Erratum to: Effect of burn-up on the radioactivation behavior of cladding hull materials studied using the ORIGEN-S code

Min Ku Jeon · Chang Hwa Lee · Chang Je Park ·
Jung Hoon Choi · In Hak Cho · Kweon Ho Kang ·
Hwan-Seo Park · Geun Il Park

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Unfortunately in the original publication some errors were found in the input data of simulation program. Consequently, the values of Tables 2, 3, 4, and 5 and Fig. 1 have been changed and the revised version of tables and figures are given in the following pages. In the original work, the authors have mentioned an increase of total radioactivity

which was about 16.7–24 % when fuel burn-up increased from 30 to 75 GWD/MTU. But it should be noted that in the new calculation results, a significant increase in the radioactivity was observed between 30 and 45 GWD/MTU, and the total radioactivity values increased by 167, 262, 280, and 318 % for the Zry-4, Zirlo, HANA-4, and HANA-6 cases, respectively, when the fuel burn-up increased from 30 to 75 GWD/MTU. Although the values were changed, the conclusion for the view point of ^{94}Nb and ^{60}Co still remains same as shown in the new Fig. 1.

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M. K. Jeon (✉) · C. H. Lee · J. H. Choi ·
I. H. Cho · K. H. Kang · H.-S. Park · G. I. Park
Nuclear Fuel Cycle Waste Treatment Research Division, Korea
Atomic Energy Research Institute, 989-111 Daedeok-daero,
Yuseong-gu, Daejeon 305-353, Republic of Korea
e-mail: minku@kaeri.re.kr

C. J. Park
Reactor Core Design Division, Korea Atomic Energy Research
Institute, 989-111 Daedeok-daero, Yuseong-gu,
Daejeon 305-353, Republic of Korea

Table 2 The radioactivation calculation results of Zircaloy-4 for various burn-ups of 30, 45, 60, and 75 GWD/MTU (only major nuclides are shown)

	30 GWD/ MTU (Bq/g)	45 GWD/ MTU (Bq/g)	60 GWD/ MTU (Bq/g)	75 GWD/ MTU (Bq/g)
^{125}Sb	8.635×10^6	1.478×10^7	1.933×10^7	2.286×10^7
$^{125\text{m}}\text{Te}$	2.108×10^6	3.608×10^6	4.719×10^6	5.582×10^6
^{55}Fe	1.868×10^6	3.217×10^6	4.316×10^6	5.262×10^6
$^{119\text{m}}\text{Sn}$	2.428×10^5	3.149×10^5	3.582×10^5	3.946×10^5
$^{121\text{m}}\text{Sn}$	6.243×10^4	1.286×10^5	1.968×10^5	2.658×10^5
^{121}Sn	4.845×10^4	9.981×10^4	1.527×10^5	2.063×10^5
^{93}Zr	1.293×10^4	2.750×10^4	4.366×10^4	6.131×10^4
^{60}Co	5.787×10^3	2.598×10^4	6.308×10^4	1.185×10^5
$^{93\text{m}}\text{Nb}$	4.887×10^3	1.111×10^4	1.870×10^4	2.762×10^4
^{54}Mn	2.271×10^3	2.966×10^3	3.359×10^3	3.667×10^3
Total	1.299×10^7	2.222×10^7	2.921×10^7	3.478×10^7

Table 3 The radioactivation calculation results of Zirlo for various burn-ups of 30, 45, 60, and 75 GWD/MTU (only major nuclides are shown)

	30 GWD/ MTU (Bq/g)	45 GWD/ MTU (Bq/g)	60 GWD/ MTU (Bq/g)	75 GWD/ MTU (Bq/g)
$^{93\text{m}}\text{Nb}$	1.562×10^7	3.191×10^7	4.854×10^7	6.532×10^7
^{125}Sb	6.642×10^6	1.137×10^7	1.487×10^7	1.758×10^7
$^{125\text{m}}\text{Te}$	1.622×10^6	2.776×10^6	3.631×10^6	4.294×10^6
^{55}Fe	9.344×10^5	1.608×10^6	2.158×10^6	2.631×10^6
^{94}Nb	5.459×10^5	1.116×10^6	1.691×10^6	2.256×10^6
$^{119\text{m}}\text{Sn}$	1.868×10^5	2.422×10^5	2.756×10^5	3.036×10^5
$^{121\text{m}}\text{Sn}$	4.802×10^4	9.893×10^4	1.515×10^5	2.045×10^5
^{121}Sn	3.727×10^4	7.678×10^4	1.175×10^5	1.586×10^5
^{93}Zr	1.287×10^4	2.736×10^4	4.345×10^4	6.101×10^4
^{60}Co	2.894×10^3	1.298×10^4	3.153×10^4	5.923×10^4
Total	2.564×10^7	4.925×10^7	7.151×10^7	9.288×10^7

Table 4 The radioactivation calculation results of HANA-4 for various burn-ups of 30, 45, 60, and 75 GWD/MTU (only major nuclides are shown)

	30 GWD/ MTU (Bq/g)	45 GWD/ MTU (Bq/g)	60 GWD/ MTU (Bq/g)	75 GWD/ MTU (Bq/g)
$^{93\text{m}}\text{Nb}$	2.341×10^7	4.787×10^7	7.281×10^7	9.519×10^7
^{125}Sb	2.656×10^6	4.547×10^6	5.947×10^6	6.689×10^6
^{55}Fe	1.868×10^6	3.217×10^6	4.316×10^6	4.999×10^6
^{94}Nb	8.188×10^5	1.675×10^6	2.539×10^6	3.316×10^6
$^{125\text{m}}\text{Te}$	6.488×10^5	1.110×10^6	1.452×10^6	1.634×10^6
$^{119\text{m}}\text{Sn}$	7.471×10^4	9.688×10^4	1.102×10^5	1.100×10^5
$^{121\text{m}}\text{Sn}$	1.921×10^4	3.957×10^4	6.056×10^4	7.984×10^4
^{121}Sn	1.491×10^4	3.072×10^4	4.700×10^4	6.196×10^4
^{93}Zr	1.286×10^4	2.733×10^4	4.340×10^4	5.947×10^4
^{60}Co	5.787×10^3	2.598×10^4	6.308×10^4	1.113×10^5
Total	2.954×10^7	5.864×10^7	8.738×10^7	1.123×10^8

Table 5 The radioactivation calculation results of HANA-6 for various burn-ups of 30, 45, 60, and 75 GWD/MTU (only major nuclides are shown)

	30 GWD/ MTU (Bq/g)	45 GWD/ MTU (Bq/g)	60 GWD/ MTU (Bq/g)	75 GWD/ MTU (Bq/g)
$^{93\text{m}}\text{Nb}$	1.717×10^7	3.511×10^7	5.339×10^7	7.186×10^7
^{94}Nb	6.005×10^5	1.228×10^6	1.861×10^6	2.483×10^6
^{63}Ni	7.658×10^4	1.601×10^5	2.477×10^5	3.375×10^5
^{93}Zr	1.299×10^4	2.762×10^4	4.387×10^4	6.160×10^4
^{60}Co	9.138×10^3	1.726×10^4	2.444×10^4	3.078×10^4
^{90}Y	1.110×10^2	4.851×10^2	1.200×10^3	2.336×10^3
^{90}Sr	1.109×10^2	4.849×10^2	1.199×10^3	2.336×10^3
^{91}Nb	7.403×10^0	1.661×10	2.759×10	4.041×10
^{65}Zn	4.911×10^0	1.513×10	2.968×10	4.861×10
^{99}Tc	8.250×10^{-1}	7.693	2.971×10	7.920×10
Total	1.787×10^7	3.655×10^7	5.558×10^7	7.477×10^7

Fig. 1 Comparison of radioactivity of (a) ^{94}Nb and (b) ^{60}Co for various cladding materials and fuel burn-ups