
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.: 58-8018
SRP Section: 02.05.05 – Stability of Slopes
Application Section: 2.5.5
Date of RAI Issue: 07/06/2015

Question No. 02.05.05-1

Section 2.5.5 of the APR 1400 DCD, states that no assumptions in regard to slope stability are used in the evaluation of the standard design and that the stability of all slopes will be a site specific issue. In accordance with 10 CFR parts 50 and 100 and SRP 2.5.5. please provide a COL Action Item requesting COL applicants referencing the APR 1400 DCD to provide site specific information in accordance with SRP 2.5.5 and determine the static and dynamic stability of all natural and man-made slopes, in order to ensure that the failure of any slope will not adversely affect the safety of the plant.

Response

To ensure the COL applicant has adequately demonstrated that the failure of any slope will not adversely affect the safety of the plant, a COL Action Item will be added and the description for the stability of slopes in DCD Subsection 2.5.5 will be revised as follows:

“The APR1400 standard plant design is based on the premise that there is no site specific potential for slope failure that could adversely affect the nuclear island. Combined License applicants referencing the APR1400 design will address site specific information about the static and dynamic stability of all natural and manmade soil and rock slopes including embankments and dams.”

Impact on DCD

DCD Subsections 2.5.5, 2.5.6 and the associated COL Table 1.8-2 will be revised 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, or Environmental Reports.

APR1400 DCD TIER 22.5.4.12 Techniques to Improve Subsurface Conditions

If necessary to improve subsurface conditions, the plans, summaries of specifications, and methods of quality control are described in the site-specific information.

2.5.5 Stability of Slopes

~~No assumptions in regard to slope stability are used in the evaluation of the APR1400 standard design.~~

~~The stability of all natural and manmade slopes, including embankments and dams, that are vital to the safety of APR1400, is included in site specific information.~~

2.5.6 Combined License Information

The APR1400 standard plant design is based on the premise that there is no site-specific potential for slope failure that could adversely affect the nuclear island. COL applicants referencing the APR1400 design are to provide site-specific information about the static and dynamic stability of all natural and man-made soil and rock slopes including embankments and dams (COL 2.5 (14)).

completely enveloped by the CSDRS-compatible free-field response motions at the bottom elevation of the nuclear island for a site with the low-strain shear wave velocity greater than 304.8 m/s (1,000 ft/s) at the finished grade in the free field. Alternately, the COL applicant is to confirm that the FIRS of the nuclear island are completely enveloped by the CSDRS for a hard rock site with a low-strain shear wave velocity of supporting medium for the nuclear island greater than 2,804 m/s (9,200 ft/s).

COL 2.5(3) The COL applicant is to confirm that the lower bound of the site-specific strain-compatible soil profile for a soil site is greater than the lower bound of the generic strain-compatible soil profiles used in the APR1400 seismic analyses.

COL 2.5(4) The COL applicant is to confirm that the site-specific GMRS determined at the finished grade are completely enveloped by the HRHF response spectra for a site with a low-strain shear wave velocity of supporting medium for the nuclear island higher than 1,494 m/s (4,900 ft/s) overlaying hard rock with a low-strain shear wave velocity greater than 2,804 m/s (9,200 ft/s).

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- COL 2.5(5) The COL applicant is to perform a site-specific seismic analysis to generate in-structure response spectra at key locations using the procedure described in Appendix 3.7A if COL 2.5(2) and COL 2.5(3) above are not met. In addition, the COL applicant is to confirm that the site-specific in-structure response spectra so generated are enveloped by the corresponding in-structure response spectra provided in Appendix 3.7A.
- COL 2.5(6) The COL applicant is to perform a site-specific seismic response analysis using the procedure described in Appendix 3.7B and the EPRI White Paper “Seismic Screening of Components Sensitive to High Frequency Vibratory Motions” (Reference 6), if COL 2.5(4) is not met.
- COL 2.5(7) The COL applicant is to perform an evaluation of the subsurface conditions within the standard plant structure footprint based on the geologic investigation in accordance with NRC RG 1.132.
- COL 2.5(8) The COL applicant is to confirm that the dynamic properties of SFG to be used in construction of the APR1400 seismic Category I structures satisfy the SFG requirements provided in Table 2.0-1.

- 2.5.7 Reference COL 2.5(14) The COL applicant is to provide site-specific information about the static and dynamic stability of all natural and man-made soil and rock slopes including embankments and dams.
1. Regulatory Guide 1.208, “A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion,” U.S. Nuclear Regulatory Commission, March 2007.
 2. Regulatory Guide 1.132, “Site Investigations for Foundations of Nuclear Power Plants,” Rev. 2, U.S. Nuclear Regulatory Commission, October 2003.
 3. Regulatory Guide 1.138, “Laboratory Investigations of Soils and Rocks for Engineering Analysis and Design of Nuclear Power Plants,” Rev. 2, U.S. Nuclear Regulatory Commission, December 2003.
 4. Regulatory Guide 1.208, “A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion,” U.S. Nuclear Regulatory Commission, March 2007.
 5. NRC DC/COL-ISG-017, "Interim Staff Guidance on Ensuring Hazard-Consistent Seismic Input for Site Response and Soil Structure Interaction Analyses," U.S. Nuclear Regulatory Commission, August 2009.

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Table 1.8-2 (2 of 29)

Item No.	Description
COL 2.5(1)	The COL applicant is to provide the site-specific information on geology, seismology, and geotechnical engineering as required in NRC RG 1.206.
COL 2.5(2)	The COL applicant is to confirm that the foundation input response spectra (FIRS) of the nuclear island are completely enveloped by the CSDRS-compatible free-field response motions at the bottom elevation of the nuclear island for a site with the low-strain shear wave velocity greater than 304.8 m/s (1,000 ft/s) at the finished grade in the free field. Alternately, the COL applicant is to confirm that FIRS of the nuclear island are completely enveloped by the CSDRS for a hard rock site with a low-strain shear wave velocity of supporting medium for the nuclear island greater than 2,804 m/s (9,200 ft/s).
COL 2.5(3)	The COL applicant is to confirm that the lower bound of the site-specific strain-compatible soil profile for a soil site is greater than the lower bound of the generic strain-compatible soil profiles used in the APR1400 seismic analyses.
COL 2.5(4)	The COL applicant is to confirm that the site-specific GMRS determined at the finished grade are completely enveloped by the hard rock high frequency (HRHF) response spectra for a site with a low-strain shear wave velocity of supporting medium for the nuclear island higher than 1,494 m/s (4,900 ft/s) overlaying a hard rock with a low-strain shear wave velocity greater than 2,804 m/s (9,200 ft/s).
COL 2.5(5)	The COL applicant is to perform a site-specific seismic analysis to generate in-structure response spectra at key locations using the procedure described in Appendix 3.7A if COL 2.5(2) and COL 2.5(3) above are not met. In addition, the COL applicant is to confirm that the site-specific in-structure response spectra so generated are enveloped by the corresponding in-structure response spectra provided in Appendix 3.7A.
COL 2.5(6)	The COL applicant is to perform a site-specific seismic response analysis using the procedure described in Appendix 3.7B and the EPRI White Paper, "Seismic Screening of Components Sensitive to High Frequency Vibratory Motions," if COL 2.5(4) is not met.
COL 2.5(7)	The COL applicant is to perform an evaluation of the subsurface conditions within the standard plant structure footprint based on the geologic investigation in accordance with NRC RG 1.132.
COL 2.5(8)	The COL applicant is to confirm that the dynamic properties of structural fill granular to be used in construction of the APR1400 seismic Category I structures satisfy the requirements of structural fill granular provided in Table 2.0-1.
COL 3.2(1)	The COL applicant is to identify the seismic classification of site-specific SSCs that should be designed to withstand the effects of the SSE.
COL 3.2(2)	The COL applicant is to identify the quality group classification of site-specific systems and components and their applicable codes and standards.
COL 3.3(1)	The COL applicant is to demonstrate that the site-specific design wind speed is bounded by the design wind speed of 64.8 m/s (145 mph).
COL 3.3(2)	The COL applicant is to demonstrate that the site-specific seismic Category II structures adjacent to the seismic Category I structures are designed to meet the provisions described in Subsection 3.3.1.2.
COL 3.3(3)	The COL applicant is to provide reasonable assurance that site-specific structures and components not designed for the extreme wind loads do not impact either the function or integrity of adjacent seismic Category I SSCs.

COL 2.5(14) The COL applicant is to provide site-specific information about the static and dynamic stability of all natural and man-made soil and rock slopes including embankments and dams.