revision 2, and approved by the staff in NUREG-1793 and 10 CFR 52 Appendix D.

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Design Control Document (DCD) Revision:

None

PRA Revision:

None