
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
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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 - (Rev. 1)

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⁾	19263	17401	6656	26466	25321	10251	1.37	1.46	1.54
195 ⁽²⁾	10174	7661	5262	20088	15395	10604	1.97	2.01	2.02
174	68233	66361	30736	95614	92658	48565	1.40	1.40	1.58
156	101579	111413	54516	135587	146113	76779	1.33	1.31	1.41
137.5	143267	165299	88733	185412	210140	118591	1.29	1.27	1.34
120	193300	222571	124868	246180	279707	164806	1.27	1.26	1.32
98.5	240185	282559	162898	297325	343981	208104	1.24	1.22	1.28
77	277236	335937	203768	340725	405851	257259	1.23	1.21	1.26
67	293250	358622	225936	362176	430430	283173	1.24	1.20	1.25
55	300911	369591	238280	378747	447140	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	2847	1576	3803	3803	2090	1.33	1.34	1.33
	100	9995	8745	5578	12431	10974	6920	1.24	1.25	1.24
DFOT Room	100	1051	1170	591	1607	1771	906	1.53	1.51	1.53
	63	4569	3865	3361	6364	5439	4671	1.39	1.41	1.39

Impact on DCD

DCD 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.

APR1400 DCD TIER 2

Table 3.7-22

Maximum Member Forces of Auxiliary Building

Seismic Force and Moment (kips, ft)						
Elevation (ft)	F _x	F _y	F _z	M _x	M _y	M _z
213.5 ^(a) → 213.5	5425	7174	2920	314174	197979	637117
213 ^(a) → 213	14787	13126	5504	478184	711285	1502367
195 ^(a) → 195	19263	17401	6656	765341	945752	1981261
195 ^(b) → 195	10174	7661	5262	184377	550634	706529
174	68233	66361	30736	2430827	2518524	2257363
156	101579	111413	54516	4762013	4780395	3313104
137.5	143267	165299	88733	7929215	7729526	4421197
120	193300	222571	124868	12005966	11199955	5614660
98.5	240185	282559	162898	18111608	16597000	6657538
77	277236	335937	203768	25105085	22507797	7326407
67	293250	358622	225936	28399238	25433525	7608524
55	300911	369591	238280	32392109	28921247	7725579

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