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.:	**466-8577**
SRP Section:	**03.11 – Environmental Qualification of Mechanical and Electrical Equipment**
Application Section:	**03.11**
Date of RAI Issue:	**04/21/2016**

Question No. 03.11-17

10 CFR 50.49 and 10 CFR 50, Appendix A, criterion 4 require that certain components important to safety be designed to withstand environmental conditions, including the effects of radiation, associated with design basis events, including normal operation, anticipated operational occurrences, and design basis accidents.

As a result of the Chapter 12 shielding audit, it was determined that the 1% failed fuel source term of the boric acid concentrator, provided in Calculation No. 1-321-N376-012, was incorrect. The source term is used in calculating the equipment qualification total integrated dose (TID). During audit related discussions with the applicant, the applicant indicated that the source term incorrectly assumed a concentration factor of 10, instead of 100. Therefore, the applicant is requested to:

1. Update the 1% failed fuel source term for the boric acid concentrator and provide the corrected source term.

2. Update all relevant radiation TID information accordingly and ensure that all associated information in the FSAR and APR1400-E-X-NR-14001, is appropriately updated as a result of this correction.

Response

1. The corrected source term for the boric acid concentrator, based on a concentration factor of 100 instead of 10, is given in Tables 1 and 2.

Table 1. Source Terms of BAC During Normal Operation – Vapor Phase [Bq]

(1.0% Fuel Failure, Continuous Gas Stripping)

Nuclide	Activity [Bq]
H-3	6.00E+11
N-16	0.00E+00
Kr-85m	2.66E+06
Kr-85	3.30E+06
Kr-87	7.60E+05
Kr-88	4.19E+06
Xe-131m	1.77E+07
Xe-133m	1.90E+06
Xe-133	1.27E+09
Xe-135m	1.25E+05
Xe-135	2.40E+07
Xe-137	8.00E+03
Xe-138	9.50E+04

Table 2. Source Terms of BAC During Normal Operation – Liquid Phase [Bq]

(1.0% Fuel Failure, Continuous Gas Stripping)

Nuclide	Activity [Bq]	Nuclide	Activity [Bq]
H-3	8.07E+10	Te-129	3.18E+06
N-16	0.00E+00	I-131	2.16E+11
Kr-85m	2.58E+04	Te-131m	3.86E+08
Kr-85	3.26E+04	Te-131	2.05E+06
Kr-87	7.36E+03	Te-132	7.49E+09
Kr-88	4.09E+04	I-132	6.81E+08
Xe-131m	1.74E+05	I-133	3.51E+10
Xe-133m	1.86E+04	I-134	1.60E+08
Xe-133	1.28E+07	Cs-134	3.41E+10
Xe-135m	1.18E+03	I-135	5.90E+09
Xe-135	2.34E+05	Cs-136	2.72E+09
Xe-137	7.73E+01	Cs-137	3.98E+10
Xe-138	9.24E+02	Ba-140	5.00E+08
Br-84	4.55E+06	La-140	2.96E+07
Rb-88	1.81E+08	Ce-141	2.72E+07
Sr-89	6.47E+08	Ce-143	7.38E+06
Sr-90	5.33E+07	Ce-144	9.87E+07
Sr-91	2.38E+07	Na-24	3.52E+08
Y-91m	1.70E+08	Cr-51	2.38E+09
Y-91	8.63E+09	Mn-54	3.64E+08
Y-93	7.95E+07	Fe-55	2.84E+08
Zr-95	1.25E+08	Fe-59	5.79E+07
Nb-95	9.42E+07	Co-58	9.54E+08
Tc-99m	5.11E+08	Co-60	1.25E+08
Mo-99	9.98E+09	Zn-65	1.14E+08
Ru-103	3.30E+07	Ba-137m	3.98E+10
Ru-106	1.71E+07	W-187	3.06E+07
Ag-110m	2.95E+08	Np-239	6.58E+07
Te-129m	1.01E+09		

2. As a result of the change in concentration factor to 100, the normal TIDs of the boric acid concentrator and boric acid filter were re-calculated. The corresponding values in APR1400-E-X-NR-14001 will be revised, which will also be incorporated into the response to RAI 176-8089, Question 03.11-9. The normal TIDs for all associated components (except for the boric acid concentrator and boric acid filter) were previously evaluated with a concentration factor of 100 and, therefore, do not require revision.

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

Technical Report APR1400-E-X-NR-14001, Rev. 0, "Equipment Qualification Program" will be revised as shown in Attachment 2 to the response to RAI 176-8089 Question 03.11-9 dated July 8, 2016.