



परमाणु
ऊर्जा
नियामक
परिषद



Atomic
Energy
Regulatory
Board



अध्यक्ष
CHAIRMAN

भारत सरकार
GOVERNMENT OF INDIA

No.CH/AERB/SD/44/2021/48

December 7, 2021

AERB Directive No. 01/2021

Subject: Radiation Substance or Material

In exercise of the powers conferred by the Government of India, Department of Atomic Energy notification no. S.O.503 (E) dated 2nd February 2021, this directive is made to specify radioactivity levels in substance or material deemed to be a ‘radioactive substance or radioactive material’.

Any “radioactive substance” or “radioactive material” shall, subject to the regulatory conditions hereinafter mentioned, mean any substance or material with activity concentration of artificial radionuclides in excess of 0.01 Bq/g or for any naturally occurring radionuclides of ^{238}U or ^{232}Th decay series greater than 1 Bq/g or the activity concentration of ^{40}K greater than 10 Bq/g.

Regulatory Conditions

1. A source within a justified practice may be exempted from treatment as radioactive if under all reasonably foreseeable circumstances the effective dose expected to be incurred by any individual (normally evaluated on the basis of a safety assessment), owing to the exempt practice or the exempt source within the practice, is of the order of $10 \mu\text{Sv}$ or less in a year and, for scenarios which are of low probability as determined by the Atomic Energy Regulatory Board (hereinafter referred to as ‘AERB’), the effective dose expected to be incurred by any individual does not exceed 1 mSv in a year. Such determination accorded in respect of a source /material or equipment may be revoked or revised by AERB based on safety considerations.



नियामक भवन, अनुशक्ति नगर, मुंबई - 400 094
NIYAMAK BHAVAN, ANUSHAKTI NAGAR, MUMBAI - 400 094

Page 1 of 22

दूरभाष / TELEPHONE : 91-22-2556 2343, 2599 0604
फैक्स / FAX : 91-22-2556 2344, 2556 5717, 2558 3230
E-mail: chairman@aerb.gov.in
वेबसाइट / WEBSITE : www.aerb.gov.in

2. Any radioactive substance or material with either activity concentration or total activity content of an individual radionuclide not exceeding the values specified in Table-I (for Moderate Amounts of Material) and Table-II (for Bulk Amounts of solid material) hereunder shall be referred as generic exemption levels and are exempted from treatment as radioactive. Such substance or material exceeding the generic exemption levels, may be exempted from treatment as radioactive if it is demonstrated that the dose criteria specified hereinabove are met and shall be referred as specific exemption. For radionuclides of natural origin specific exemption of bulk amounts of material shall necessarily be considered on a case to case basis by using an effective dose criterion of the order of 1 mSv in a year, commensurate with typical doses due to natural background levels of radiation. Specific exemption of liquids and gases in bulk amounts and surface-contaminated commodities will be decided by AERB on case by case basis.
3. Mixtures/aggregates of radioactive substance or material would qualify for exemption provided the sum of the activity/activity concentration value of each of the radionuclides in the mixture/aggregate taken as a fraction of the corresponding generic exemption levels does not exceed unity. If in case of bulk amounts of solid materials with a mixture of natural and artificial radionuclides, this summation rule cannot be applied, exemption will be decided on a case by case basis based on safety assessment.
4. Radioactive substance or material which is under regulatory control may be cleared from the application of any further regulatory control provided that:
 - a) The activity concentration of an individual radionuclide of artificial origin in solid form does not exceed the relevant level given in Table II; or
 - b) The activity concentrations of radionuclides of natural origin do not exceed activity concentration of less than 1 Bq/g of radionuclides in the uranium decay chain or thorium decay chain and of less than 10 Bq/g of K-40; or
 - c) For radionuclides of natural origin in residues that might be recycled into construction materials, or the disposal of which is liable to cause contamination of drinking water supplies, it shall be demonstrated that the assessed individual dose due to the activity concentration in the residues would be of the order of 1 mSv in a year, which is commensurate with typical doses due to natural background levels of radiation.
 - d) It shall be demonstrated that under all reasonably foreseeable circumstances, the effective dose expected to be incurred by any individual (normally evaluated on the basis of a safety assessment) owing to the cleared material is of the order of 10 μ Sv or less in a year and for scenarios which are of low probability as determined by AERB, the effective dose expected to be incurred by any individual for such low probability scenarios does not exceed 1 mSv in a year.
5. If a material or waste contains more than one radionuclide of artificial origin, its clearance from regulatory control shall be in the following manner –
 - a) If a material or waste contains more than one radionuclide of artificial origin, its clearance may be permitted, provided the sum of the activity concentration value of each radionuclide present in the mixture/aggregate taken as a fraction of the corresponding generic clearance levels does not exceed unity.

परमाणु ऊर्जा नियामक परिषद

Atomic Energy Regulatory Board

- b) If a material or waste contains more than one radionuclide of natural origin, the sum of fractions approach is not appropriate. In such cases, if each radionuclide of natural origin is less than or equal to the clearance level specified, then the material can be cleared. However, radionuclides of natural origin that arise as a result of a practice are treated in the same way as artificial radionuclides.
- c) If a material or waste contains a mixture of radionuclides of natural origin and radionuclides of artificial origin, the radionuclides of artificial origin in the waste or material will be considered separately from the radionuclides of natural origin when making a decision as to whether the waste can be cleared.

For the sake of removal of doubts, it is hereby clarified that -

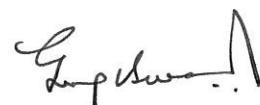
- a) Clearance shall not be automatic and has to be applied for.
- b) Clearance is used in relation to materials, waste and movable objects, while for removal from regulatory control of buildings and sites, the term "release from regulatory control" is used which is based on different radiological criteria.
- c) Release of materials, objects or items (non-radioactive and non-contaminated material, object or items within an authorized practice that become or may gradually become radioactive or surface contaminated during the operation of the activities within that practice) either during the execution of the practice or after its discontinuation, will continue to remain under regulatory control unless it is demonstrated that they qualify for clearance.
- d) The clearance levels do not apply to waste disposal except that in the case of decommissioning, certain wastes may be cleared as per the clearance levels.
- e) Clearance is applicable in planned exposure situations. It is also applicable to management of material originating from remediation activities or from post-emergency situations. If the concept of clearance is applied to material arising from such situations, it shall be demonstrated that the assessed individual dose due to the activity concentration in the material would be of the order of 1 mSv in a year;
- f) Levels specified in Table II also serve as the basis for clearance of liquids, provided that concentration or filtration processes may not occur with the cleared liquids.
- g) Conditional clearance of liquids and gases may be granted on a case to case basis.
- h) Clearance levels referred hereinabove may also be applied for the clearance of materials arising from practices provided individual effective dose would not exceed 10 μSv in a year and for scenarios which are of low probability as determined by AERB, the effective dose expected to be incurred by any individual does not exceed 1 mSv in a year, pending establishment of radionuclide specific values for the radionuclides of natural origin.
- i) For small quantities of material, or for other situations where the assumptions for the generic derivation of clearance levels do not apply, a case by case approach can be used.
- j) Clearance of contaminated metal would need to be addressed on a case by case basis.

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board

6. CAVEAT:

- 1) The recommended levels of activity concentration for exemption stipulated herein shall not apply to the following:
 - (a) Foodstuffs, drinking water, animal feed and any material intended for use in food or animal feed;
 - (b) Radon in air, as action levels for the indoor concentration of radon;
 - (c) Potassium-40 in the body;
 - (d) Material in transport;
 - (e) Control of radioactive discharges of liquid and airborne effluents from authorized practices, or to radioactive residues in the environment.
 - (f) management of cadavers incorporated with radioactive substance or materials.
- 2) AERB shall be promptly informed about exempt practices or sources within such practices in case modifications or any changes are introduced that could affect the exemption conditions.
- 3) Deliberate dilution of material for the purpose of meeting the exemption levels for moderate or bulk amount of materials shall not be carried out without prior approval of AERB. In the case of conditional clearance, mixing with clean material may be stipulated as part of the condition.
- 4) Any radioactive material irrespective of meeting the criteria for exemption and clearance, if notified as prescribed substance, additionally attracts the provisions of the Atomic Energy Act, 1962 and the relevant rules issued thereunder. Further, nothing in this Directive shall be construed to be exemption from any applicable non-radiological regulatory controls.

This directive shall come into effect from the date of its issuance and the substances/equipment which are hitherto under regulatory control and qualify for exemption will continue to remain under such control for the current validity period of the license.



[G.NAGESWARA RAO]

CHAIRMAN, ATOMIC ENERGY REGULATORY BOARD

गुंटूर नारेश्वर राव / G. NAGESWARA RAO

अध्यक्ष / Chairman

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board

પરમાણુ ઊર્જા નિયામક પરિષદ

Atomic Energy Regulatory Board

TABLE I. LEVELS FOR EXEMPTION OF MODERATE AMOUNTS OF MATERIAL WITHOUT FURTHER CONSIDERATION: EXEMPT ACTIVITY CONCENTRATIONS AND EXEMPT ACTIVITIES OF RADIONUCLIDES

"Moderate amount" refers to masses that "are at the most of the order of a tonne. However, one tonne is not a sacrosanct barrier delineating watertight compartments of bulk and moderate amounts. The phrase "of the order of" should be interpreted in a pragmatic way and moderate/ bulk will be determined based on value judgment.

Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)	Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)
Be-7	1×10^3	1×10^7		1×10^1	1×10^6
Be-10	1×10^4	1×10^6	Sc-47	1×10^2	1×10^6
C-11	1×10^1	1×10^6	Sc-48	1×10^1	1×10^5
C-14	1×10^4	1×10^7	Sc-49	1×10^3	1×10^5
N-13	1×10^2	1×10^9	Ti-44	1×10^1	1×10^5
Ne-19	1×10^2	1×10^9	Ti-45	1×10^1	1×10^6
O-15	1×10^2	1×10^9	V-47	1×10^1	1×10^5
F-18	1×10^1	1×10^6	V-48	1×10^1	1×10^5
Na-22	1×10^1	1×10^6	V-49	1×10^4	1×10^7
Na-24	1×10^1	1×10^5	Cr-48	1×10^2	1×10^6
Mg-28	1×10^1	1×10^5	Cr-49	1×10^1	1×10^6
Al-26	1×10^1	1×10^5	Cr-51	1×10^3	1×10^7
Si-31	1×10^3	1×10^6	Mn-51	1×10^1	1×10^5
Si-32	1×10^3	1×10^6	Mn-52	1×10^1	1×10^5
P-32	1×10^3	1×10^5	Mn-52m	1×10^1	1×10^5
P-33	1×10^5	1×10^8	Mn-53	1×10^4	1×10^9
S-35	1×10^5	1×10^8	Mn-54	1×10^1	1×10^6
Cl-36	1×10^4	1×10^6	Mn-56	1×10^1	1×10^5
Cl-38	1×10^1	1×10^5	Fe-52	1×10^1	1×10^6
Cl-39	1×10^1	1×10^5	Fe-55	1×10^4	1×10^6
Ar-37	1×10^6	1×10^8	Fe-59	1×10^1	1×10^6
Ar-39	1×10^7	1×10^4	Fe-60	1×10^2	1×10^5
Ar-41	1×10^2	1×10^9	Co-55	1×10^1	1×10^6
K-40	1×10^2	1×10^6	Co-56	1×10^1	1×10^5
K-42	1×10^2	1×10^6	Co-57	1×10^2	1×10^6
K-43	1×10^1	1×10^6	Co-58	1×10^1	1×10^6
K-44	1×10^1	1×10^5	Co-58m	1×10^4	1×10^7
K-45	1×10^1	1×10^5	Co-60	1×10^1	1×10^5
Ca-41	1×10^5	1×10^7	Co-60m	1×10^3	1×10^6
Ca-45	1×10^4	1×10^7	Co-61	1×10^2	1×10^6
Ca-47	1×10^1	1×10^6	Co-62m	1×10^1	1×10^5
Sc-43	1×10^1	1×10^6	Ni-56	1×10^1	1×10^6
Sc-44	1×10^1	1×10^5	Ni-57	1×10^1	1×10^6

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board

TABLE I. (cont.)

Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)	Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)
Ni-59	1×10^4	1×10^8	As-72	1×10^1	1×10^5
Ni-63	1×10^5	1×10^8	As-73	1×10^3	1×10^7
Ni-65	1×10^1	1×10^6	As-74	1×10^1	1×10^6
Ni-66	1×10^4	1×10^7	As-76	1×10^2	1×10^5
Cu-60	1×10^1	1×10^5	As-77	1×10^3	1×10^6
Cu-61	1×10^1	1×10^6	As-78	1×10^1	1×10^5
Cu-64	1×10^2	1×10^6	Se-70	1×10^1	1×10^6
Cu-67	1×10^2	1×10^6	Se-73	1×10^1	1×10^6
Zn-62	1×10^2	1×10^6	Se-73m	1×10^2	1×10^6
Zn-63	1×10^1	1×10^5	Se-75	1×10^2	1×10^6
Zn-65	1×10^1	1×10^6	Se-79	1×10^4	1×10^7
Zn-69	1×10^4	1×10^6	Se-81	1×10^3	1×10^6
Zn-69m	1×10^2	1×10^6	Se-81m	1×10^3	1×10^7
Zn-71m	1×10^1	1×10^6	Se-83	1×10^1	1×10^5
Zn-72	1×10^2	1×10^6	Br-74	1×10^1	1×10^5
Ga-65	1×10^1	1×10^5	Br-74m	1×10^1	1×10^5
Ga-66	1×10^1	1×10^5	Br-75	1×10^1	1×10^6
Ga-67	1×10^2	1×10^6	Br-76	1×10^1	1×10^5
Ga-68	1×10^1	1×10^5	Br-77	1×10^2	1×10^6
Ga-70	1×10^2	1×10^6	Br-80	1×10^2	1×10^5
Ga-72	1×10^1	1×10^5	Br-80m	1×10^3	1×10^7
Ga-73	1×10^2	1×10^6	Br-82	1×10^1	1×10^6
Ge-66	1×10^1	1×10^6	Br-83	1×10^3	1×10^6
Ge-67	1×10^1	1×10^5	Br-84	1×10^1	1×10^5
Ge-68 ^b	1×10^1	1×10^5	Kr-74	1×10^2	1×10^9
Ge-69	1×10^1	1×10^6	Kr-76	1×10^2	1×10^9
Ge-71	1×10^4	1×10^8	Kr-77	1×10^2	1×10^9
Ge-75	1×10^3	1×10^6	Kr-79	1×10^3	1×10^5
Ge-77	1×10^1	1×10^5	Kr-81	1×10^4	1×10^7
Ge-78	1×10^2	1×10^6	Kr-81m	1×10^3	1×10^{10}
As-69	1×10^1	1×10^5	Kr-83m	1×10^5	1×10^{12}
As-70	1×10^1	1×10^5	Kr-85	1×10^5	1×10^4
As-71	1×10^1	1×10^6	Kr-85m	1×10^3	1×10^{10}

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board
 TABLE I. (cont.)

Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)	Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)
Kr-87	1×10^2	1×10^9	Y-94	1×10^1	1×10^5
Kr-88	1×10^2	1×10^9	Y-95	1×10^1	1×10^5
Rb-79	1×10^1	1×10^5	Zr-86	1×10^2	1×10^7
Rb-81	1×10^1	1×10^6	Zr-88	1×10^2	1×10^6
Rb-81m	1×10^3	1×10^7	Zr-89	1×10^1	1×10^6
Rb-82m	1×10^1	1×10^6	Zr-93 ^b	1×10^3	1×10^7
Rb-83 ^b	1×10^2	1×10^6	Zr-95	1×10^1	1×10^6
Rb-84	1×10^1	1×10^6	Zr-97 ^b	1×10^1	1×10^5
Rb-86	1×10^2	1×10^5	Nb-88	1×10^1	1×10^5
Rb-87	1×10^3	1×10^7	Nb-89	1×10^1	1×10^5
Rb-88	1×10^2	1×10^5	Nb-89m	1×10^1	1×10^5
Rb-89	1×10^2	1×10^5	Nb-90	1×10^1	1×10^5
Sr-80	1×10^3	1×10^7	Nb-93m	1×10^4	1×10^7
Sr-81	1×10^1	1×10^5	Nb-94	1×10^1	1×10^6
Sr-82 ^b	1×10^1	1×10^5	Nb-95	1×10^1	1×10^6
Sr-83	1×10^1	1×10^6	Nb-95m	1×10^2	1×10^7
Sr-85	1×10^2	1×10^6	Nb-96	1×10^1	1×10^5
Sr-85m	1×10^2	1×10^7	Nb-97	1×10^1	1×10^6
Sr-87m	1×10^2	1×10^6	Nb-98	1×10^1	1×10^5
Sr-89	1×10^3	1×10^6	Mo-90	1×10^1	1×10^6
Sr-90 ^b	1×10^2	1×10^4	Mo-93	1×10^3	1×10^8
Sr-91	1×10^1	1×10^5	Mo-93m	1×10^1	1×10^6
Sr-92	1×10^1	1×10^6	Mo-99	1×10^2	1×10^6
Y-86	1×10^1	1×10^5	Mo-101	1×10^1	1×10^6
Y-86m	1×10^2	1×10^7	Tc-93	1×10^1	1×10^6
Y-87 ^b	1×10^1	1×10^6	Tc-93m	1×10^1	1×10^6
Y-88	1×10^1	1×10^6	Tc-94	1×10^1	1×10^6
Y-90	1×10^3	1×10^5	Tc-94m	1×10^1	1×10^5
Y-90m	1×10^1	1×10^6	Tc-95	1×10^1	1×10^6
Y-91	1×10^3	1×10^6	Tc-95m	1×10^1	1×10^6
Y-91m	1×10^2	1×10^6	Tc-96	1×10^1	1×10^6
Y-92	1×10^2	1×10^5	Tc-96m	1×10^3	1×10^7
Y-93	1×10^2	1×10^5	Tc-97	1×10^3	1×10^8

परमाणु ऊर्जा नियमक परिषद
Atomic Energy Regulatory Board

TABLE I. (cont.)

Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)	Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)
Tc-97m	1×10^3	1×10^7	Ag-106m	1×10^1	1×10^6
Tc-98	1×10^1	1×10^6	Ag-108m	1×10^1	1×10^6
Tc-99	1×10^4	1×10^7	Ag-110m	1×10^1	1×10^6
Tc-99m	1×10^2	1×10^7	Ag-111	1×10^3	1×10^6
Tc-101	1×10^2	1×10^6	Ag-112	1×10^1	1×10^5
Tc-104	1×10^1	1×10^5	Ag-115	1×10^1	1×10^5
Ru-94	1×10^2	1×10^6	Cd-104	1×10^2	1×10^7
Ru-97	1×10^2	1×10^7	Cd-107	1×10^3	1×10^7
Ru-103	1×10^2	1×10^6	Cd-109	1×10^4	1×10^6
Ru-105	1×10^1	1×10^6	Cd-113	1×10^3	1×10^6
Ru-106 ^b	1×10^2	1×10^5	Cd-113m	1×10^3	1×10^6
Rh-99	1×10^1	1×10^6	Cd-115	1×10^2	1×10^6
Rh-99m	1×10^1	1×10^6	Cd-115m	1×10^3	1×10^6
Rh-100	1×10^1	1×10^6	Cd-117	1×10^1	1×10^6
Rh-101	1×10^2	1×10^7	Cd-117m	1×10^1	1×10^6
Rh-101m	1×10^2	1×10^7	In-109	1×10^1	1×10^6
Rh-102	1×10^1	1×10^6	In-110	1×10^1	1×10^6
Rh-102m	1×10^2	1×10^6	In-110m	1×10^1	1×10^5
Rh-103m	1×10^4	1×10^8	In-111	1×10^2	1×10^6
Rh-105	1×10^2	1×10^7	In-112	1×10^2	1×10^6
Rh-106m	1×10^1	1×10^5	In-113m	1×10^2	1×10^6
Rh-107	1×10^2	1×10^6	In-114	1×10^3	1×10^5
Pd-100	1×10^2	1×10^7	In-114m	1×10^2	1×10^6
Pd-101	1×10^2	1×10^6	In-115	1×10^3	1×10^5
Pd-103	1×10^3	1×10^8	In-115m	1×10^2	1×10^6
Pd-107	1×10^5	1×10^8	In-116m	1×10^1	1×10^5
Pd-109	1×10^3	1×10^6	In-117	1×10^1	1×10^6
Ag-102	1×10^1	1×10^5	In-117m	1×10^2	1×10^6
Ag-103	1×10^1	1×10^6	In-119m	1×10^2	1×10^5
Ag-104	1×10^1	1×10^6	Sn-110	1×10^2	1×10^7
Ag-104m	1×10^1	1×10^6	Sn-111	1×10^2	1×10^6
Ag-105	1×10^2	1×10^6	Sn-113	1×10^3	1×10^7
Ag-106	1×10^1	1×10^6	Sn-117m	1×10^2	1×10^6

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board
 TABLE I. (cont.)

Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)	Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)
Sn-119m	1×10^3	1×10^7	Te-123m	1×10^2	1×10^7
Sn-121	1×10^5	1×10^7	Te-125m	1×10^3	1×10^7
Sn-121m ^b	1×10^3	1×10^7	Te-127	1×10^3	1×10^6
Sn-123	1×10^3	1×10^6	Te-127m	1×10^3	1×10^7
Sn-123m	1×10^2	1×10^6	Te-129	1×10^2	1×10^6
Sn-125	1×10^2	1×10^5	Te-129m	1×10^3	1×10^6
Sn-126 ^b	1×10^1	1×10^5	Te-131	1×10^2	1×10^5
Sn-127	1×10^1	1×10^6	Te-131m	1×10^1	1×10^6
Sn-128	1×10^1	1×10^6	Te-132	1×10^2	1×10^7
Sb-115	1×10^1	1×10^6	Te-133	1×10^1	1×10^5
Sb-116	1×10^1	1×10^6	Te-133m	1×10^1	1×10^5
Sb-116m	1×10^1	1×10^5	Te-134	1×10^1	1×10^6
Sb-117	1×10^2	1×10^7	I-120	1×10^1	1×10^5
Sb-118m	1×10^1	1×10^6	I-120m	1×10^1	1×10^5
Sb-119	1×10^3	1×10^7	I-121	1×10^2	1×10^6
Sb-120	1×10^2	1×10^6	I-123	1×10^2	1×10^7
Sb-120m	1×10^1	1×10^6	I-124	1×10^1	1×10^6
Sb-122	1×10^2	1×10^4	I-125	1×10^3	1×10^6
Sb-124	1×10^1	1×10^6	I-126	1×10^2	1×10^6
Sb-124m	1×10^2	1×10^6	I-128	1×10^2	1×10^5
Sb-125	1×10^2	1×10^6	I-129	1×10^2	1×10^5
Sb-126	1×10^1	1×10^5	I-130	1×10^1	1×10^6
Sb-126m	1×10^1	1×10^5	I-131	1×10^2	1×10^6
Sb-127	1×10^1	1×10^6	I-132	1×10^1	1×10^5
Sb-128	1×10^1	1×10^5	I-132m	1×10^2	1×10^6
Sb-128m	1×10^1	1×10^5	I-133	1×10^1	1×10^6
Sb-129	1×10^1	1×10^6	I-134	1×10^1	1×10^5
Sb-130	1×10^1	1×10^5	I-135	1×10^1	1×10^6
Sb-131	1×10^1	1×10^6	Xe-120	1×10^2	1×10^9
Te-116	1×10^2	1×10^7	Xe-121	1×10^2	1×10^9
Te-121	1×10^1	1×10^6	Xe-122 ^b	1×10^2	1×10^9
Te-121m	1×10^2	1×10^6	Xe-123	1×10^2	1×10^9
Te-123	1×10^3	1×10^6	Xe-125	1×10^3	1×10^9

गु

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board
 TABLE I. (cont.)

Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)	Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)
Xe-127	1×10^3	1×10^5	La-131	1×10^1	1×10^6
Xe-129m	1×10^3	1×10^4	La-132	1×10^1	1×10^6
Xe-131m	1×10^4	1×10^4	La-135	1×10^3	1×10^7
Xe-133m	1×10^3	1×10^4	La-137	1×10^3	1×10^7
Xe-133	1×10^3	1×10^4	La-138	1×10^1	1×10^6
Xe-135	1×10^3	1×10^{10}	La-140	1×10^1	1×10^5
Xe-135m	1×10^2	1×10^9	La-141	1×10^2	1×10^5
Xe-138	1×10^2	1×10^9	La-142	1×10^1	1×10^5
Cs-125	1×10^1	1×10^4	La-143	1×10^2	1×10^5
Cs-127	1×10^2	1×10^5	Ce-134	1×10^3	1×10^7
Cs-129	1×10^2	1×10^5	Ce-135	1×10^1	1×10^6
Cs-130	1×10^2	1×10^6	Ce-137	1×10^3	1×10^7
Cs-131	1×10^3	1×10^6	Ce-137m	1×10^3	1×10^6
Cs-132	1×10^1	1×10^5	Ce-139	1×10^2	1×10^6
Cs-134m	1×10^3	1×10^5	Ce-141	1×10^2	1×10^7
Cs-134	1×10^1	1×10^4	Ce-143	1×10^2	1×10^6
Cs-135	1×10^4	1×10^7	Ce-144 ^b	1×10^2	1×10^5
Cs-135m	1×10^1	1×10^6	Pr-136	1×10^1	1×10^5
Cs-136	1×10^1	1×10^5	Pr-137	1×10^2	1×10^6
Cs-137 ^b	1×10^1	1×10^4	Pr-138m	1×10^1	1×10^6
Cs-138	1×10^1	1×10^4	Pr-139	1×10^2	1×10^7
Ba-126	1×10^2	1×10^7	Pr-142	1×10^2	1×10^5
Ba-128	1×10^2	1×10^7	Pr-142m	1×10^7	1×10^9
Ba-131	1×10^2	1×10^6	Pr-143	1×10^4	1×10^6
Ba-131m	1×10^2	1×10^7	Pr-144	1×10^2	1×10^5
Ba-133	1×10^2	1×10^6	Pr-145	1×10^3	1×10^5
Ba-133m	1×10^2	1×10^6	Pr-147	1×10^1	1×10^5
Ba-135m	1×10^2	1×10^6	Nd-136	1×10^2	1×10^6
Ba-137m	1×10^1	1×10^6	Nd-138	1×10^3	1×10^7
Ba-139	1×10^2	1×10^5	Nd-139	1×10^2	1×10^6
Ba-140 ^b	1×10^1	1×10^5	Nd-139m	1×10^1	1×10^6
Ba-141	1×10^2	1×10^5	Nd-141	1×10^2	1×10^7
Ba-142	1×10^2	1×10^6	Nd-147	1×10^2	1×10^6

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board

TABLE I. (cont.)

Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)	Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)
Nd-149	1×10^2	1×10^6	Eu-155	1×10^2	1×10^7
Nd-151	1×10^1	1×10^5	Eu-156	1×10^1	1×10^6
Pm-141	1×10^1	1×10^5	Eu-157	1×10^2	1×10^6
Pm-143	1×10^2	1×10^6	Eu-158	1×10^1	1×10^5
Pm-144	1×10^1	1×10^6	Gd-145	1×10^1	1×10^5
Pm-145	1×10^3	1×10^7	Gd-146 ^b	1×10^1	1×10^6
Pm-146	1×10^1	1×10^6	Gd-147	1×10^1	1×10^6
Pm-147	1×10^4	1×10^7	Gd-148	1×10^1	1×10^4
Pm-148	1×10^1	1×10^5	Gd-149	1×10^2	1×10^6
Pm-148m	1×10^1	1×10^6	Gd-151	1×10^2	1×10^7
Pm-149	1×10^3	1×10^6	Gd-152	1×10^1	1×10^4
Pm-150	1×10^1	1×10^5	Gd-153	1×10^2	1×10^7
Pm-151	1×10^2	1×10^6	Gd-159	1×10^3	1×10^6
Sm-141	1×10^1	1×10^5	Tb-147	1×10^1	1×10^6
Sm-141m	1×10^1	1×10^6	Tb-149	1×10^1	1×10^6
Sm-142	1×10^2	1×10^7	Tb-150	1×10^1	1×10^6
Sm-145	1×10^2	1×10^7	Tb-151	1×10^1	1×10^6
Sm-146	1×10^1	1×10^5	Tb-153	1×10^2	1×10^7
Sm-147	1×10^1	1×10^4	Tb-154	1×10^1	1×10^6
Sm-151	1×10^4	1×10^8	Tb-155	1×10^2	1×10^7
Sm-153	1×10^2	1×10^6	Tb-156	1×10^1	1×10^6
Sm-155	1×10^2	1×10^6	Tb-156m (24.4 h)	1×10^3	1×10^7
Sm-156	1×10^2	1×10^6	Tb-156m' (5 h)	1×10^4	1×10^7
Eu-145	1×10^1	1×10^6	Tb-157	1×10^4	1×10^7
Eu-146	1×10^1	1×10^6	Tb-158	1×10^1	1×10^6
Eu-147	1×10^2	1×10^6	Tb-160	1×10^1	1×10^6
Eu-148	1×10^1	1×10^6	Tb-161	1×10^3	1×10^6
Eu-149	1×10^2	1×10^7	Dy-155	1×10^1	1×10^6
Eu-150	1×10^1	1×10^6	Dy-157	1×10^2	1×10^6
Eu-150m	1×10^3	1×10^6	Dy-159	1×10^3	1×10^7
Eu-152	1×10^1	1×10^6	Dy-165	1×10^3	1×10^6
Eu-152m	1×10^2	1×10^6	Dy-166	1×10^3	1×10^6
Eu-154	1×10^1	1×10^6	Ho-155	1×10^2	1×10^6

પરમાણુ ઊર્જા નિયામક પરિષદ
Atomic Energy Regulatory Board

TABLE I. (cont.)

Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)	Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)
Ho-157	1×10^2	1×10^6	Lu-172	1×10^1	1×10^6
Ho-159	1×10^2	1×10^6	Lu-173	1×10^2	1×10^7
Ho-161	1×10^2	1×10^7	Lu-174	1×10^2	1×10^7
Ho-162	1×10^2	1×10^7	Lu-174m	1×10^2	1×10^7
Ho-162m	1×10^1	1×10^6	Lu-176	1×10^2	1×10^6
Ho-164	1×10^3	1×10^6	Lu-176m	1×10^3	1×10^6
Ho-164m	1×10^3	1×10^7	Lu-177	1×10^3	1×10^7
Ho-166	1×10^3	1×10^5	Lu-177m	1×10^1	1×10^6
Ho-166m	1×10^1	1×10^6	Lu-178	1×10^2	1×10^5
Ho-167	1×10^2	1×10^6	Lu-178m	1×10^1	1×10^5
Er-161	1×10^1	1×10^6	Lu-179	1×10^3	1×10^6
Er-165	1×10^3	1×10^7	Hf-170	1×10^2	1×10^6
Er-169	1×10^4	1×10^7	Hf-172 ^b	1×10^1	1×10^6
Er-171	1×10^2	1×10^6	Hf-173	1×10^2	1×10^6
Er-172	1×10^2	1×10^6	Hf-175	1×10^2	1×10^6
Tm-162	1×10^1	1×10^6	Hf-177m	1×10^1	1×10^5
Tm-166	1×10^1	1×10^6	Hf-178m	1×10^1	1×10^6
Tm-167	1×10^2	1×10^6	Hf-179m	1×10^1	1×10^6
Tm-170	1×10^3	1×10^6	Hf-180m	1×10^1	1×10^6
Tm-171	1×10^4	1×10^8	Hf-181	1×10^1	1×10^6
Tm-172	1×10^2	1×10^6	Hf-182	1×10^2	1×10^6
Tm-173	1×10^2	1×10^6	Hf-182m	1×10^1	1×10^6
Tm-175	1×10^1	1×10^6	Hf-183	1×10^1	1×10^6
Yb-162	1×10^2	1×10^7	Hf-184	1×10^2	1×10^6
Yb-166	1×10^2	1×10^7	Ta-172	1×10^1	1×10^6
Yb-167	1×10^2	1×10^6	Ta-173	1×10^1	1×10^6
Yb-169	1×10^2	1×10^7	Ta-174	1×10^1	1×10^6
Yb-175	1×10^3	1×10^7	Ta-175	1×10^1	1×10^6
Yb-177	1×10^2	1×10^6	Ta-176	1×10^1	1×10^6
Yb-178	1×10^3	1×10^6	Ta-177	1×10^2	1×10^7
Lu-169	1×10^1	1×10^6	Ta-178	1×10^1	1×10^6
Lu-170	1×10^1	1×10^6	Ta-179	1×10^3	1×10^7
Lu-171	1×10^1	1×10^6	Ta-180	1×10^1	1×10^6

ਪਰਸਾਣੁ ਊਰਜਾ ਨਿਯਮਕ ਪਰਿ਷ਦ
Atomic Energy Regulatory Board

TABLE I. (cont.)

Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)	Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)
Ta-180m	1×10^3	1×10^7	Os-191	1×10^2	1×10^7
Ta-182	1×10^1	1×10^4	Os-191m	1×10^3	1×10^7
Ta-182m	1×10^2	1×10^6	Os-193	1×10^2	1×10^6
Ta-183	1×10^2	1×10^6	Os-194 ^b	1×10^2	1×10^5
Ta-184	1×10^1	1×10^6	Ir-182	1×10^1	1×10^5
Ta-185	1×10^2	1×10^5	Ir-184	1×10^1	1×10^6
Ta-186	1×10^1	1×10^5	Ir-185	1×10^1	1×10^6
W-176	1×10^2	1×10^6	Ir-186	1×10^1	1×10^6
W-177	1×10^1	1×10^6	Ir-186m	1×10^1	1×10^6
W-178 ^b	1×10^1	1×10^6	Ir-187	1×10^2	1×10^6
W-179	1×10^2	1×10^7	Ir-188	1×10^1	1×10^6
W-181	1×10^3	1×10^7	Ir-189 ^b	1×10^2	1×10^7
W-185	1×10^4	1×10^7	Ir-190	1×10^1	1×10^6
W-187	1×10^2	1×10^6	Ir-190m (3.1 h)	1×10^1	1×10^6
W-188 ^b	1×10^2	1×10^5	Ir-190m' (1.2 h)	1×10^4	1×10^7
Re-177	1×10^1	1×10^6	Ir-192	1×10^1	1×10^4
Re-178	1×10^1	1×10^6	Ir-192m	1×10^2	1×10^7
Re-181	1×10^1	1×10^6	Ir-193m	1×10^4	1×10^7
Re-182	1×10^1	1×10^6	Ir-194	1×10^2	1×10^5
Re-182m	1×10^1	1×10^6	Ir-194m	1×10^1	1×10^6
Re-184	1×10^1	1×10^6	Ir-195	1×10^2	1×10^6
Re-184m	1×10^2	1×10^6	Ir-195m	1×10^2	1×10^6
Re-186	1×10^3	1×10^6	Pt-186	1×10^1	1×10^6
Re-186m	1×10^3	1×10^7	Pt-188 ^b	1×10^1	1×10^6
Re-187	1×10^6	1×10^9	Pt-189	1×10^2	1×10^6
Re-188	1×10^2	1×10^5	Pt-191	1×10^2	1×10^6
Re-188m	1×10^2	1×10^7	Pt-193	1×10^4	1×10^7
Re-189 ^b	1×10^2	1×10^6	Pt-193m	1×10^3	1×10^7
Os-180	1×10^2	1×10^7	Pt-195m	1×10^2	1×10^6
Os-181	1×10^1	1×10^6	Pt-197	1×10^3	1×10^6
Os-182	1×10^2	1×10^6	Pt-197m	1×10^2	1×10^6
Os-185	1×10^1	1×10^6	Pt-199	1×10^2	1×10^6
Os-189m	1×10^4	1×10^7	Pt-200	1×10^2	1×10^6

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board

TABLE I. (cont.)

Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)	Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)
Au-193	1×10^2	1×10^7	Pb-201	1×10^1	1×10^6
Au-194	1×10^1	1×10^6	Pb-202	1×10^3	1×10^6
Au-195	1×10^2	1×10^7	Pb-202m	1×10^1	1×10^6
Au-198	1×10^2	1×10^6	Pb-203	1×10^2	1×10^6
Au-198m	1×10^1	1×10^6	Pb-205	1×10^4	1×10^7
Au-199	1×10^2	1×10^6	Pb-209	1×10^5	1×10^6
Au-200	1×10^2	1×10^5	Pb-210 ^b	1×10^1	1×10^4
Au-200m	1×10^1	1×10^6	Pb-211	1×10^2	1×10^6
Au-201	1×10^2	1×10^6	Pb-212 ^b	1×10^1	1×10^5
Hg-193	1×10^2	1×10^6	Pb-214	1×10^2	1×10^6
Hg-193m	1×10^1	1×10^6	Bi-200	1×10^1	1×10^6
Hg-194 ^b	1×10^1	1×10^6	Bi-201	1×10^1	1×10^6
Hg-195	1×10^2	1×10^6	Bi-202	1×10^1	1×10^6
Hg-195m ^b	1×10^2	1×10^6	Bi-203	1×10^1	1×10^6
Hg-197	1×10^2	1×10^7	Bi-205	1×10^1	1×10^6
Hg-197m	1×10^2	1×10^6	Bi-206	1×10^1	1×10^5
Hg-199m	1×10^2	1×10^6	Bi-207	1×10^1	1×10^6
Hg-203	1×10^2	1×10^5	Bi-210	1×10^3	1×10^6
Tl-194	1×10^1	1×10^6	Bi-210m ^b	1×10^1	1×10^5
Tl-194m	1×10^1	1×10^6	Bi-212 ^b	1×10^1	1×10^5
Tl-195	1×10^1	1×10^6	Bi-213	1×10^2	1×10^6
Tl-197	1×10^2	1×10^6	Bi-214	1×10^1	1×10^5
Tl-198	1×10^1	1×10^6	Po-203	1×10^1	1×10^6
Tl-198m	1×10^1	1×10^6	Po-205	1×10^1	1×10^6
Tl-199	1×10^2	1×10^6	Po-206	1×10^1	1×10^6
Tl-200	1×10^1	1×10^6	Po-207	1×10^1	1×10^6
Tl-201	1×10^2	1×10^6	Po-208	1×10^1	1×10^4
Tl-202	1×10^2	1×10^6	Po-209	1×10^1	1×10^4
Tl-204	1×10^4	1×10^4	Po-210	1×10^1	1×10^4
Pb-195m	1×10^1	1×10^6	At-207	1×10^1	1×10^6
Pb-198	1×10^2	1×10^6	At-211	1×10^3	1×10^7
Pb-199	1×10^1	1×10^6	Fr-222	1×10^3	1×10^5
Pb-200	1×10^2	1×10^6	Fr-223	1×10^2	1×10^6

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board

TABLE I. (cont.)

Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)	Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)
Rn-220 ^b	1×10^4	1×10^7	U-235 ^b	1×10^1	1×10^4
Rn-222 ^b	1×10^1	1×10^8	U-236	1×10^1	1×10^4
Ra-223 ^b	1×10^2	1×10^5	U-237	1×10^2	1×10^6
Ra-224 ^b	1×10^1	1×10^5	U-238 ^b	1×10^1	1×10^4
Ra-225	1×10^2	1×10^5	U-239	1×10^2	1×10^6
Ra-226 ^b	1×10^1	1×10^4	U-240	1×10^3	1×10^7
Ra-227	1×10^2	1×10^6	U-240 ^b	1×10^1	1×10^6
Ra-228 ^b	1×10^1	1×10^5	Np-232	1×10^1	1×10^6
Ac-224	1×10^2	1×10^6	Np-233	1×10^2	1×10^7
Ac-225 ^b	1×10^1	1×10^4	Np-234	1×10^1	1×10^6
Ac-226	1×10^2	1×10^5	Np-235	1×10^3	1×10^7
Ac-227 ^b	1×10^{-1}	1×10^3	Np-236	1×10^2	1×10^5
Ac-228	1×10^1	1×10^6	Np-236m	1×10^3	1×10^7
Th-226 ^b	1×10^3	1×10^7	Np-237 ^b	1×10^0	1×10^3
Th-227	1×10^1	1×10^4	Np-238	1×10^2	1×10^6
Th-228 ^b	1×10^0	1×10^4	Np-239	1×10^2	1×10^7
Th-229 ^b	1×10^0	1×10^3	Np-240	1×10^1	1×10^6
Th-230	1×10^0	1×10^4	Pu-234	1×10^2	1×10^7
Th-231	1×10^3	1×10^7	Pu-235	1×10^2	1×10^7
Th-232	1×10^1	1×10^4	Pu-236	1×10^1	1×10^4
Th-234 ^b	1×10^3	1×10^5	Pu-237	1×10^3	1×10^7
Pa-227	1×10^1	1×10^6	Pu-238	1×10^0	1×10^4
Pa-228	1×10^1	1×10^6	Pu-239	1×10^0	1×10^4
Pa-230	1×10^1	1×10^6	Pu-240	1×10^0	1×10^3
Pa-231	1×10^0	1×10^3	Pu-241	1×10^2	1×10^5
Pa-232	1×10^1	1×10^6	Pu-242	1×10^0	1×10^4
Pa-233	1×10^2	1×10^7	Pu-243	1×10^3	1×10^7
Pa-234	1×10^1	1×10^6	Pu-244	1×10^0	1×10^4
U-230 ^b	1×10^1	1×10^5	Pu-245	1×10^2	1×10^6
U-231	1×10^2	1×10^7	Pu-246	1×10^2	1×10^6
U-232 ^b	1×10^0	1×10^3	Am-237	1×10^2	1×10^6
U-233	1×10^1	1×10^4	Am-238	1×10^1	1×10^6
U-234	1×10^1	1×10^4	Am-239	1×10^2	1×10^6

गृहीत

પરમાણુ ઊર્જા નિયામક પરિષદ
Atomic Energy Regulatory Board

TABLE I. (cont.)

Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)	Radionuclide	Activity Concentration (Bq/g)	Activity (Bq)
Am-240	1×10^1	1×10^6	Bk-247	1×10^0	1×10^4
Am-241	1×10^0	1×10^4	Bk-249	1×10^3	1×10^6
Am-242	1×10^3	1×10^6	Bk-250	1×10^1	1×10^6
Am-242m ^b	1×10^0	1×10^4	Cf-244	1×10^4	1×10^7
Am-243 ^b	1×10^0	1×10^3	Cf-246	1×10^3	1×10^6
Am-244	1×10^1	1×10^6	Cf-248	1×10^1	1×10^4
Am-244m	1×10^4	1×10^7	Cf-249	1×10^0	1×10^3
Am-245	1×10^3	1×10^6	Cf-250	1×10^1	1×10^4
Am-246	1×10^1	1×10^5	Cf-251	1×10^0	1×10^3
Am-246m	1×10^1	1×10^6	Cf-252	1×10^1	1×10^4
Cm-238	1×10^2	1×10^7	Cf-253	1×10^2	1×10^5
Cm-240	1×10^2	1×10^5	Cf-254	1×10^0	1×10^3
Cm-241	1×10^2	1×10^6	Es-250	1×10^2	1×10^6
Cm-242	1×10^2	1×10^5	Es-251	1×10^2	1×10^7
Cm-243	1×10^0	1×10^4	Es-253	1×10^2	1×10^5
Cm-244	1×10^1	1×10^4	Es-254	1×10^1	1×10^4
Cm-245	1×10^0	1×10^3	Es-254m	1×10^2	1×10^6
Cm-246	1×10^0	1×10^3	Fm-252	1×10^3	1×10^6
Cm-247	1×10^0	1×10^4	Fm-253	1×10^2	1×10^6
Cm-248	1×10^0	1×10^3	Fm-254	1×10^4	1×10^7
Cm-249	1×10^3	1×10^6	Fm-255	1×10^3	1×10^6
Cm-250	1×10^{-1}	1×10^3	Fm-257	1×10^1	1×10^5
Bk-245	1×10^2	1×10^6	Md-257	1×10^2	1×10^7
Bk-246	1×10^1	1×10^6	Md-258	1×10^2	1×10^5

^a m and m' denote metastable states of the radionuclide. The metastable state m' is of higher energy than the metastable state m.

^b Parent radionuclides and their progeny whose dose contributions are taken into account in the dose calculations (thus requiring only the exemption level of the parent radionuclide to be considered) are listed below:

Ge-68	Ga-68	Y-87	Sr-87m
Rb-83	Kr-83m	Zr-93	Nb-93m
Sr-82	Rb-82	Zr-97	Nb-97
Sr-90	Y-90	Ru-106	Rh-106

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board

Ag-108m	Ag-108	Ra-223	Rn-219, Po-215, Pb-211, Bi-211, Tl-207
Sn-121m	Sn-121 (0.776)	Ra-224	Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Sn-126	Sb-126m	Ra-226	Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
Xe-122	I-122	Ra-228	Ac-228
Cs-137	Ba-137m	Ac-225	Fr-221, At-217, Bi-213, Po-213 (0.978), Tl-209 (0.0216), Pb-209 (0.978)
Ba-140	La-140	Ac-227	Fr-223 (0.0138)
Ce-134	La-134	Th-226	Ra-222, Rn-218, Po-214
Ce-144	Pr-144	Th-228	Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Gd-146	Eu-146	Th-229	Ra-225, Ac-225, Fr-221, At-217, Bi-213, Po-213, Pb-209
Hf-172	Lu-172	Th-234	Pa-234m
W-178	Ta-178	U-230	Th-226, Ra-222, Rn-218, Po-214
W-188	Re-188	U-232	Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Re-189	Os-189m (0.241)	U-235	Th-231
Ir-189	Os-189m	U-238	Th-234, Pa-234m
Pt-188	Ir-188	U-240	Np-240m
Hg-194	Au-194	Np-237	Pa-233
Hg-195m	Hg-195 (0.542)	Am-242m	Am-242
Pb-210	Bi-210, Po-210	Am-243	Np-239
Pb-212	Bi-212, Tl-208 (0.36), Po-212 (0.64)		
Bi-210m	Tl-206		
Bi-212	Tl-208 (0.36), Po-212 (0.64)		
Rn-220	Po-216		
Rn-222	Po-218, Pb-214, Bi-214, Po-214		

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board

TABLE II. LEVELS FOR EXEMPTION OF BULK AMOUNTS OF SOLID MATERIAL WITHOUT FURTHER CONSIDERATION AND FOR CLEARANCE OF BULK AMOUNTS OF SOLID MATERIAL WITHOUT FURTHER CONSIDERATION: ACTIVITY CONCENTRATIONS OF RADIONUCLIDES OF ARTIFICIAL ORIGIN

Bulk amounts" of materials cannot be interpreted as several moderate amounts for exemption purposes

Radionuclide	Activity Concentration (Bq/g)	Radionuclide	Activity Concentration (Bq/g)
H-3	100	Co-58	1
Be-7	10	Co-58m	10 000
C-14	1	Co-60	0.1
F-18	10	Co-60m	1 000
Na-22	0.1	Co-61	100
Na-24	1	Co-62m	10
Si-31	1000	Ni-59	100
P-32	1000	Ni-63	100
P-33	1000	Ni-65	10
S-35	100	Cu-64	100
Cl-36	1	Zn-65	0.1
Cl-38	10	Zn-69	1 000
K-42	100	Zn-69m ^a	10
K-43	10	Ga-72	10
Ca-45	100	Ge-71	10 000
Ca-47	10	As-73	1 000
Sc-46	0.1	As-74	10
Sc-47	100	As-76	10
Sc-48	1	As-77	1 000
V-48	1	Se-75	1
Cr-51	100	Br-82	1
Mn-51	10	Rb-86	100
Mn-52	1	Sr-85	1
Mn-52m	10	Sr-85m	100
Mn-53	100	Sr-87m	100
Mn-54	0.1	Sr-89	1 000
Mn-56	10	Sr-90 ^a	1
Fe-52 ^a	10	Sr-91 ^a	10
Fe-55	1 000	Sr-92	10
Fe-59	1	Y-90	1 000
Co-55	10	Y-91	100
Co-56	0.1	Y-91m	100
Co-57	1	Y-92	100

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board

TABLE II. (cont.)

Radionuclide	Activity Concentration (Bq/g)	Radionuclide	Activity Concentration (Bq/g)
Y-93	100	In-111	10
Zr-93	10	In-113m	100
Zr-95 ^a	1	In-114m ^a	10
Zr-97 ^a	10	In-115m	100
Nb-93m	10	Sn-113 ^a	1
Nb-94	0.1	Sn-125	10
Nb-95	1	Sb-122	10
Nb-97 ^a	10	Sb-124	1
Nb-98	10	Sb-125 ^a	0.1
Mo-90	10	Te-123m	1
Mo-93	10	Te-125m	1000
Mo-99 ^a	10	Te-127	1000
Mo-101 ^a	10	Te-127m ^a	10
Tc-96	1	Te-129	100
Tc-96m	1000	Te-129m ^a	10
Tc-97	10	Te-131	100
Tc-97m	100	Te-131m ^a	10
Tc-99	1	Te-132 ^a	1
Tc-99m	100	Te-133	10
Ru-97	10	Te-133m	10
Ru-103 ^a	1	Te-134	10
Ru-105 ^a	10	I-123	100
Ru-106 ^a	0.1	I-125	100
Rh-103m	10000	I-126	10
Rh-105	100	I-129	0.01
Pd-103 ^a	1000	I-130	10
Pd-109 ^a	100	I-131	10
Ag-105	1	I-132	10
Ag-110m ^a	0.1	I-133	10
Ag-111	100	I-134	10
Cd-109 ^a	1	I-135	10
Cd-115 ^a	10	Cs-129	10
Cd-115m ^a	100	Cs-131	1000

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board

TABLE II. (cont.)

Radionuclide	Activity Concentration (Bq/g)	Radionuclide	Activity Concentration (Bq/g)
Cs-132	10	Er-171	100
Cs-134	0.1	Tm-170	100
Cs-134m	1000	Tm-171	1000
Cs-135	100	Yb-175	100
Cs-136	1	Lu-177	100
Cs-137 ^a	0.1	Hf-181	1
Cs-138	10	Ta-182	0.1
Ba-131	10	W-181	10
Ba-140	1	W-185	1 000
La-140	1	W-187	10
Ce-139	1	Re-186	1000
Ce-141	100	Re-188	100
Ce-143	10	Os-185	1
Ce-144 ^a	10	Os-191	100
Pr-142	100	Os-191m	1000
Pr-143	1000	Os-193	100
Nd-147	100	Ir-190	1
Nd-149	100	Ir-192	1
Pm-147	1000	Ir-194	100
Pm-149	1000	Pt-191	10
Sm-151	1000	Pt-193m	1000
Sm-153	100	Pt-197	1000
Eu-152	0.1	Pt-197m	100
Eu-152m	100	Au-198	10
Eu-154	0.1	Au-199	100
Eu-155	1	Hg-197	100
Gd-153	10	Hg-197m	100
Gd-159	100	Hg-203	10
Tb-160	1	Tl-200	10
Dy-165	1000	Tl-201	100
Dy-166	100	Tl-202	10
Ho-166	100	Tl-204	1
Er-169	1 000	Pb-203	10

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board

TABLE II. (cont.)

Radionuclide	Activity Concentration (Bq/g)	Radionuclide	Activity Concentration (Bq/g)
Bi-206	1	Pu-241	10
Bi-207	0.1	Pu-242	0.1
Po-203	10	Pu-243	1 000
Po-205	10	Pu-244 ^a	0.1
Po-207	10	Am-241	0.1
At-211	1 000	Am-242	1 000
Ra-225	10	Am-242m ^a	0.1
Ra-227	100	Am-243 ^a	0.1
Th-226	1 000	Cm-242	10
Th-229	0.1	Cm-243	1
Pa-230	10	Cm-244	1
Pa-233	10	Cm-245	0.1
U-230	10	Cm-246	0.1
U-231	100	Cm-247 ^a	0.1
U-232 ^a	0.1	Cm-248	0.1
U-233	1	Bk-249	100
U-236	10	Cf-246	1 000
U-237	100	Cf-248	1
U-239	100	Cf-249	0.1
U-240 ^a	100	Cf-250	1
Np-237 ^a	1	Cf-251	0.1
Np-239	100	Cf-252	1
Np-240	10	Cf-253	100
Pu-234	100	Cf-254	1
Pu-235	100	Es-253	100
Pu-236	1	Es-254 ^a	0.1
Pu-237	100	Es-254m ^a	10
Pu-238	0.1	Fm-254	10 000
Pu-239	0.1	Fm-255	100
Pu-240	0.1		

^a Parent radionuclides, and their progeny whose dose contributions are taken into account in the dose calculations (thus requiring only the exemption level of the parent radionuclide to be considered), are listed below:

Fe-52 Mn-52m
 Zn-69m Zn-69
 Sr-90 Y-90

Sn-113 In-113m
 Sb-125 Te-125m
 Te-127m Te-127

परमाणु ऊर्जा नियामक परिषद
Atomic Energy Regulatory Board

Sr-91	Y-91m
Zr-95	Nb-95
Zr-97	Nb-97m, Nb-97
Nb-97	Nb-97m
Mo-99	Tc-99m
Mo-101	Tc-101
Ru-103	Rh-103m
Ru-105	Rh-105m
Ru-106	Rh-106
Pd-103	Rh-103m
Pd-109	Ag-109m
Ag-110m	Ag-110
Cd-109	Ag-109m
Cd-115	In-115m
Cd-115m	In-115m
In-114m	In-114
Sn-113	In-113m
Sb-125	Te-125m
Te-127m	Te-127
Te-129m	Te-129
Te-131m	Te-131
Te-132	I-132
Cs-137	Ba-137m
Ce-144	Pr-144, Pr-144m
U-232	Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208
U-240	Np-240m, Np-240
Np-237	Pa-233
Pu-244	U-240, Np-240m, Np-240
Am-242m	Np-238
Am-243	Np-239
Cm-247	Pu-243
Es-254	Bk-250
Es-254m	Fm-254