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

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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**

To evaluate the conservatism of the equivalent static method analysis, which is applied to the AB and EDGB, maximum story shear forces of the AB and the 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).

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 <sub>x</sub> (E-W)	F <sub>y</sub> (N-S)	F <sub>z</sub> (VT)	F <sub>x</sub> (E-W)	F <sub>y</sub> (N-S)	F <sub>z</sub> (VT)	F <sub>x</sub> (E-W)	F <sub>y</sub> (N-S)	F <sub>z</sub> (VT)
213.5	5425	7174	2920	7288	9646	3930	1.34	1.34	1.35
213	14787	13126	5504	17605	16861	7986	1.19	1.28	1.45
195	29437	25062	11918	46554	40716	20855	1.58	1.62	1.75
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

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 <sub>x</sub> (E-W)	F <sub>y</sub> (N-S)	F <sub>z</sub> (VT)	F <sub>x</sub> (E-W)	F <sub>y</sub> (N-S)	F <sub>z</sub> (VT)	F <sub>x</sub> (E-W)	F <sub>y</sub> (N-S)	F <sub>z</sub> (VT)
EDG Building	135	2860	2847	1576	2894	2894	1588	1.01	1.02	1.01
	100	9995	8745	5578	10850	9660	6033	1.09	1.10	1.08
DFOT Room	100	1051	1170	591	1410	1552	796	1.34	1.33	1.35
	63	4569	3865	3361	5670	4839	4169	1.24	1.25	1.24

**Impact on DCD**

There is no impact on the DCD.

**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.