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## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

### APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 325-8386  
SRP Section: 03.05.02 – Structures System and Components To Be Protected From Externally-Generated Missiles  
Application Section: 3.5.2  
Date of RAI Issue: 12/02/2015

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### **Question No. 03.05.02-7, Follow-up to Question 03.05.02-3**

GDC 2 requires that SSCs important to safety to be protected against natural phenomena. The design bases for these SSCs are to reflect the importance of the safety functions to be performed. Also, GDC 60 requires that the nuclear power unit design include means to suitably control the release of radioactive materials in gaseous and liquid effluents and to handle radioactive solid waste produced during normal reactor operation, including anticipated operational occurrences. RG 1.143 provides guidance for the radwaste management SSCs. In addition, although not referenced in RG 1.143, GDC 61 requires that radioactive waste and other systems which may contain radioactivity be designed with appropriate containment and confinement during both normal and postulated accident conditions.

In response to RAI 8046, Question 3.5.2-3, item c, the applicant stated that the compound building does not function as a missile barrier and provided a DCD markup that removes the associated statement in DCD Tier 1, Section 2.2.4. Due to this deletion, it is unclear to the staff how the compound building, and therefore, the radwaste systems conform to the guidance of RG 1.143.

DCD Tier 2, Section 11.2 specifies that the compound building is classified as RW-IIa. Table 2 of RG 1.143 specifies that RW-IIa facilities should be protected against tornado missiles. In order to conform to RG 1.143, the applicant is requested to revise the response to Question 3.5.2-3, item c, and include in its application:

a. an evaluation of the missile protection provided by the compound building, including the identification of tornado missile spectra and associated velocities, demonstrating that the compound building meets or exceeds the criteria of RW-IIa; or

b. a full evaluation of the radiological consequences demonstrating that a total unmitigated radiological release (considering the maximum inventory in the building) would not result in a dose of greater than 100 mrem at the protected area boundary or 5 rem to site personnel.

(Note: while RG 1.143, Regulatory Position 5, indicates that the dose limit at the protected area

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boundary is 500 mrem, SRP 11.2 clarifies that for the purposes of the SRP the dose limit is 100 mrem, consistent with 10 CFR 20.1301. Therefore, unless an alternative approach to the SRP is proposed, the limit is 100 mrem at the protected area boundary.)

### **Response**

The compound building is to be protected against tornado missiles in accordance with the RW-IIa classification and as defined in RG 1.143. Since the compound building is classified as a non-safety related structure, the structural design is excluded from the scope of the DCD. The missile protection evaluation including definition of the tornado missile spectrum for the compound building is to be performed by the COL applicant. Subsection 3.5.1.4 will describe an additional COL item, 3.5(8), for the applicant to address this issue.

KHNP mistakenly deleted the compound building from having a missile protection function against externally generated missiles in responding to RAI 88-8046 Question 3.5.2-3, item c. In accordance with our response to RAI 117-8061 Question 03.05.01-1, (Ref. KHNP submittal MKD/NW-15-0268L dated December 22, 2015) and the above response to this RAI, the compound building is to be designed for protection from externally-generated missile to conform to RG 1.143.

The response to RAI 88-8046 Question 3.5.2-3, item c will be revised to align the response with this RAI response and that of RAI 117-8061.

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### **Impact on DCD**

DCD Tier 2, Subsection 3.5.1.4, 3.5.4 and Table 1.8-2 will be revised as indicated in the Attachment.

### **Impact on PRA**

There is no impact on the PRA.

### **Impact on Technical Specifications**

There is no impact on the Technical Specifications.

### **Impact on Technical/Topical/Environmental Reports**

There is no impact on any Technical, Topical, or Environmental Report.

**APR1400 DCD TIER 2**

assurance that the seismic Category I structures are designed to withstand these loads (COL 3.5(3)).

Insert from next page.

3.5.1.5 Site Proximity Missiles (Except Aircraft)

The COL applicant is to evaluate the potential for site proximity explosions and missiles due to train explosions (including rocket effects), truck explosions, ship or barge explosions, industrial facilities, pipeline explosions, or military facilities (COL 3.5(4)). If the total probability of explosion is greater than an order of magnitude of  $10^{-7}$  per year, a missile description, including size, shape, weight, energy, material properties, and trajectory, will be specified. A description of the missile effects on the SSCs will be developed and addressed, if necessary.

3.5.1.6 Aircraft Hazards

The COL applicant is to provide justification for the site-specific aircraft hazard and an aircraft hazard analysis in accordance with the requirements of NRC RG 1.206 (Reference 10) (COL 3.5(5)).

3.5.2 Structures, Systems, and Components to be Protected from Externally Generated Missiles

All safety-related SSCs required to safely shut the reactor down and maintain it in a safe condition are housed in seismic Category I structures. Seismic Category I structures are designed as tornado/hurricane resistant (see Subsection 3.5.1.4) and other external missile resistant.

Structures used to protect safety-related SSCs meet the requirements of NRC RGs 1.13 (Reference 11), 1.27 (Reference 12), 1.115 (Reference 13), and 1.117 (Reference 14).

Essential SSCs protected against missile impact are listed in Table 3.5-4. SSCs inside containment are protected by the thick seismic Category I concrete walls of the reactor building and are not listed.

The COL applicant is to identify applicable tornado missile spectra and associate velocities for the compound building, and to evaluate the missile protection provided by the building (COL 3.5(8)).

**APR1400 DCD TIER 2****3.5.4 Combined License Information**

COL 3.5(1) The COL applicant is to provide the procedure for heavy load transfer to strictly limit the transfer route inside and outside containment during plant maintenance and repair periods.

COL 3.5(2) The COL applicant is to perform an assessment of the orientation of the turbine generator of this and other unit(s) at multi-unit sites for the probability of missile generation using the evaluation of Subsection 3.5.1.3.2 to verify that essential SSCs are outside the low-trajectory turbine missile strike zone.

COL 3.5(3) The COL applicant is to evaluate site-specific hazards induced by external events that may produce more energetic missiles than tornado or hurricane missiles, and provide reasonable assurance that seismic Category I and II structures are designed to withstand these loads.

COL 3.5(4) The COL applicant is to evaluate the potential for site proximity explosions and missiles due to train explosions (including rocket effects), truck explosions, ship or barge explosions, industrial facilities, pipeline explosions, or military facilities.

COL 3.5(5) The COL applicant is to provide justification for the site-specific aircraft hazard and an aircraft hazard analysis in accordance with the requirements of NRC RG 1.206.

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**3.5.5 References**

1. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," U.S. Nuclear Regulatory Commission.
2. NUREG-0800, Standard Review Plan, Section 3.5.1.1, "Internally Generated Missiles (Outside Containment)," Rev. 3, U.S. Nuclear Regulatory Commission, March 2007.
3. NUREG-0800, Standard Review Plan, Section 9.1.5, "Overhead Heavy Load Handling Systems," Rev. 1, U.S. Nuclear Regulatory Commission, March 2007.

COL3.5(8) The COL applicant is to identify applicable tornado missile spectra and associate velocities for the compound building, and to evaluate the missile protection provided by the building.

## APR1400 DCD TIER 2

Table 1.8-2 (3 of 29)

Item No.	Description
COL 3.4(1)	The COL applicant is to provide site-specific information on protection measures for the design-basis flood, as required in Subsection 2.4.10.
COL 3.4(2)	The COL applicant is to provide flooding analysis with flood protection and mitigation features from internal flooding for the CCW Heat Exchanger Building and ESW Building.
COL 3.4(3)	The COL applicant is to confirm that the potential site-specific external flooding events are bounded by design-basis flood values or otherwise demonstrate that the design is acceptable.
COL 3.4(4)	The COL applicant is to identify any site-specific physical models that could be used to predict prototype performance of hydraulic structures and systems.
COL 3.5(1)	The COL applicant is to provide the procedure for heavy load transfer to strictly limit the transfer route inside and outside containment during plant maintenance and repair periods.
COL 3.5(2)	The COL applicant is to perform an assessment of the orientation of the turbine generator of this and other unit(s) at multi-unit sites for the probability of missile generation using the evaluation of Subsection 3.5.1.3.2 to verify that essential SSCs are outside the low-trajectory turbine missile strike zone.
COL 3.5(3)	The COL applicant is to evaluate site-specific hazards induced by external events that may produce more energetic missiles than tornado or hurricane missiles, and provide reasonable assurance that seismic Category I and II structures are designed to withstand these loads.
COL 3.5(4)	The COL applicant is to evaluate the potential for site proximity explosions and missiles due to train explosions (including rocket effects), truck explosions, ship or barge explosions, industrial facilities, pipeline explosions, or military facilities.
COL 3.5(5)	The COL applicant is to provide justification for the site-specific aircraft hazard and an aircraft hazard analysis in accordance with the requirements of NRC RG 1.206.
COL 3.6(1)	The COL applicant is to identify the site-specific SSCs that are safety related or required for safe shutdown that are located near high- and moderate-energy piping systems and that are susceptible to the consequences of piping failures.
COL 3.6(2)	The COL applicant is to provide a list of site-specific high- and moderate-energy piping systems including layout drawings and protection features and the failure modes and effects analysis for safe shutdown due to the postulated HELBs.
COL 3.6(3)	The COL applicant is to confirm that the bases for the LBB acceptance criteria are satisfied by the final as-built design and materials of the piping systems as site-specific evaluations, and is to provide the information including LBB evaluation report for the verification of LBB analyses.
COL 3.6(4)	The COL applicant is to provide the procedure for initial filling and venting to avoid the known causes for water hammer in DVI line.
COL 3.7(1)	The COL applicant is to determine the site-specific SSE and OBE that are applied to the seismic design of the site-specific seismic Category I and II SSCs and the basis for the plant shutdown. The COL applicant is also to verify the appropriateness of the site-specific SSE and OBE.
COL 3.7(2)	The COL applicant is to confirm that the horizontal components of the SSE site-specific ground motion in the free-field at the foundation level of the structure satisfy a peak ground acceleration of at least 0.1 g.

COL3.5(8) The COL applicant is to identify applicable tornado missile spectra and associate velocities for the compound building, and to evaluate the missile protection provided by the building.