

RADIATION SAFETY DIRECTORATE

Pursuant to Article 26-e, paragraph 1, item 19 of the Law on Ionising Radiation Protection and Radiation Safety (Official Gazette of the Republic of Macedonia No. 48/02 and 135/07), the Director of the Radiation Safety Directorate hereby adopts a

RULEBOOK ON THE CRITERIA FOR EXEMPTION OF AN IONISING RADIATION SOURCE AND FOR RELEASE OF THE EXPOSURE TO A DETERMINED SOURCE FROM CONTROL

I. General provisions

Article 1

This Rulebook shall prescribe the criteria for exemption of an ionising radiation source and for release of the exposure to a determined source from control.

Article 2

The provisions of this Rulebook shall not refer to radionuclides in building materials, potable water, food, feed and any material used as food or feed, as well as to the transport of radioactive materials.

In addition, the provisions of this Rulebook shall not refer to electrical apparatuses which do not have parts operating at a voltage higher than 5 kV.

Article 3

The criteria for exemption of ionising radiation sources shall not refer to sources whose use is not justified in accordance with the regulations governing the protection against ionising radiation and radiation safety.

II. Criteria for exemption of an ionising radiation source

Article 4

An ionising radiation source may be exempted from the procedure of issuing a permit for performing an activity, if the following requirements are met:

- the effective dose of an individual's exposure occurring as a result of the exempted ionising radiation source does not exceed 10 μ Sv per year;
- the collective effective dose does not exceed 1 person-Sv per year, and
- the optimisation assessment demonstrates that the exemption is the optimal solution.

Article 5

Radionuclides used in a certain activity with ionising radiation sources shall be exempted from the procedure of issuing a permit for performing an activity if the activity and the activity per unit mass (hereinafter referred to as: activity concentration) do not exceed the activity values and/or the activity concentration (hereinafter referred to as: exemption levels) listed in Table 1 of Appendix 1, which is a constituent part of this Rulebook.

The exemption levels referred to in paragraph 1 of this Article shall not apply to materials

weighing up to one ton.

Article 6

The exemption of an ionising radiation source from the procedure of issuing a permit for performing an activity shall be also applied in cases including the following sources:

1. An apparatus containing radioactive substances exceeding the exemption levels set out in Appendix 1 of this Rulebook, where:

- it has been constructed in the form of a sealed ionising radiation source;
- the equivalent dose rate under normal operating conditions does not exceed 1 µSv/h at a distance of 0,1 m from any accessible surface of the apparatus; and
- the necessary conditions have been provided for releasing and/or disposal of the radioactive substances in accordance with the regulations governing the protection against ionising radiation and radiation safety; or

2. Any cathode ray tube intended for the display of visual images or other electrical apparatus operating at a maximum voltage of 30 kV, providing that this operation does not exceed, under normal operating conditions, the rate of an ambient dose equivalent $H^*(10)$ and a directional dose equivalent $H'(0,07; \Omega)$ of 1 µSv/h at a distance of 0,1 m from any accessible surface of the apparatus; or

3. Any other apparatus generating ionising radiation other than those described in points 1 and 2 of this Article providing that the equivalent dose rate, under normal operating conditions, does not exceed 1 µSv/h at a distance of 0,1 m from any accessible surface of the apparatus; or

4. Material contaminated with radioactive substances resulting from authorised releases in accordance with the regulations governing the protection against ionising radiation and radiation safety.

Article 7

The exemption levels for natural radioactive sources expressed as activity concentrations shall be set out in the table attached in Appendix 2, which is a constituent part of this Rulebook.

In the case of a mixture of natural radioactive sources, the activity concentration for each radioactive source shall be smaller than the exemption levels set out in the table referred to in paragraph 1 of this Article.

Article 8

The exemption levels for materials with a mass exceeding one ton and containing artificial radionuclides, expressed as activity concentration, shall be set out in the table referred to in Appendix 3, which is a constituent part of this Rulebook.

Article 9

A mixture of several artificial radionuclides shall be exempted from the procedure of issuing a permit for performing an activity if the following requirements are met:

$$\sum_k \frac{C_k}{C_{E,k}} \leq 1,$$

or

$$\sum_k \frac{A_k}{A_{E,k}} \leq 1$$

where A_k is the activity of radionuclide k , $A_{E,k}$ is the exemption level for radionuclide k , C_k is the activity concentration of radionuclide k , and $C_{E,k}$ is the exemption level of radionuclide k .

Article 10

The provisions of Article 7 paragraph 2 and Article 9 of this Rulebook shall apply to mixtures of natural and artificial radionuclides.

Article 11

When determining the criteria for exemption levels, the appearance of radionuclides which are in secular equilibrium with the parent short-lived radionuclide shall also be taken into consideration.

The list of radioactive short-lived nuclides shall be set out in Table 2 referred to in Appendix 1, which is a constituent part of this Rulebook.

The exemption levels for radionuclides not included in Appendix 1 of this Rulebook shall be determined by the Radiation Safety Directorate.

III. Release of the exposure to a determined source from control

Article 12

The exposure to the following sources shall be released from control:

- K-40 in the human body;
- cosmic radiation prevailing at ground level, and
- unchanged concentrations of radionuclides in unprocessed materials.

IV. Final provision

Article 13

This Rulebook shall enter into force on the eighth day from the date of its publication in the Official Gazette of the Republic of Macedonia.

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2 December 2009

Skopje

Director,
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APPENDIX 1
Exemption levels

The exemption levels for radionuclides carrying the suffix '+' in the first column of Table 1 of this Appendix shall not only refer to the parent radionuclide, but also to the parent radionuclides in secular equilibrium with their correspondent short-lived daughter radionuclides. Parent radionuclides and their short-lived daughter radionuclides shall be listed in Table 2 of this Appendix.

Table 1. Exemption levels for radionuclides of materials weighing up to one ton

Nuclide	Activity [Bq]	Activity concentration [kBq/kg]	Nuclide	Activity [Bq]	Activity concentration [kBq/kg]
H-3	10 ⁹	10 ⁶	Mn-51	10 ⁵	10
Be-7	10 ⁷	10 ³	Mn-52	10 ⁵	10
C-14	10 ⁷	10 ⁴	Mn-52m	10 ⁵	10
O-15	10 ⁹	10 ²	Mn-53	10 ⁹	10 ⁴
F-18	10 ⁶	10	Mn-54	10 ⁶	10
Na-22	10 ⁶	10	Mn-56	10 ⁵	10
Na-24	10 ⁵	10	Fe-52	10 ⁶	10
Si-31	10 ⁶	10 ³	Fe-55	10 ⁶	10 ⁴
P-32	10 ⁵	10 ³	Fe-59	10 ⁶	10
P-33	10 ⁸	10 ⁵	Co-55	10 ⁶	10
S-35	10 ⁸	10 ⁵	Co-56	10 ⁵	10
Cl-36	10 ⁶	10 ⁴	Co-57	10 ⁶	10 ²
Cl-38	10 ⁵	10	Co-58	10 ⁶	10
Ar-37	10 ⁸	10 ⁶	Co-58m	10 ⁷	10 ⁴
Ar-41	10 ⁹	10 ²	Co-60	10 ⁵	10
K-40	10 ⁶	10 ²	Co-60m	10 ⁶	10 ³
K-42	10 ⁶	10 ²	Co-61	10 ⁶	10 ²
K-43	10 ⁶	10	Co-62m	10 ⁵	10
Ca-45	10 ⁷	10 ⁴	Ni-59	10 ⁸	10 ⁴
Ca-47	10 ⁶	10	Ni-63	10 ⁸	10 ⁵
Sc-46	10 ⁶	10	Ni-65	10 ⁶	10
Sc-47	10 ⁶	10 ²	Cu-64	10 ⁶	10 ²
Sc-48	10 ⁵	10	Zn-65	10 ⁶	10
V-48	10 ⁵	10	Zn-69	10 ⁶	10 ⁴
Cr-51	10 ⁷	10 ³	Zn-69m	10 ⁶	10 ²

Nuclide	Activity [Bq]	Activity concentration [kBq/kg]
Ga-67	10^6	10^2
Ga-72	10^5	10
Ge-71	10^8	10^4
As-73	10^7	10^3
As-74	10^6	10
As-76	10^5	10^2
As-77	10^6	10^3
Se-75	10^6	10^2
Br-82	10^6	10
Kr-74	10^9	10^2
Kr-76	10^9	10^2
Kr-77	10^9	10^2
Kr-79	10^5	10^3
Kr-81	10^7	10^4
Kr-83m	10^{12}	10^5
Kr-85	10^4	10^5
Kr-85m	10^{10}	10^3
Kr-87	10^9	10^2
Kr-88	10^9	10^2
Rb-86	10^5	10^2
Sr-85	10^6	10^2
Sr-85m	10^7	10^2
Sr-87m	10^6	10^2
Sr-89	10^6	10^3
Sr-90 +	10^4	10^2
Sr-91	10^5	10
Sr-92	10^6	10
Y-88	10^6	10^2
Y-90	10^5	10^3
Y-91	10^6	10^3
Y-91m	10^6	10^2
Y-92	10^5	10^2
Y-93	10^5	10^2
Zr-93 +	10^7	10^3
Zr-95	10^6	10
Zr-97 +	10^5	10

Nuclide	Activity [Bq]	Activity concentration [kBq/kg]
Nb-93m	10^7	10^4
Nb-94	10^6	10
Nb-95	10^6	10
Nb-97	10^6	10
Nb-98	10^5	10
Mo-90	10^6	10
Mo-93	10^8	10^3
Mo-99	10^6	10^2
Mo-101	10^6	10
Tc-96	10^6	10
Tc-96m	10^7	10^3
Tc-97	10^8	10^3
Tc-97m	10^7	10^3
Tc-99	10^7	10^4
Tc-99m	10^7	10^2
Ru-97	10^7	10^2
Ru-103	10^6	10^2
Ru-105	10^6	10
Ru-106 +	10^5	10^2
Rh-103m	10^8	10^4
Rh-105	10^7	10^2
Pd-103	10^8	10^3
Pd-109	10^6	10^3
Ag-105	10^6	10^2
Ag-108m +	10^6	10
Ag-110m	10^6	10
Ag-111	10^6	10^3
Cd-109	10^6	10^4
Cd-115	10^6	10^2
Cd-115m	10^6	10^3
In-111	10^6	10^2
In-113m	10^6	10^2
In-114m	10^6	10^2
In-115m	10^6	10^2
Sn-113	10^7	10^3
Sn-125	10^5	10^2

Nuclide	Activity [Bq]	Activity concentration [kBq/kg]
Sb-122	10 ⁴	10 ²
Sb-124	10 ⁶	10
Sb-125	10 ⁶	10 ²
Te-123m	10 ⁷	10 ²
Te-125m	10 ⁷	10 ³
Te-127	10 ⁶	10 ³
Te-127m	10 ⁷	10 ³
Te-129	10 ⁶	10 ²
Te-129m	10 ⁶	10 ³
Te-131	10 ⁵	10 ²
Te-131m	10 ⁶	10
Te-132	10 ⁷	10 ²
Te-133	10 ⁵	10
Te-133m	10 ⁵	10
Te-134	10 ⁶	10
I-123	10 ⁷	10 ²
I-125	10 ⁶	10 ³
I-126	10 ⁶	10 ²
I-129	10 ⁵	10 ²
I-130	10 ⁶	10
I-131	10 ⁶	10 ²
I-132	10 ⁵	10
I-133	10 ⁶	10
I-134	10 ⁵	10
I-135	10 ⁶	10
Xe-131m	10 ⁴	10 ⁴
Xe-133	10 ⁴	10 ³
Xe-135	10 ¹⁰	10 ³
Cs-129	10 ⁵	10 ²
Cs-131	10 ⁶	10 ³
Cs-132	10 ⁵	10
Cs-134m	10 ⁵	10 ³
Cs-134	10 ⁴	10
Cs-135	10 ⁷	10 ⁴
Cs-136	10 ⁵	10
Cs-137 +	10 ⁴	10

Nuclide	Activity [Bq]	Activity concentration [kBq/kg]
Cs-138	10 ⁴	10
Ba-131	10 ⁶	10 ²
Ba-133	10 ⁵	10 ²
Ba-140 +	10 ⁵	10
La-140	10 ⁵	10
Ce-139	10 ⁶	10 ²
Ce-141	10 ⁷	10 ²
Ce-143	10 ⁶	10 ²
Ce-144 +	10 ⁵	10 ²
Pr-142	10 ⁵	10 ²
Pr-143	10 ⁶	10 ⁴
Nd-147	10 ⁶	10 ²
Nd-149	10 ⁶	10 ²
Pm-147	10 ⁷	10 ⁴
Pm-149	10 ⁶	10 ³
Sm-151	10 ⁸	10 ⁴
Sm-153	10 ⁶	10 ²
Eu-152	10 ⁶	10
Eu-152m	10 ⁶	10 ²
Eu-154	10 ⁶	10
Eu-155	10 ⁷	10 ²
Gd-153	10 ⁷	10 ²
Gd-159	10 ⁶	10 ³
Tb-160	10 ⁶	10
Dy-165	10 ⁶	10 ³
Dy-166	10 ⁶	10 ³
Ho-166	10 ⁵	10 ³
Er-169	10 ⁷	10 ⁴
Er-171	10 ⁶	10 ²
Tm-170	10 ⁶	10 ³
Tm-171	10 ⁸	10 ⁴
Yb-169	10 ⁶	10 ³
Yb-175	10 ⁷	10 ³
Lu-177	10 ⁷	10 ³
Hf-181	10 ⁶	10
Ta-182	10 ⁴	10

Nuclide	Activity [Bq]	Activity concentration [kBq/kg]
W-181	10^7	10^3
W-185	10^7	10^4
W-187	10^6	10^2
Re-186	10^6	10^3
Re-188	10^5	10^2
Os-185	10^6	10
Os-191	10^7	10^2
Os-191m	10^7	10^3
Os-193	10^6	10^2
Ir-190	10^6	10
Ir-192	10^4	10
Ir-194	10^5	10^2
Pt-191	10^6	10^2
Pt-193m	10^7	10^3
Pt-197	10^6	10^3
Pt-197m	10^6	10^2
Au-198	10^6	10^2
Au-199	10^6	10^2
Hg-197	10^7	10^2
Hg-197m	10^6	10^2
Hg-203	10^5	10^2
Tl-200	10^6	10
Tl-201	10^6	10^2
Tl-202	10^6	10^2
Tl-204	10^4	10^4
Pb-203	10^6	10^2
Pb-210 +	10^4	10
Pb-212 +	10^5	10
Bi-206	10^5	10
Bi-207	10^6	10
Bi-210	10^6	10^3
Bi-212 +	10^5	10
Po-203	10^6	10
Po-205	10^6	10
Po-207	10^6	10
Po-210	10^4	10

Nuclide	Activity [Bq]	Activity concentration [kBq/kg]
At-211	10^7	10^3
Rn-220 +	10^7	10^4
Rn-222 +	10^8	10
Ra-223 +	10^5	10^2
Ra-224 +	10^5	10
Ra-225	10^5	10^2
Ra-226 +	10^4	10
Ra-227	10^6	10^2
Ra-228 +	10^5	10
Ac-228	10^6	10
Th-226 +	10^7	10^3
Th-227	10^4	10
Th-228 +	10^4	1
Th-229 +	10^3	1
Th-230	10^4	1
Th-231	10^7	10^3
Natural Th +	10^3	1
Th-234	10^5	10^3
Pa-230	10^6	10
Pa-231	10^3	1
Pa-233	10^7	10^2
U-230 +	10^5	10
U-231	10^7	10^2
U-232 +	10^3	1
U-233	10^4	10
U-234	10^4	10
U-235 +	10^4	10
U-236	10^4	10
U-237	10^6	10^2
U-238 +	10^4	10
Natural U +	10^3	1
U-239	10^6	10^2
U-240	10^7	10^3
U-240 +	10^6	10
Np-237 +	10^3	1
Np-239	10^7	10^2

Nuclide	Activity [Bq]	Activity concentration [kBq/kg]
Np-240	10^6	10
Pu-234	10^7	10^2
Pu-235	10^7	10^2
Pu-236	10^4	10
Pu-237	10^7	10^3
Pu-238	10^4	1
Pu-239	10^4	1
Pu-240	10^3	1
Pu-241	10^5	10^2
Pu-242	10^4	1
Pu-243	10^7	10^3
Pu-244	10^4	1
Am-241	10^4	1
Am-242	10^6	10^3
Am-242m +	10^4	1
Am-243 +	10^3	1
Cm-242	10^5	10^2
Cm-243	10^4	1
Cm-244	10^4	10
Cm-245	10^3	1
Cm-246	10^3	1
Cm-247	10^4	1
Cm-248	10^3	1
Bk-249	10^6	10^3
Cf-246	10^6	10^3
Cf-248	10^4	10
Cf-249	10^3	1
Cf-250	10^4	10
Cf-251	10^3	1
Cf-252	10^4	10
Cf-253	10^5	10^2
Cf-254	10^3	1
Es-253	10^5	10^2
Es-254	10^4	10
Es-254m	10^6	10^2
Fm-254	10^7	10^4

Nuclide	Activity [Bq]	Activity concentration [kBq/kg]
Fm-255	10^6	10^3

Table 2. List of parent and short-lived daughter radionuclides

Parent Nuclide	Daughter nuclides in secular equilibrium with the parent radionuclide
Sr-90	Y-90
Zr-93	Nb-93m
Zr-97	Nb-97
Ru-106	Rh-106
Ag-108m	Ag-108
Cs-137	Ba-137m
Ba-140	La-140
Ce-134	La-134
Ce-144	Pr-144
Pb-210	Bi-210, Po-210
Bi-212	Tl-208 (0.36), Po-212 (0.64)
Pb-212	Bi-212, Tl-208 (0.36), Po-212 (0.64)
Rn-220	Po-216
Rn-222	Po-218, Pb-214, Bi-214, Po-214
Ra-223	Rn-219, Po-215, Pb-211, Bi-211, Tl-207
Ra-224	Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Ra-226	Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
Ra-228	Ac-228
Th-226	Ra-222, Rn-218, Po-214
Th-228	Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Th-229	Ra-225, Ac-225, Fr-221, At-217, Bi-213, Po-213, Pb-209
Natural Th	Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Po- Tl-208 (0.36), 212(0.64)
Th-234	Pa-234m
U-230	Th-226, Ra-222, Rn-218, Po-214
U-232	Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
U-235	Th-231
U-238	Th-234, Pa-234m
Natural U	Th-234, Pa-234m, U-234, Th-230, Ra-226, Rn-222, Po-218, Pb-214, Bi- 214, Po-214, Pb-210, Bi-210, Po-210
U-240	Np-240m
Np-237	Pa-233
Am-242m	Am-242
Am-243	Np-239

APPENDIX 2

Table: Exemption levels expressed as activity concentrations for natural radionuclides

Radionuclide	Activity concentration (Bq/g)
K-40	10
All remaining natural radionuclides	1

APPENDIX 3

Exemption levels expressed as activity concentrations of artificial radionuclides for materials whose weight exceeds one ton

The exemption levels for radionuclides carrying the suffix '+' in Table 1 of this Appendix shall not only refer to the parent radionuclide, but also to the parent radionuclide in secular equilibrium with their correspondent short-lived daughter radionuclides. The parent and their short-lived daughter radionuclides are listed in Table 2 of Appendix 1 of this Rulebook.

Table

Nuclide	Activity concentration [kBq/kg]
H-3	100
Be-7	10
C-14	1
F-18	10*
Na-22	0.1
Na-24	1*
Si-31	1000*
P-32	1000
P-33	1000
S-35	100
Cl-36	1
Cl-38	10*
K-42	100
K-43	10*
Ca-45	100
Ca-47	10
Sc-46	0.1
Sc-47	100
Sc-48	1
V-48	1
Cr-51	100
Mn-51	10*
Mn-52	1

Nuclide	Activity concentration [kBq/kg]
Mn-52m	10*
Mn-53	100
Mn-54	0.1
Mn-56	10*
Fe-52	10*
Fe-55	1000
Fe-59	1
Co-55	10*
Co-56	0.1
Co-57	1
Co-58	1
Co-58m	10000 *
Co-60	0.1
Co-60m	1000*
Co-61	100*
Co-62m	10*
Ni-59	100
Ni-63	100
Ni-65	10*
Cu-64	100*
Zn-65	0.1
Zn-69	1000*
Zn-69m	10*
Ga-72	10*
Ge-71	10000
As-73	1000
As-74	10*
As-76	10*
As-77	1000
Se-75	1
Br-82	1
Rb-86	100
Sr-85	1
Sr-85m	100*
Sr-87m	100*
Sr-89	1000

Nuclide	Activity concentration [kBq/kg]
Sr-90 +	1
Sr-91	10*
Sr-92	10*
Y-90	1000
Y-91	100
Y-91m	100*
Y-92	100*
Y-93	100*
Zr-93 +	10*
Zr-95	1
Zr-97 +	10*
Nb-93m	10
Nb-94	0.1
Nb-95	1
Nb-97	10*
Nb-98	10*
Mo-90	10*
Mo-93	10
Mo-99	10
Mo-101	10*
Tc-96	1
Tc-96m	1000*
Tc-97	10
Tc-97m	100
Tc-99	1
Tc-99m	100*
Ru-97	10
Ru-103	1
Ru-105	10*
Ru-106 +	0.1
Rh-103m	10000*
Rh-105	100
Pd-103	1000
Pd-109	100
Ag-105	1
Ag-110m	0.1

Nuclide	Activity concentration [kBq/kg]
Ag-111	100
Cd-109	1
Cd-115	10
Cd-115m	100
In-111	10
In-113m	100*
In-114m	10
In-115m	100*
Sn-113	1
Sn-125	10
Sb-122	10
Sb-124	1
Sb-125	0.1
Te-123m	1
Te-125m	1000
Te-127	1000
Te-127m	10
Te-129	100*
Te-129m	10
Te-131	100*
Te-131m	10
Te-132	1
Te-133	10*
Te-133m	10*
Te-134	10*
I-123	100
I-125	100
I-126	10
I-129	0.01
I-130	10*
I-131	10
I-132	10*
I-133	10*
I-134	10*
I-135	10*
Cs-129	10

Nuclide	Activity concentration [kBq/kg]
Cs-131	1000
Cs-132	10
Cs-134m	1000*
Cs-134	0.1
Cs-135	100
Cs-136	1
Cs-137 +	0.1
Cs-138	10
Ba-131	10
Ba-140 +	1
La-140	1
Ce-139	1
Ce-141	100
Ce-143	10
Ce-144 +	10
Pr-142	100*
Pr-143	1000
Nd-147	100
Nd-149	100*
Pm-147	1000
Pm-149	1000
Sm-151	1000
Sm-153	100
Eu-152	0.1
Eu-152m	100*
Eu-154	0.1
Eu-155	1
Gd-153	10
Gd-159	100*
Tb-160	1
Dy-165	1000*
Dy-166	100
Ho-166	100
Er-169	1000
Er-171	100*
Tm-170	100

Nuclide	Activity concentration [kBq/kg]
Tm-171	1000
Yb-175	100
Lu-177	100
Hf-181	1
Ta-182	0.1
W-181	10
W-185	1000
W-187	10
Re-186	1000
Re-188	100*
Os-185	1
Os-191	100
Os-191m	1000*
Os-193	100
Ir-190	1
Ir-192	1
Ir-194	100*
Pt-191	10
Pt-193m	1000
Pt-197	1000*
Pt-197m	100*
Au-198	10
Au-199	100
Hg-197	100
Hg-197m	100
Hg-203	10
Tl-200	10
Tl-201	100
Tl-202	10
Tl-204	1
Pb-203	10
Bi-206	1
Bi-207	0.1
Po-203	10*
Po-205	10*
Po-207	10*

Nuclide	Activity concentration [kBq/kg]
At-211	1000
Ra-225	10
Ra-227	100
Th-226 +	1000
Th-229 +	0.1
Pa-230	10
Pa-233	10
U-230 +	10
U-231	100
U-232 +	0.1
U-233	1
U-236	10
U-237	100
U-239	100*
U-240	100*
Np-237 +	1
Np-239	100
Np-240	10*
Pu-234	100*
Pu-235	100*
Pu-236	1
Pu-237	100
Pu-238	0.1
Pu-239	0.1
Pu-240	0.1
Pu-241	10
Pu-242	0.1
Pu-243	1000*
Pu-244	0.1
Am-241	0.1
Am-242	1000*
Am-242m +	0.1
Am-243 +	0.1
Cm-242	10
Cm-243	1
Cm-244	1

Nuclide	Activity concentration [kBq/kg]
Cm-245	0.1
Cm-246	0.1
Cm-247	0.1
Cm-24S	0.1
Bk-249	100
Cf-246	1000
Cf-24S	1
Cf-249	0.1
Cf-250	1
Cf-251	0.1
Cf-252	1
Cf-253	100
Cf-254	1
Es-253	100
Es-254	0.1
Es-254m	10
Fm-254	10000 *
Fm-255	100*

* Half-life shorter than 1 day.