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.:	**74-8060**
SRP Section:	**03.05.01.04 – Missiles Generated by Tornadoes and Extreme Winds**
Application Section:	**3.5.1.4**
Date of RAI Issue:	**07/15/2015**

Question No. 03.05.01.04-1

GDC 2 requires that SSCs important to safety to be protected against natural phenomena, including the effects from tornados. In addition, GDC 4 requires that SSCs important to safety to be appropriately protected against the effects of missiles that may result from events and conditions outside the nuclear power unit.

As identified in DCD Tier 2, Table 3.5-2, “Design Basis Missiles,” the APR 1400 design basis tornado-borne automobile missile is assumed to impact at an altitude of less than 10.06 m (33 ft) above grade level. This is consistent with the guidance of RG 1.76, however, for sites with surrounding ground elevations higher than plant grade (e.g. elevated parking lot) a COL applicant that references the APR1400 design certification should confirm that automobile missiles cannot be generated within a 0.5 mile radius of safety-related SSCs that would lead to impact higher than 10.06 m (33 ft) above plant grade.

The applicant is requested to include in the DCD a COL information item that requires a COL applicant who references the APR 1400 design certification to confirm that automobile missiles cannot be generated within a 0.5 mile radius of safety-related SSCs that would lead to impact higher than 10.06 m (33 ft) above plant grade.

Response

The APR1400 plant grade is considered to be at the same altitude within a 0.5 mile radius of safety-related SSCs. Therefore, the exterior walls and roof slabs of seismic Category I structures are designed to withstand automobile missiles that would impact at altitudes less than 10.06 m (33 ft) above plant grade. The potential for automobile missiles to impact SSCs at an altitude higher than 10.06 m (33 ft) above plant grade would be based on site specific properties and will be evaluated by the COL applicant. Therefore, a COL Item will be added to ensure that

automobile missiles cannot be generated within a 0.5 mile radius of safety-related SSCs that would lead to impact higher than 10.06 m (33 ft) above plant grade.

Impact on DCD

DCD Tier 2 Sections 3.5.1.4, 3.5.4 and Table 1.8-2 will be revised to provide a COL Item as indicated in the attached markup.

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, and Environmental Reports.

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

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.

The COL applicant is to confirm that automobile missiles cannot be generated within a 0.5 mile radius of safety-related SSCs that would lead to impact higher than 10.06 m (33 ft) above plant grade(COL 3.5(6)).

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.

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.

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.

COL 3.5(6) The COL applicant is to confirm that automobile missiles cannot be generated within a 0.5 mile radius of safety-related SSCs that would lead to impact higher than 10.06 m (33 ft) above plant grade.

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.

COL 3.5(6) The COL applicant is to confirm that automobile missiles cannot be generated within a 0.5 mile radius of safety-related SSCs that would lead to impact higher than 10.06 m (33 ft) above plant grade.