REVISED 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.:	**252-8299**
SRP Section:	**03.07.02 – Seismic System Analysis**
Application Section:	**3.7.2**
Date of RAI Issue:	**10/19/2015**

Question No. 03.07.02-12

10 CFR 50 Appendix S requires that the safety functions of structures, systems, and components (SSCs) must be assured during and after the vibratory ground motion associated with the safe shutdown earthquake (SSE) ground motion through design, testing, or qualification methods. In accordance with 10 CFR 50 Appendix S, the staff reviews the adequacy of the seismic analysis methods used to demonstrate that SSCs can withstand seismic loads and remain functional.

DCD Sections 3.8A.2.3.1 and 3.8A.3.3.1, for the AB and EDGB respectively, indicate that an equivalent static method of analysis is performed to obtain the member forces for these structures. Per SRP Section 3.7.2.II.1, the use of equivalent static load method is acceptable provided it can be demonstrated that the method produces conservative results in terms of responses. Therefore, to assist the staff in its evaluation of the conservatism of the equivalent static method implemented by the applicant, the staff requests the applicant to provide comparisons of maximum member forces obtained from the equivalent static method to corresponding results from the time history analysis method (i.e. SASSI analysis), or to RSA results using foundation ISRS from the time history analysis.

Response

To evaluate the conservatism of equivalent static method analysis that is applied to the AB and EDGB, maximum story shear forces of the AB and EDGB from the equivalent static method are compared to corresponding results from the time-history analysis method (i.e., SASSI analysis). As indicated in the Table 1 and 2 comparison results, use of the equivalent static load method produces more conservative results than the time-history analysis method (SASSI analysis).

In the Table 3.7-22 of DCD Tier 2, “Maximum Member Forces of Auxiliary Building,” the applicable locations of seismic forces and moments from EL. 195’-0” to EL. 213’-6” are not as

clearly specified as they are in technical report APR1400-E-S-NR-14003-P. Therefore, DCD Tier 2, Table 3.7-22 will be revised as indicated in the attachment associated with this response.

Table 1. Comparison of Maximum Story Shear Forces of AB

Elevation (ft)	Maximum Story Shear Force (kips)						Maximum Story Shear Force Ratio (b/a)		
	Time History (SASSI) Analysis (a)			Equivalent Static Analysis (b)					
	F_x (E-W)	F_y (N-S)	F_z (VT)	F_x (E-W)	F_y (N-S)	F_z (VT)	F_x (E-W)	F_y (N-S)	F_z (VT)
213.5(1)	5425	7174	2920	7288	9646	3930	1.34	1.34	1.35
213(1)	14787	13126	5504	17605	16861	7986	1.19	1.28	1.45
195(1)	29437192 63	25062 17 401	11918665 6	46554264 66	40716253 21	20856102 51	1.581.37	1.621. 46	1.7554
195(2)	10174	7661	5262	20088	15395	10604	1.97	2.01	2.02
174	68233	66361	30736	95614	92658	48[illegible]5	1.40	1.40	1.58
156	101579	111413	54516	135587	1[illegible]13	7677[illegible]	1.33	1.31	1.41
137.5	143267	165299	88733	185412	[illegible]10140	118591	1.29	1.27	1.34
120	193300	222571	124868	246180	[illegible]27970[illegible]	164806	1.27	1.26	1.32
98.5	240185	282559	162898	297325	[illegible]51	208104	1.24	1.22	1.28
77	277236	335937	203768	340725	405[illegible]1	257259	1.23	1.21	1.26
67	293250	358622	225936	3[illegible]	43043[illegible]	283173	1.24	1.20	1.25
55	300911	369591	238280	376[illegible]47	[illegible]40	303042	1.26	1.21	1.27

Notes : (1) East part of Auxiliary Building
(2) West part of Auxiliary Building

Table 2. Comparison of Maximum Story Shear Forces of EDGB

Structure	Elevation (ft)	Maximum Story Shear Force (kips)						Maximum Story Shear Force Ratio (b/a)		
		Time History (SASSI) Analysis (a)			Equivalent Static Analysis (b)					
		F_x (E-W)	F_y (N-S)	F_z (VT)	F_x (E-W)	F_y (N-S)	F_z (VT)	F_x (E-W)	F_y (N-S)	F_z (VT)
EDG Building	135	2860	[illegible]	1576	28943803	28943803	15882090	1.041.33	1.021.34	1.041.33
	100	9995	8745	5578	10850124 31	9660109 74	6033692[illegible]	1.091.24	1.101.25	1.081.24
DFOT Room	100	1051	1170	591	14161007	15521771	796906	1.341.53	1.331.51	1.351.53
	63	4569	3865	3361	56706364	48395439	41694671	1.241.39	1.251.41	1.241.39

Impact on DCD

There is no impact on the DCDDCD Tier 2, Table 3.7-22 will be revised as indicated in the attachment associated with this response.

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.

Table 3.7-22

Maximum Member Forces of Auxiliary Building

Elevation (ft)	Seismic Force and Moment (kips, ft)				
	Fx		Mx	My	Mz
213.5(a) ~~213.5~~	5425		314174	197979	637117
213(a) ~~213~~	14787		478184	711285	1502367
195(a) ~~195~~	19263		765341	945752	1981261
195(b) ~~195~~	10174		184377	550634	706529
174	68233		2430827	2518524	2257363
156	101579		4763713	4780395	3313104
137.5	143267		9292[illegible]	7729526	4421197
120	193300		12005966	11199955	5614660
98.5	240185		1[illegible]11608	16597000	6657538
77	277236		25105085	22507797	7326407
67	293250		28399238	25433525	7608524
55	300911		32392109	28921247	7725579

~~(a) : East part of Auxiliary Building~~
(b) : West part of Auxiliary Building