KHNPDCDRAIsPEm Resource

From:	Ciocco, Jeff
Sent:	Monday, July 20, 2015 9:31 AM
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Cc:	Nolan, Ryan; Dias, Antonio; Betancourt, Luis; Lee, Samuel
Subject:	APR1400 Design Certification Application RAI 88-8046 (03.05.02 - Structures Systems and Components To Be Protected From Externally-Generated Missiles)
Attachments:	APR1400 DC RAI 88 SPSB 8046.pdf; image001.jpg

KHNP,

The attachment contains the subject request for additional information (RAI). This RAI was sent to you in draft form. Your licensing review schedule assumes technically correct and complete responses within 30 days of receipt of RAIs.

Please submit your RAI response to the NRC Document Control Desk.

Thank you,

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Protecting People and the Environment

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REQUEST FOR ADDITIONAL INFORMATION 88-8046

Issue Date: 07/20/2015
Application Title: APR1400 Design Certification Review – 52-046
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.
Docket No. 52-046
Review Section: 03.05.02 - Structures Systems and Components To Be Protected From Externally-Generated Missiles
Application Section:

QUESTIONS

03.05.02-1

GDC 2 requires, in part, that SSCs important to safety be protected against natural phenomena, including tornados and hurricanes. GDC 4 requires, in part, that SSCs important to safety be appropriately protected against the effects of missiles that may result from events and conditions outside the nuclear power unit. In addition, SRP 3.5.2 acceptance is based, in part, on conformance with the guidance of RG 1.117.

DCD Tier 2, Section 3.5.2 states that "[o]penings and penetrations through the exterior walls and roofs of seismic Category I structures and the location of equipment in the vicinity of such openings are arranged so that a missile passing through the opening would not prevent the safe shutdown of the plant and would not result in an offsite release of nuclides exceeding the limits defined in 10 CFR Part 100 (Reference 15)." However, RG 1.117 position C.3 specifies that failure of an SSC from a wind-borne missile should not result in an offsite exposure greater than 25% of the limits defined in 10 CFR Part 100.

The applicant is requested to revise DCD Tier 2, Section 3.5.2 in order to conform to the guidelines set forth in RG 1.117.

03.05.02-2

GDC 2 requires, in part, that SSCs important to safety be protected against natural phenomena, including tornados and hurricanes. GDC 2 also states that "[t]he design bases for these structures, systems, and components shall reflect…the most severe of the natural phenomena."

DCD Tier 2, Section 14.3.2.7 specifies that ITAAC for plant systems are developed to require or verify heat removal capabilities for design basis accidents (DBAs) as well as tornado and missile protection. In addition, DCD Tier 2 Section 3.5.2 states that "…physical protection features are designed to resist tornado missiles in accordance with the design procedures descripted in Section 3.5.3." However, as indicated in DCD Tier 2, Subsection 3.5.1.4, the design basis hurricane and associated missiles of the APR 1400 design are more severe than design basis tornado winds and associated missiles.

The applicant is requested to revise these statements, and any other similar statements, in the DCD to also include hurricane winds and associated missiles which can be more limiting than tornado effects.

03.05.02-3

GDC 2 requires, in part, that SSCs important to safety be protected against natural phenomena, including tornados and hurricanes. GDC 4 requires, in part, that SSCs important to safety be appropriately protected against the effects of missiles that may result from equipment failures and events and conditions outside the nuclear power unit. In addition, SRP 3.5.2 acceptance is based, in part, on conformance with the guidance of RG 1.117.

In the review of DCD Tier 2 Table 3.5-4, the staff found several items that need further clarification. For this reason, the staff requests the applicant to address the following items:

a) DCD Tier 2, Section 3.5, states "Essential SSCs outside containment to be protected from missiles are provided in Table 3.5-4." However, the title of Table 3.5-4 is "Essential Systems and Components to Be Protected from Externally Generated Missiles." It is unclear to the staff if Table 3.5-4 is also applicable to internally-generated missiles.

The applicant is requested to revise either the statement in the DCD or the title of Table 3.5-4.

b) It is unclear to the staff whether this table is meant to be an all inclusive list containing all SSCs requiring protection against missiles. For example, RG 1.117, Appendix A specifies that any SSC required for attaining safe shutdown should be protected against external missiles. DCD Tier 2, Section 7.4 contains a list of systems required to achieve and maintain the reactor shutdown; however, some systems are not listed in DCD Tier 2, Table 3.5-4 (e.g., auxiliary feedwater system).

The staff requests the applicant to clarify the purpose of Table 3.5-4 and whether there are SSCs requiring missile protection that are not listed in Table 3.5-4.

c) DCD Tier 1, Section 2.2.2.1 states that the EDG building is designed and constructed to withstand external events, including tornados and hurricanes. DCD Tier 2, Section 8.3.1.1.4, item d, states that Class 1E EDGs and associated equipment are located in separate rooms of the auxiliary building and EDG building. However, DCD Tier 2, Table 3.5-4 does not list the EDG building as a structure necessary to protect essential SSCs.

DCD Tier 1, Section 2.2.4, states the exterior walls and roof of the compound building are credited with providing missile protection; however, Table 3.5-4 does not include the compound building as a structure performing a missile barrier function.

The applicant is requested to include the EDG building and compound building in DCD Tier 2 Table 3.5-4 as a structure credited as a missile barrier.

03.05.02-4

GDC 2 requires, in part, that SSCs important to safety be protected against natural phenomena, including tornados and hurricanes. GDC 4 requires, in part, that SSCs important to safety be appropriately protected against the effects of missiles that may result from events and conditions outside the nuclear power unit. SRP 3.5.2 specifies that one method for protection against externally-generated missiles is to place the SSC underground at a sufficient depth.

DCD Tier 2, Section 3.7.3.7 indicates that the APR 1400 design has buried seismic category I piping. However, DCD Tier 2, Section 3.5.2 states that "[a]ll safety-related SSCs required to safely shut the reactor down and maintain it in a safe condition are housed in seismic Category I structures."

The applicant is requested to clarify in the DCD whether the APR 1400 has safety-related piping outside seismic category I structures (e.g., buried piping or piping tunnel), and whether it is protected from externally-generated missiles consistent with the methods of SRP 3.5.2 and RG 1.117.

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03.05.02-5

GDC 4 requires, in part that, SSCs important to safety be appropriately protected against the effects of missiles that may result from events and conditions outside the nuclear power unit. SRP 3.5.2 specifies that a missile induced failure of a nonsafety-related SSC should not prevent a safety-related SSC from completing its safety function.

DCD Tier 2, Section 3.5.2 does not have an evaluation or discussion of the adverse interactions from nonsafety-related SSCs. DCD Tier 2 Section 3.3.2.3 evaluates the effects of failures of structures or components not designed to extreme wind loads on nearby safety-related structures; however, Section 3.3.2.3 only discusses the effects of wind load, and not missile impact.

The applicant is requested to provide a discussion or analysis in the DCD that determines whether missile induced failure of nonsafety-related SSCs could prevent a safety-related SSC from completing its safety function.

03.05.02-6

10 CFR 52.47(b)(1) requires that a DC application contain the proposed inspections, tests, analyses, and acceptance criteria (ITAAC) that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the design certification is built and will operate in accordance with the design certification, the provisions of the Atomic Energy Act, and the NRC's regulations.

DCD Tier 2, Section 3.5.2 states that all safety-related SSCs required to shutdown the reactor and maintain it in a safe shutdown condition are housed in seismic category I structures. DCD Tier 2, Table 3.5-4 identifies the ESW building and CCW heat exchanger buildings as providing a missile barrier for externally-generated missiles. DCD Tier 1, Table 2.2.1-3 indicates that the ESW and CCW structures are seismic category 1; however, DCD Tier 1, Section 2.2 does not contain any ITAAC to verify that the ESW and CCW heat exchanger structures have been built and constructed to withstand design-basis loads.

The applicant is requested to include appropriate ITAAC for the ESW building and CCW heat exchanger building structures in DCD Tier 1 in order to provide reasonable assurance that the structures are constructed consistent with the design certification.


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