

§ 835.1303 [Reserved]

§ 835.1304 Nuclear accident dosimetry.

(a) Installations possessing sufficient quantities of fissile material to potentially constitute a critical mass, such that the excessive exposure of individuals to radiation from a nuclear accident is possible, shall provide nuclear accident dosimetry for those individuals.

(b) Nuclear accident dosimetry shall include the following:

(1) A method to conduct initial screening of individuals involved in a nuclear accident to determine whether significant exposures to radiation occurred;

(2) Methods and equipment for analysis of biological materials;

(3) A system of fixed nuclear accident dosimeter units; and

(4) Personal nuclear accident dosimeters.

[58 FR 65485, Dec. 14, 1993, as amended at 63 FR 59687, Nov. 4, 1998]

APPENDIX A TO PART 835—DERIVED AIR CONCENTRATIONS (DAC) FOR CONTROLLING RADIATION EXPOSURE TO WORKERS AT DOE FACILITIES

The data presented in appendix A are to be used for controlling individual internal doses in accordance with §835.209, identifying the need for air monitoring in accordance with §835.403, and identifying the need for posting of airborne radioactivity areas in accordance with §835.603(d).

The DAC values are given for individual radionuclides. For known mixtures of radionuclides, determine the sum of the ratio of the observed concentration of a particular

radionuclide and its corresponding DAC for all radionuclides in the mixture. If this sum exceeds unity (1), then the DAC has been exceeded. For unknown radionuclides, the most restrictive DAC (lowest value) for those isotopes not known to be absent shall be used.

The derived air concentrations (DAC) for limiting radiation exposures through inhalation of radionuclides by workers are listed in this appendix. The values are based on either a stochastic (committed effective dose equivalent) dose limit of 5 rems (0.05 Sv) or a nonstochastic (organ) dose limit of 50 rems (0.5 Sv) per year, whichever is more limiting.

NOTE: the 15 rems [0.15 Sv] dose limit for the lens of the eye does not appear as a critical organ dose limit.)

The columns in this appendix contain the following information: (1) Radionuclide; (2) inhaled air DAC for lung retention class D, W, and Y in units of $\mu\text{Ci/ml}$; (3) inhaled air DAC for lung retention class D, W, and Y in units of Bq/m^3 ; and (4) an indication of whether or not the DAC for each class is controlled by the stochastic (effective dose equivalent) or nonstochastic (tissue) dose. The classes D, W, and Y have been established to describe the clearance of inhaled radionuclides from the lung. This classification refers to the approximate length of retention in the pulmonary region. Thus, the range of half-times for retention in the pulmonary region is less than 10 days for class D (days), from 10 to 100 days for class W (weeks), and greater than 100 days for class Y (years). The DACs are listed by radionuclide, in order of increasing atomic mass, and are based on the assumption that the particle size distribution of the inhaled material is unknown and an assumed particle size distribution of $1 \mu\text{m}$ is used. For situations where the particle size distribution is known to differ significantly from $1 \mu\text{m}$, appropriate corrections can be made to both the estimated dose to workers and the DACs.

Radionuclide	Inhaled air-lung retention class ³			Inhaled air-lung retention class ³			Stochastic or organ ¹
	$\mu\text{Ci/ml}$			Bq/m^3			
	D	W	Y	D	W	Y	(D/ W/ Y)
H-3 (Water) ²	2.E-05	2.E-05	2.E-05	8.E+05	8.E+05	8.E+05	St/St/St
H-3 (Elemental) ²	5.E-01	5.E-01	5.E-01	2.E+10	2.E+10	2.E+10	St/St/St
Be-7	-	9.E-06	8.E-06	-	3.E+05	3.E+05	/St/St
Be-10	-	6.E-08	6.E-09	-	2.E+03	2.E+02	/St/St
C-11 (Org) ²	2.E-04	2.E-04	2.E-04	6.E+06	6.E+06	6.E+06	St/St/St
C-11 (CO) ²	5.E-04	5.E-04	5.E-04	2.E+07	2.E+07	2.E+07	St/St/St
C-11 (CO ₂) ²	3.E-04	3.E-04	3.E-04	1.E+07	1.E+07	1.E+07	St/St/St
C-14 (Org) ²	1.E-06	1.E-06	1.E-06	4.E+07	4.E+04	4.E+07	St/St/St
C-14 (CO) ²	7.E-04	7.E-04	7.E-04	3.E+07	3.E+07	3.E+07	St/St/St
C-14 (CO ₂) ²	9.E-05	9.E-05	9.E-05	3.E+06	3.E+06	3.E+06	St/St/St
F-18	3.E-05	4.E-05	3.E-05	1.E+06	1.E+06	1.E+06	St/St/St
Na-22	3.E-07	-	-	1.E+04	-	-	St/ /
Na-24	2.E-06	-	-	8.E+04	-	-	St/ /
Mg-28	7.E-07	5.E-07	-	3.E+04	2.E+04	-	St/St/
Al-26	3.E-08	3.E-08	-	1.E+03	1.E+03	-	St/St/
Si-31	1.E-05	1.E-05	1.E-05	4.E+05	5.E+05	4.E+05	St/St/St

Radionuclide	Inhaled air-lung retention class ³			Inhaled air-lung retention class ³			Stochastic or organ ¹
	μCi/ml			Bq/m ³			
	D	W	Y	D	W	Y	(D/ W/ Y)
Si-32	1.E-07	5.E-08	2.E-09	4.E+03	2.E+03	8.E+01	St/St/St
P-32	4.E-07	2.E-07	-	1.E+04	6.E+03	-	St/St/
P-33	3.E-06	1.E-06	-	1.E+05	4.E+04	-	St/St/
S-35	7.E-06	9.E-07	-	3.E+05	3.E+04	-	St/St/
S-35 (Gas)	-	6.E-06	-	-	2.E+05	-	/St/
Cl-36	1.E-06	1.E-07	-	4.E+04	4.E+03	-	St/St/
Cl-38	2.E-05	2.E-05	-	6.E+05	7.E+05	-	St/St/
Cl-39	2.E-05	2.E-05	-	8.E+05	9.E+05	-	St/St/
K-40	2.E-07	-	-	6.E+03	-	-	St/ /
K-42	2.E-06	-	-	7.E+04	-	-	St/ /
K-43	4.E-06	-	-	1.E+05	-	-	St/ /
K-44	3.E-05	-	-	1.E+06	-	-	St/ /
K-45	5.E-05	-	-	2.E+06	-	-	St/ /
Ca-41	-	2.E-06	-	-	6.E+04	-	/E/
Ca-45	-	3.E-07	-	-	1.E+04	-	/St/
Ca-47	-	4.E-07	-	-	1.E+04	-	/St/
Sc-43	-	-	1.E-05	-	-	4.E+05	/ /St
Sc-44m	-	-	3.E-07	-	-	1.E+04	/ /St
Sc-44	-	-	5.E-06	-	-	2.E+05	/ /St
Sc-46	-	-	1.E-07	-	-	4.E+03	/ /St
Sc-47	-	-	1.E-06	-	-	5.E+04	/ /St
Sc-48	-	-	6.E-07	-	-	2.E+04	/ /St
Sc-49	-	-	2.E-05	-	-	8.E+05	/ /St
Ti-44	5.E-09	1.E-08	2.E-09	2.E+02	4.E+02	9.E+01	St/St/St
Ti-45	1.E-05	1.E-05	1.E-05	4.E+05	5.E+05	5.E+05	St/St/St
V-47	4.E-05	4.E-05	-	1.E+06	1.E+06	-	St/St/
V-48	4.E-07	3.E-07	-	2.E+04	1.E+04	-	St/St/
V-49	1.E-05	7.E-06	-	5.E+05	3.E+05	-	BS/St/
Cr-48	5.E-06	3.E-06	3.E-06	2.E+05	1.E+05	1.E+05	St/St/St
Cr-49	3.E-05	4.E-05	4.E-05	1.E+06	2.E+06	1.E+06	St/St/St
Cr-51	2.E-05	1.E-05	8.E-06	7.E+05	4.E+05	3.E+05	St/St/St
Mn-51	2.E-05	2.E-05	-	8.E+05	9.E+05	-	St/St/
Mn-52m	4.E-05	4.E-05	-	1.E+06	2.E+06	-	St/St/
Mn-52	5.E-07	4.E-07	-	2.E+04	1.E+04	-	St/St/
Mn-53	5.E-06	5.E-06	-	2.E+05	2.E+05	-	BS/St/
Mn-54	4.E-07	3.E-07	-	1.E+04	1.E+04	-	St/St/
Mn-56	6.E-06	9.E-06	-	2.E+05	3.E+05	-	St/St/
Fe-52	1.E-06	1.E-06	-	5.E+04	4.E+04	-	St/St/
Fe-55	8.E-07	2.E-06	-	3.E+04	6.E+04	-	St/St/
Fe-59	1.E-07	2.E-07	-	5.E+03	8.E+03	-	St/St/
Fe-60	3.E-09	8.E-09	-	1.E+02	3.E+02	-	St/St/
Co-55	-	1.E-06	1.E-06	-	4.E+04	4.E+04	/St/St
Co-56	-	1.E-07	8.E-08	-	5.E+03	3.E+03	/St/St
Co-57	-	1.E-06	3.E-07	-	4.E+04	1.E+04	/St/St
Co-58m	-	4.E-05	3.E-05	-	1.E+06	1.E+06	/St/St
Co-58	-	5.E-07	3.E-07	-	2.E+04	1.E+04	/St/St
Co-60m	-	2.E-03	1.E-03	-	6.E+07	4.E+07	/St/St
Co-60	-	7.E-08	1.E-08	-	3.E+03	5.E+02	/St/St
Co-61	-	3.E-05	2.E-05	-	1.E+06	9.E+05	/St/St
Co-62m	-	7.E-05	7.E-05	-	3.E+06	2.E+06	/St/St
Ni-56 (Inorg)	8.E-07	5.E-07	-	3.E+04	2.E+04	-	St/St/
Ni-56 (Vapor)	-	5.E-07	-	-	2.E+04	-	/St/
Ni-57 (Inorg)	2.E-06	1.E-06	-	7.E+04	5.E+04	-	St/St/
Ni-57 (Vapor)	-	3.E-06	-	-	1.E+05	-	/St/
Ni-59 (Inorg)	2.E-06	3.E-06	-	6.E+04	1.E+05	-	St/St/
Ni-59 (Vapor)	-	8.E-07	-	-	3.E+04	-	/St/
Ni-63 (Inorg)	7.E-07	1.E-06	-	3.E+04	4.E+04	-	St/St/
Ni-63 (Vapor)	-	3.E-07	-	-	1.E+04	-	/St/
Ni-65 (Inorg)	1.E-05	1.E-05	-	4.E+05	5.E+05	-	St/St/
Ni-65 (Vapor)	-	7.E-06	-	-	3.E+05	-	/St/
Ni-66 (Inorg)	7.E-07	3.E-07	-	3.E+04	1.E+04	-	St/St/
Ni-66 (Vapor)	-	1.E-06	-	-	5.E+04	-	/St/
Cu-60	4.E-05	5.E-05	4.E-05	1.E+06	2.E+06	2.E+06	St/St/St
Cu-61	1.E-05	2.E-05	1.E-05	5.E+05	6.E+05	5.E+05	St/St/St
Cu-64	1.E-05	1.E-05	9.E-06	5.E+05	4.E+05	3.E+05	St/St/St
Cu-67	3.E-06	2.E-06	2.E-06	1.E+05	8.E+04	7.E+04	St/St/St
Zn-62	-	-	1.E-06	-	-	4.E+04	/ /St
Zn-63	-	-	3.E-05	-	-	1.E+06	/ /St
Zn-65	-	-	1.E-07	-	-	4.E+03	/ /St
Zn-69m	-	-	3.E-06	-	-	1.E+05	/ /St
Zn-69	-	-	6.E-05	-	-	2.E+06	/ /St

Radionuclide	Inhaled air-lung retention class ³			Inhaled air-lung retention class ³			Stochastic or organ ¹
	μCi/ml			Bq/m ³			
	D	W	Y	D	W	Y	(D/ W/ Y)
Zn-71m	-	-	7.E-06	-	-	3.E+05	/ /St
Zn-72	-	-	5.E-07	-	-	2.E+04	/ /St
Ga-65	7.E-05	8.E-05	-	3.E+06	3.E+06	-	St/St/
Ga-66	1.E-06	1.E-06	-	5.E+04	5.E+04	-	St/St/
Ga-67	6.E-06	4.E-06	-	2.E+05	2.E+05	-	St/St/
Ga-68	2.E-05	2.E-05	-	6.E+05	8.E+05	-	St/St/
Ga-70	7.E-05	8.E-05	-	3.E+06	3.E+06	-	St/St/
Ga-72	2.E-06	1.E-06	-	6.E+04	5.E+04	-	St/St/
Ga-73	6.E-06	6.E-06	-	2.E+05	2.E+05	-	St/St/
Ge-66	1.E-05	8.E-06	-	4.E+05	3.E+05	-	St/St/
Ge-67	4.E-05	4.E-05	-	1.E+06	2.E+06	-	St/St/
Ge-68	2.E-06	4.E-08	-	6.E+04	2.E+03	-	St/St/
Ge-69	6.E-06	3.E-06	-	2.E+05	1.E+05	-	St/St/
Ge-71	2.E-04	2.E-05	-	7.E+06	6.E+05	-	St/St/
Ge-75	3.E-05	3.E-05	-	1.E+06	1.E+06	-	St/St/
Ge-77	4.E-06	2.E-06	-	2.E+05	9.E+04	-	St/St/
Ge-78	9.E-06	9.E-06	-	4.E+05	3.E+05	-	St/St/
As-69	-	5.E-05	-	-	2.E+06	-	/St/
As-70	-	2.E-05	-	-	8.E+05	-	/St/
As-71	-	2.E-06	-	-	7.E+04	-	/St/
As-72	-	6.E-07	-	-	2.E+04	-	/St/
As-73	-	7.E-07	-	-	3.E+04	-	/St/
As-74	-	3.E-07	-	-	1.E+04	-	/St/
As-76	-	6.E-07	-	-	2.E+04	-	/St/
As-77	-	2.E-06	-	-	8.E+04	-	/St/
As-78	-	9.E-06	-	-	3.E+05	-	/St/
Se-70	1.E-05	2.E-05	-	6.E+05	7.E+05	-	St/St/
Se-73m	6.E-05	6.E-05	-	2.E+06	2.E+06	-	St/St/
Se-73	6.E-06	7.E-06	-	2.E+05	2.E+05	-	St/St/
Se-75	3.E-07	3.E-07	-	1.E+04	9.E+03	-	St/St/
Se-79	3.E-07	2.E-07	-	1.E+04	9.E+03	-	St/St/
Se-81m	3.E-05	3.E-05	-	1.E+06	1.E+06	-	St/St/
Se-81	9.E-05	1.E-04	-	3.E+06	4.E+06	-	St/St/
Se-83	5.E-05	5.E-05	-	2.E+06	2.E+06	-	St/St/
Br-74m	1.E-05	2.E-05	-	6.E+05	6.E+05	-	St/St/
Br-74	3.E-05	3.E-05	-	1.E+06	1.E+06	-	St/St/
Br-75	2.E-05	2.E-05	-	7.E+05	8.E+05	-	St/St/
Br-76	2.E-06	2.E-06	-	7.E+04	7.E+04	-	St/St/
Br-77	1.E-05	8.E-06	-	4.E+05	3.E+05	-	St/St/
Br-80m	7.E-06	6.E-06	-	3.E+05	2.E+05	-	St/St/
Br-80	8.E-05	9.E-05	-	3.E+06	3.E+06	-	St/St/
Br-82	2.E-06	2.E-06	-	6.E+04	6.E+04	-	St/St/
Br-83	3.E-05	3.E-05	-	1.E+06	1.E+06	-	St/St/
Br-84	2.E-05	3.E-05	-	9.E+05	1.E+06	-	St/St/
Rb-79	5.E-05	-	-	2.E+06	-	-	St/ /
Rb-81m	1.E-04	-	-	5.E+06	-	-	St/ /
Rb-81	2.E-05	-	-	8.E+05	-	-	St/ /
Rb-82m	7.E-06	-	-	3.E+05	-	-	St/ /
Rb-83	4.E-07	-	-	2.E+04	-	-	St/ /
Rb-84	3.E-07	-	-	1.E+04	-	-	St/ /
Rb-86	3.E-07	-	-	1.E+04	-	-	St/ /
Rb-87	6.E-07	-	-	2.E+04	-	-	St/ /
Rb-88	3.E-05	-	-	1.E+06	-	-	St/ /
Rb-89	6.E-05	-	-	2.E+06	-	-	St/ /
Sr-80	5.E-06	-	5.E-06	2.E+05	-	2.E+05	St/ /St
Sr-81	3.E-05	-	3.E-05	1.E+06	-	1.E+06	St/ /St
Sr-83	3.E-06	-	2.E-06	1.E+05	-	5.E+04	St/ /St
Sr-85m	3.E-04	-	3.E-04	9.E+06	-	1.E+07	St/ /St
Sr-85	1.E-06	-	7.E-07	4.E+04	-	2.E+04	St/ /St
Sr-87m	5.E-05	-	6.E-05	2.E+06	-	2.E+06	St/ /St
Sr-89	3.E-07	-	6.E-08	1.E+04	-	2.E+03	St/ /St
Sr-90	8.E-09	-	2.E-09	3.E+02	-	6.E+01	BS/ /St
Sr-91	2.E-06	-	1.E-06	9.E+04	-	5.E+04	St/ /St
Sr-92	4.E-06	-	3.E-06	1.E+05	-	1.E+05	St/ /St
Y-86m	-	2.E-05	2.E-05	-	9.E+05	9.E+05	/St/St
Y-86	-	1.E-06	1.E-06	-	5.E+04	5.E+04	/St/St
Y-87	-	1.E-06	1.E-06	-	5.E+04	5.E+04	/St/St
Y-88	-	1.E-07	1.E-07	-	4.E+03	4.E+03	/St/St
Y-90m	-	5.E-06	5.E-06	-	2.E+05	2.E+05	/St/St
Y-90	-	3.E-07	2.E-07	-	1.E+04	9.E+03	/St/St
Y-91m	-	1.E-04	7.E-05	-	4.E+06	3.E+06	/St/St

Radionuclide	Inhaled air-lung retention class ³			Inhaled air-lung retention class ³			Stochastic or organ ¹
	μCi/ml			Bq/m ³			
	D	W	Y	D	W	Y	(D/ W/ Y)
Y-91	—	7.E-08	5.E-08	—	3.E+03	2.E+03	/St/St
Y-92	—	3.E-06	3.E-06	—	1.E+05	1.E+05	/St/St
Y-93	—	1.E-06	1.E-06	—	4.E+04	4.E+04	/St/St
Y-94	—	3.E-05	3.E-05	—	1.E+06	1.E+06	/St/St
Y-95	—	6.E-05	6.E-05	—	2.E+06	2.E+06	/St/St
Zr-86	2.E-06	1.E-06	1.E-06	6.E+04	4.E+04	4.E+04	St/St/St
Zr-88	9.E-08	2.E-07	1.E-07	3.E+03	7.E+03	5.E+03	St/St/St
Zr-89	2.E-06	1.E-06	1.E-06	5.E+04	4.E+04	4.E+04	St/St/St
Zr-93	3.E-09	1.E-08	2.E-08	1.E+02	4.E+02	9.E+02	BS/BS/BS
Zr-95	6.E-08	2.E-07	1.E-07	2.E+03	6.E+03	4.E+03	BS/St/St
Zr-97	8.E-07	6.E-07	5.E-07	3.E+04	2.E+04	2.E+04	St/St/St
Nb-88	—	1.E-04	9.E-05	—	4.E+06	3.E+06	/St/St
Nb-89 (66 min)	—	2.E-05	2.E-05	—	6.E+05	6.E+05	/St/St
Nb-89 (122 min)	—	8.E-06	7.E-06	—	3.E+05	2.E+05	/St/St
Nb-90	—	1.E-06	1.E-06	—	4.E+04	4.E+04	/St/St
Nb-93m	—	5.E-07	7.E-08	—	2.E+04	3.E+03	/St/St
Nb-94	—	8.E-08	6.E-09	—	3.E+03	2.E+02	/St/St
Nb-95m	—	1.E-06	9.E-07	—	4.E+04	4.E+04	/St/St
Nb-95	—	5.E-07	5.E-07	—	2.E+04	2.E+04	/St/St
Nb-96	—	1.E-06	1.E-06	—	4.E+04	4.E+04	/St/St
Nb-97	—	3.E-05	3.E-05	—	1.E+06	1.E+06	/St/St
Nb-98	—	2.E-05	2.E-05	—	8.E+05	8.E+05	/St/St
Mo-90	3.E-06	—	2.E-06	1.E+05	—	7.E+04	St/ /St
Mo-93m	7.E-06	—	6.E-06	3.E+05	—	2.E+05	St/ /St
Mo-93	2.E-06	—	7.E-08	8.E+04	—	3.E+03	St/ /St
Mo-99	1.E-06	—	6.E-07	4.E+04	—	2.E+04	St/ /St
Mo-101	6.E-05	—	6.E-05	2.E+06	—	2.E+06	St/ /St
Tc-93m	7.E-05	1.E-04	—	2.E+06	5.E+06	—	St/St/
Tc-93	3.E-05	4.E-05	—	1.E+06	2.E+06	—	St/St/
Tc-94m	2.E-05	2.E-05	—	7.E+05	9.E+05	—	St/St/
Tc-94	8.E-06	1.E-05	—	3.E+05	4.E+05	—	St/St/
Tc-96m	1.E-04	1.E-04	—	4.E+06	4.E+06	—	St/St/
Tc-96	1.E-06	9.E-07	—	5.E+04	3.E+04	—	St/St/
Tc-97m	3.E-06	5.E-07	—	1.E+05	2.E+04	—	SW/St/
Tc-97	2.E-05	2.E-06	—	8.E+05	9.E+04	—	St/St/
Tc-98	7.E-07	1.E-07	—	3.E+04	5.E+03	—	St/St/
Tc-99m	6.E-05	1.E-04	—	2.E+06	4.E+06	—	St/St/
Tc-99	2.E-06	3.E-07	—	8.E+04	1.E+04	—	SW/St/
Tc-101	1.E-04	2.E-04	—	5.E+06	6.E+06	—	St/St/
Tc-104	3.E-05	4.E-05	—	1.E+06	1.E+06	—	St/St/
Ru-94	2.E-05	3.E-05	2.E-05	7.E+05	1.E+06	9.E+05	St/St/St
Ru-97	8.E-06	5.E-06	5.E-06	3.E+05	2.E+05	2.E+05	St/St/St
Ru-103	7.E-07	4.E-07	3.E-07	3.E+04	2.E+04	1.E+04	St/St/St
Ru-105	6.E-06	6.E-06	5.E-06	2.E+05	2.E+05	2.E+05	St/St/St
Ru-106	4.E-08	2.E-08	5.E-09	1.E+03	8.E+02	2.E+02	St/St/St
Rh-99m	2.E-05	3.E-05	3.E-05	9.E+05	1.E+06	1.E+06	St/St/St
Rh-99	1.E-06	9.E-07	8.E-07	5.E+04	3.E+04	3.E+04	St/St/St
Rh-100	2.E-06	2.E-06	2.E-06	8.E+04	6.E+04	6.E+04	St/St/St
Rh-101m	5.E-06	3.E-06	3.E-06	2.E+05	1.E+05	1.E+05	St/St/St
Rh-101	2.E-07	3.E-07	7.E-08	8.E+03	1.E+04	2.E+03	St/St/St
Rh-102m	2.E-07	2.E-07	5.E-08	8.E+03	6.E+03	2.E+03	St/St/St
Rh-102	4.E-08	7.E-08	2.E-08	1.E+03	3.E+03	9.E+02	St/St/St
Rh-103m	4.E-04	5.E-04	5.E-04	2.E+07	2.E+07	2.E+07	St/St/St
Rh-105	5.E-06	3.E-06	2.E-06	2.E+05	1.E+05	9.E+04	St/St/St
Rh-106m	1.E-05	1.E-05	1.E-05	4.E+05	6.E+05	5.E+05	St/St/St
Rh-107	1.E-04	1.E-04	1.E-04	4.E+06	4.E+06	4.E+06	St/St/St
Pd-100	6.E-07	5.E-07	6.E-07	2.E+04	2.E+04	2.E+04	St/St/St
Pd-101	1.E-05	1.E-05	1.E-05	5.E+05	5.E+05	5.E+05	St/St/St
Pd-103	3.E-06	2.E-06	1.E-06	1.E+05	7.E+04	5.E+04	St/St/St
Pd-107	9.E-06	3.E-06	2.E-07	3.E+05	1.E+05	6.E+03	K /St/St
Pd-109	3.E-06	2.E-06	2.E-06	1.E+05	8.E+04	7.E+04	St/St/St
Ag-102	8.E-05	9.E-05	8.E-05	3.E+06	3.E+06	3.E+06	St/St/St
Ag-103	4.E-05	6.E-05	5.E-05	2.E+06	2.E+06	2.E+06	St/St/St
Ag-104m	4.E-05	5.E-05	5.E-05	2.E+06	2.E+06	2.E+06	St/St/St
Ag-104	3.E-05	6.E-05	6.E-05	1.E+06	2.E+06	2.E+06	St/St/St
Ag-105	4.E-07	7.E-07	7.E-07	2.E+04	3.E+04	3.E+04	St/St/St
Ag-106m	3.E-07	4.E-07	4.E-07	1.E+04	1.E+04	1.E+04	St/St/St
Ag-106	7.E-05	8.E-05	8.E-05	3.E+06	3.E+06	3.E+06	St/St/St
Ag-108m	8.E-08	1.E-07	1.E-08	3.E+03	4.E+03	4.E+02	St/St/St
Ag-110m	6.E-08	8.E-08	4.E-08	2.E+03	3.E+03	1.E+03	St/St/St
Ag-111	7.E-07	4.E-07	4.E-07	2.E+04	1.E+04	1.E+04	L /St/St

Radionuclide	Inhaled air-lung retention class ³			Inhaled air-lung retention class ³			Stochastic or organ ¹
	μCi/ml			Bq/m ³			
	D	W	Y	D	W	Y	(D/ W/ Y)
Ag-112	3.E-06	4.E-06	4.E-06	1.E+05	2.E+05	1.E+05	St/St/St
Ag-115	4.E-05	4.E-05	3.E-05	1.E+06	1.E+06	1.E+06	St/St/St
Cd-104	3.E-05	5.E-05	5.E-05	1.E+06	2.E+06	2.E+06	St/St/St
Cd-107	2.E-05	2.E-05	2.E-05	8.E+05	9.E+05	8.E+05	St/St/St
Cd-109	1.E-08	5.E-08	5.E-08	5.E+02	2.E+03	2.E+03	K /K /St
Cd-113m	1.E-09	4.E-09	5.E-09	4.E+01	1.E+02	2.E+02	K /K /St
Cd-113	9.E-10	3.E-09	6.E-09	4.E+01	1.E+02	2.E+02	K /K /St
Cd-115m	2.E-08	5.E-08	6.E-08	8.E+02	2.E+03	2.E+03	K /St/St
Cd-115	6.E-07	5.E-07	6.E-07	2.E+04	2.E+04	2.E+04	St/St/St
Cd-117m	5.E-06	7.E-06	6.E-06	2.E+05	3.E+05	2.E+05	St/St/St
Cd-117	5.E-06	7.E-06	6.E-06	2.E+05	3.E+05	2.E+05	St/St/St
In-109	2.E-05	3.E-05	-	7.E+05	1.E+06	-	St/St/
In-110 (69 min)	2.E-05	2.E-05	-	7.E+05	9.E+05	-	St/St/
In-110 (5 h)	7.E-06	8.E-06	-	3.E+05	3.E+05	-	St/St/
In-111	3.E-06	3.E-06	-	1.E+05	1.E+05	-	St/St/
In-112	3.E-04	3.E-04	-	1.E+07	1.E+07	-	St/St/
In-113m	6.E-05	8.E-05	-	2.E+06	3.E+06	-	St/St/
In-114m	3.E-08	4.E-08	-	1.E+03	2.E+03	-	St/St/
In-115m	2.E-05	2.E-05	-	7.E+05	7.E+05	-	St/St/
In-115	6.E-10	2.E-09	-	2.E+01	8.E+01	-	St/St/
In-116m	3.E-05	5.E-05	-	1.E+06	2.E+06	-	St/St/
In-117m	1.E-05	2.E-05	-	5.E+05	7.E+05	-	St/St/
In-117	7.E-05	9.E-05	-	3.E+06	3.E+06	-	St/St/
In-119m	5.E-05	6.E-05	-	2.E+06	2.E+06	-	St/St/
Sn-110	5.E-06	5.E-06	-	2.E+05	2.E+05	-	St/St/
Sn-111	9.E-05	1.E-04	-	4.E+06	4.E+06	-	St/St/
Sn-113	5.E-07	2.E-07	-	2.E+04	9.E+03	-	St/St/
Sn-117m	5.E-07	6.E-07	-	2.E+04	2.E+04	-	BS/St/
Sn-119m	1.E-06	4.E-07	-	4.E+04	1.E+04	-	St/St/
Sn-121m	4.E-07	2.E-07	-	1.E+04	9.E+03	-	St/St/
Sn-121	6.E-06	5.E-06	-	2.E+05	2.E+05	-	St/St/
Sn-123m	5.E-05	6.E-05	-	2.E+06	2.E+06	-	St/St/
Sn-123	3.E-07	7.E-08	-	1.E+04	3.E+03	-	St/St/
Sn-125	4.E-07	2.E-07	-	1.E+04	5.E+03	-	St/St/
Sn-126	2.E-08	3.E-08	-	9.E+02	1.E+03	-	St/St/
Sn-127	8.E-06	8.E-06	-	3.E+05	3.E+05	-	St/St/
Sn-128	1.E-05	1.E-05	-	4.E+05	6.E+05	-	St/St/
Sb-115	1.E-04	1.E-04	-	4.E+06	5.E+06	-	St/St/
Sb-116m	3.E-05	6.E-05	-	1.E+06	2.E+06	-	St/St/
Sb-116	1.E-04	1.E-04	-	4.E+06	5.E+06	-	St/St/
Sb-117	9.E-05	1.E-04	-	3.E+06	4.E+06	-	St/St/
Sb-118m	8.E-06	9.E-06	-	3.E+05	3.E+05	-	St/St/
Sb-119	2.E-05	1.E-05	-	7.E+05	4.E+05	-	St/St/
Sb-120 (16 min)	2.E-04	2.E-04	-	7.E+06	8.E+06	-	St/St/
Sb-120 (6 d)	9.E-07	6.E-07	-	3.E+04	2.E+04	-	St/St/
Sb-122	1.E-06	4.E-07	-	4.E+04	2.E+04	-	St/St/
Sb-124m	3.E-04	3.E-04	-	1.E+07	9.E+06	-	St/St/
Sb-124	4.E-07	1.E-07	-	1.E+04	4.E+03	-	St/St/
Sb-125	1.E-06	2.E-07	-	4.E+04	8.E+03	-	St/St/
Sb-126m	8.E-05	8.E-05	-	3.E+06	3.E+06	-	St/St/
Sb-126	4.E-07	2.E-07	-	2.E+04	8.E+03	-	St/St/
Sb-127	9.E-07	4.E-07	-	3.E+04	1.E+04	-	St/St/
Sb-128 (9 h)	2.E-06	1.E-06	-	6.E+04	5.E+04	-	St/St/
Sb-128 (10 min)	2.E-04	2.E-04	-	6.E+06	7.E+06	-	St/St/
Sb-129	4.E-06	4.E-06	-	1.E+05	1.E+05	-	St/St/
Sb-130	3.E-05	3.E-05	-	1.E+06	1.E+06	-	St/St/
Sb-131	1.E-05	1.E-05	-	4.E+05	4.E+05	-	T /T /
Te-116	9.E-06	1.E-05	-	3.E+05	5.E+05	-	St/St/
Te-121m	8.E-08	2.E-07	-	3.E+03	6.E+03	-	BS/St/
Te-121	2.E-06	1.E-06	-	7.E+04	5.E+04	-	St/St/
Te-123m	9.E-08	2.E-07	-	3.E+03	8.E+03	-	BS/St/
Te-123	8.E-08	2.E-07	-	3.E+03	7.E+03	-	BS/BS/
Te-125m	2.E-07	3.E-07	-	7.E+03	1.E+04	-	BS/St/
Te-127m	1.E-07	1.E-07	-	4.E+03	4.E+03	-	BS/St/
Te-127	9.E-06	7.E-06	-	4.E+05	3.E+05	-	St/St/
Te-129m	3.E-07	1.E-07	-	1.E+04	4.E+03	-	St/St/
Te-129	3.E-05	3.E-05	-	1.E+06	1.E+06	-	St/St/
Te-131m	2.E-07	2.E-07	-	6.E+03	6.E+03	-	T /T /
Te-131	2.E-06	2.E-06	-	8.E+04	8.E+04	-	T /T /
Te-132	9.E-08	9.E-08	-	4.E+03	3.E+03	-	T /T /
Te-133m	2.E-06	2.E-06	-	8.E+04	8.E+04	-	T /T /

Radionuclide	Inhaled air-lung retention class ³			Inhaled air-lung retention class ³			Stochastic or organ ¹
	μCi/ml			Bq/m ³			
	D	W	Y	D	W	Y	(D/ W/ Y)
Te-133	9.E-06	9.E-06	-	4.E+05	4.E+05	-	T / T /
Te-134	1.E-05	1.E-05	-	4.E+05	4.E+05	-	T / T /
I-120m	9.E-06	-	-	3.E+05	-	-	St / /
I-120	4.E-06	-	-	1.E+05	-	-	T / /
I-121	7.E-06	-	-	3.E+05	-	-	T / /
I-123	3.E-06	-	-	1.E+05	-	-	T / /
I-124	3.E-08	-	-	1.E+03	-	-	T / /
I-125	3.E-08	-	-	1.E+03	-	-	T / /
I-126	1.E-08	-	-	5.E+02	-	-	T / /
I-128	5.E-05	-	-	2.E+06	-	-	St / /
I-129	4.E-09	-	-	1.E+02	-	-	T / /
I-130	3.E-07	-	-	1.E+04	-	-	T / /
I-131	2.E-08	-	-	7.E+02	-	-	T / /
I-132m	4.E-06	-	-	1.E+05	-	-	T / /
I-132	3.E-06	-	-	1.E+05	-	-	T / /
I-133	1.E-07	-	-	4.E+03	-	-	T / /
I-134	2.E-05	-	-	7.E+05	-	-	E / /
I-135	7.E-07	-	-	2.E+04	-	-	T / /
Cs-125	6.E-05	-	-	2.E+06	-	-	St / /
Cs-127	4.E-05	-	-	2.E+06	-	-	St / /
Cs-129	1.E-05	-	-	5.E+05	-	-	St / /
Cs-130	8.E-05	-	-	3.E+06	-	-	St / /
Cs-131	1.E-05	-	-	5.E+05	-	-	St / /
Cs-132	2.E-06	-	-	6.E+04	-	-	St / /
Cs-134m	6.E-05	-	-	2.E+06	-	-	St / /
Cs-134	4.E-08	-	-	2.E+03	-	-	St / /
Cs-135m	8.E-05	-	-	3.E+06	-	-	St / /
Cs-135	5.E-07	-	-	2.E+04	-	-	St / /
Cs-136	3.E-07	-	-	1.E+04	-	-	St / /
Cs-137	7.E-08	-	-	2.E+03	-	-	St / /
Cs-138	2.E-05	-	-	9.E+05	-	-	St / /
Ba-126	6.E-06	-	-	2.E+05	-	-	St / /
Ba-128	7.E-07	-	-	3.E+04	-	-	St / /
Ba-131m	6.E-04	-	-	2.E+07	-	-	St / /
Ba-131	3.E-06	-	-	1.E+05	-	-	St / /
Ba-133m	4.E-06	-	-	1.E+05	-	-	St / /
Ba-133	3.E-07	-	-	1.E+04	-	-	St / /
Ba-135m	5.E-06	-	-	2.E+05	-	-	St / /
Ba-139	1.E-05	-	-	5.E+05	-	-	St / /
Ba-140	6.E-07	-	-	2.E+04	-	-	St / /
Ba-141	3.E-05	-	-	1.E+06	-	-	St / /
Ba-142	6.E-05	-	-	2.E+06	-	-	St / /
La-131	5.E-05	7.E-05	-	2.E+06	3.E+06	-	St/St/
La-132	4.E-06	5.E-06	-	2.E+05	2.E+05	-	St/St/
La-135	4.E-05	4.E-05	-	2.E+06	2.E+06	-	St/St/
La-137	3.E-08	1.E-07	-	1.E+03	4.E+03	-	L / E /
La-138	2.E-09	6.E-09	-	5.E+01	2.E+02	-	St/St/
La-140	6.E-07	5.E-07	-	2.E+04	2.E+04	-	St/St/
La-141	4.E-06	5.E-06	-	1.E+05	2.E+05	-	St/St/
La-142	9.E-06	1.E-05	-	4.E+05	5.E+05	-	St/St/
La-143	4.E-05	4.E-05	-	2.E+06	1.E+06	-	St/St/
Ce-134	-	3.E-07	3.E-07	-	1.E+04	1.E+04	/St/St
Ce-135	-	2.E-06	2.E-06	-	6.E+04	5.E+04	/St/St
Ce-137m	-	2.E-06	2.E-06	-	7.E+04	6.E+04	/St/St
Ce-137	-	6.E-05	5.E-05	-	2.E+06	2.E+06	/St/St
Ce-139	-	3.E-07	3.E-07	-	1.E+04	1.E+04	/St/St
Ce-141	-	3.E-07	2.E-07	-	1.E+04	9.E+03	/St/St
Ce-143	-	8.E-07	7.E-07	-	3.E+04	2.E+04	/St/St
Ce-144	-	1.E-08	6.E-09	-	4.E+02	2.E+02	/St/St
Pr-136	-	1.E-04	9.E-05	-	4.E+06	4.E+06	/St/St
Pr-137	-	6.E-05	6.E-05	-	2.E+06	2.E+06	/St/St
Pr-138m	-	2.E-05	2.E-05	-	8.E+05	7.E+05	/St/St
Pr-139	-	5.E-05	5.E-05	-	2.E+06	2.E+06	/St/St
Pr-142m	-	7.E-05	6.E-05	-	3.E+06	2.E+06	/St/St
Pr-142	-	8.E-07	8.E-07	-	3.E+04	3.E+04	/St/St
Pr-143	-	3.E-07	3.E-07	-	1.E+04	1.E+04	/St/St
Pr-144	-	5.E-05	5.E-05	-	2.E+06	2.E+06	/St/St
Pr-145	-	4.E-06	3.E-06	-	1.E+05	1.E+05	/St/St
Pr-147	-	8.E-05	8.E-05	-	3.E+06	3.E+06	/St/St
Nd-136	-	2.E-05	2.E-05	-	9.E+05	8.E+05	/St/St
Nd-138	-	3.E-06	2.E-06	-	1.E+05	8.E+04	/St/St

Radionuclide	Inhaled air-lung retention class ³			Inhaled air-lung retention class ³			Stochastic or organ ¹
	μCi/ml			Bq/m ³			
	D	W	Y	D	W	Y	(D/ W/ Y)
Nd-139m	-	7.E-06	6.E-06	-	3.E+05	2.E+05	/St/St
Nd-139	-	1.E-04	1.E-04	-	5.E+06	4.E+06	/St/St
Nd-141	-	3.E-04	3.E-04	-	1.E+07	9.E+06	/St/St
Nd-147	-	4.E-07	3.E-07	-	2.E+04	1.E+04	/St/St
Nd-149	-	1.E-05	1.E-05	-	4.E+05	4.E+05	/St/St
Nd-151	-	8.E-05	8.E-05	-	3.E+06	3.E+06	/St/St
Pm-141	-	8.E-05	7.E-05	-	3.E+06	3.E+06	/St/St
Pm-143	-	3.E-07	3.E-07	-	9.E+03	1.E+04	/St/St
Pm-144	-	5.E-08	5.E-08	-	2.E+03	2.E+03	/St/St
Pm-145	-	7.E-08	8.E-08	-	3.E+03	3.E+03	/BS/St
Pm-146	-	2.E-08	2.E-08	-	8.E+02	7.E+02	/St/St
Pm-147	-	6.E-08	6.E-08	-	2.E+03	2.E+03	/BS/St
Pm-148m	-	1.E-07	1.E-07	-	5.E+03	5.E+03	/St/St
Pm-148	-	2.E-07	2.E-07	-	8.E+03	8.E+03	/St/St
Pm-149	-	8.E-07	8.E-07	-	3.E+04	3.E+04	/St/St
Pm-150	-	8.E-06	7.E-06	-	3.E+05	3.E+05	/St/St
Pm-151	-	2.E-06	1.E-06	-	6.E+04	5.E+04	/St/St
Sm-141m	-	4.E-05	-	-	2.E+06	-	/St/
Sm-141	-	7.E-05	-	-	3.E+06	-	/St/
Sm-142	-	1.E-05	-	-	4.E+05	-	/St/
Sm-145	-	2.E-07	-	-	8.E+03	-	/St/
Sm-146	-	1.E-11	-	-	6.E-01	-	/BS/
Sm-147	-	2.E-11	-	-	6.E-01	-	/BS/
Sm-151	-	4.E-08	-	-	2.E+03	-	/BS/
Sm-153	-	1.E-06	-	-	4.E+04	-	/St/
Sm-155	-	9.E-05	-	-	3.E+06	-	/St/
Sm-156	-	4.E-06	-	-	1.E+05	-	/St/
Eu-145	-	8.E-07	-	-	3.E+04	-	/St/
Eu-146	-	5.E-07	-	-	2.E+04	-	/St/
Eu-147	-	7.E-07	-	-	3.E+04	-	/St/
Eu-148	-	2.E-07	-	-	6.E+03	-	/St/
Eu-149	-	1.E-06	-	-	5.E+04	-	/St/
Eu-150 (12 h)	-	3.E-06	-	-	1.E+05	-	/St/
Eu-150 (34 yr)	-	8.E-09	-	-	3.E+02	-	/St/
Eu-152m	-	3.E-06	-	-	1.E+05	-	/St/
Eu-152	-	1.E-08	-	-	4.E+02	-	/St/
Eu-154	-	8.E-09	-	-	3.E+02	-	/St/
Eu-155	-	4.E-08	-	-	1.E+03	-	/BS/
Eu-156	-	2.E-07	-	-	7.E+03	-	/St/
Eu-157	-	2.E-06	-	-	7.E+04	-	/St/
Eu-158	-	2.E-05	-	-	9.E+05	-	/St/
Gd-145	7.E-05	7.E-05	-	2.E+06	3.E+06	-	St/St/
Gd-146	5.E-08	1.E-07	-	2.E+03	4.E+03	-	St/St/
Gd-147	2.E-06	2.E-06	-	6.E+04	5.E+04	-	St/St/
Gd-148	3.E-12	1.E-11	-	1.E-01	5.E-01	-	BS/BS/
Gd-149	9.E-07	1.E-06	-	3.E+04	4.E+04	-	St/St/
Gd-151	2.E-07	5.E-07	-	6.E+03	2.E+04	-	BS/St/
Gd-152	4.E-12	2.E-11	-	2.E-01	6.E-01	-	BS/BS/
Gd-153	6.E-08	3.E-07	-	2.E+03	9.E+03	-	BS/St/
Gd-159	3.E-06	2.E-06	-	1.E+05	9.E+04	-	St/St/
Tb-147	-	1.E-05	-	-	5.E+05	-	/St/
Tb-149	-	3.E-07	-	-	1.E+04	-	/St/
Tb-150	-	9.E-06	-	-	3.E+05	-	/St/
Tb-151	-	4.E-06	-	-	1.E+05	-	/St/
Tb-153	-	3.E-06	-	-	1.E+05	-	/St/
Tb-154	-	2.E-06	-	-	7.E+04	-	/St/
Tb-155	-	3.E-06	-	-	1.E+05	-	/St/
Tb-156m (24 h)	-	3.E-06	-	-	1.E+05	-	/St/
Tb-156m (5 h)	-	1.E-05	-	-	4.E+05	-	/St/
Tb-156	-	6.E-07	-	-	2.E+04	-	/St/
Tb-157	-	1.E-07	-	-	5.E+03	-	/BS/
Tb-158	-	8.E-09	-	-	3.E+02	-	/St/
Tb-160	-	1.E-07	-	-	4.E+03	-	/St/
Tb-161	-	7.E-07	-	-	2.E+04	-	/St/
Dy-155	-	1.E-05	-	-	4.E+05	-	/St/
Dy-157	-	3.E-05	-	-	1.E+06	-	/St/
Dy-159	-	1.E-06	-	-	4.E+04	-	/St/
Dy-165	-	2.E-05	-	-	7.E+05	-	/St/
Dy-166	-	3.E-07	-	-	1.E+04	-	/St/
Ho-155	-	7.E-05	-	-	2.E+06	-	/St/
Ho-157	-	6.E-04	-	-	2.E+07	-	/St/

Radionuclide	Inhaled air-lung retention class ³			Inhaled air-lung retention class ³			Stochastic or organ ¹
	μCi/ml			Bq/m ³			
	D	W	Y	D	W	Y	(D/ W/ Y)
Ho-159	-	4.E-04	-	-	2.E+07	-	/St/
Ho-161	-	2.E-04	-	-	7.E+06	-	/St/
Ho-162m	-	1.E-04	-	-	4.E+06	-	/St/
Ho-162	-	1.E-03	-	-	4.E+07	-	/St/
Ho-164m	-	1.E-04	-	-	5.E+06	-	/St/
Ho-164	-	3.E-04	-	-	1.E+07	-	/St/
Ho-166m	-	3.E-09	-	-	1.E+02	-	/St/
Ho-166	-	7.E-07	-	-	3.E+04	-	/St/
Ho-167	-	2.E-05	-	-	9.E+05	-	/St/
Er-161	-	3.E-05	-	-	1.E+06	-	/St/
Er-165	-	8.E-05	-	-	3.E+06	-	/St/
Er-169	-	1.E-06	-	-	4.E+04	-	/St/
Er-171	-	4.E-06	-	-	2.E+05	-	/St/
Er-172	-	6.E-07	-	-	2.E+04	-	/St/
Tm-162	-	1.E-04	-	-	4.E+06	-	/St/
Tm-166	-	6.E-06	-	-	2.E+05	-	/St/
Tm-167	-	8.E-07	-	-	3.E+04	-	/St/
Tm-170	-	9.E-08	-	-	3.E+03	-	/St/
Tm-171	-	1.E-07	-	-	5.E+03	-	/BS/
Tm-172	-	5.E-07	-	-	2.E+04	-	/St/
Tm-173	-	5.E-06	-	-	2.E+05	-	/St/
Tm-175	-	1.E-04	-	-	4.E+06	-	/St/
Yb-162	-	1.E-04	1.E-04	-	5.E+06	4.E+06	/St/St
Yb-166	-	8.E-07	8.E-07	-	3.E+04	3.E+04	/St/St
Yb-167	-	3.E-04	3.E-04	-	1.E+07	1.E+07	/St/St
Yb-169	-	3.E-07	3.E-07	-	1.E+04	1.E+04	/St/St
Yb-175	-	1.E-06	1.E-06	-	5.E+04	5.E+04	/St/St
Yb-177	-	2.E-05	2.E-05	-	8.E+05	7.E+05	/St/St
Yb-178	-	2.E-05	1.E-05	-	6.E+05	6.E+05	/St/St
Lu-169	-	2.E-06	2.E-06	-	7.E+04	7.E+04	/St/St
Lu-170	-	9.E-07	8.E-07	-	3.E+04	3.E+04	/St/St
Lu-171	-	8.E-07	8.E-07	-	3.E+04	3.E+04	/St/St
Lu-172	-	5.E-07	5.E-07	-	2.E+04	2.E+04	/St/St
Lu-173	-	1.E-07	1.E-07	-	4.E+03	4.E+03	/BS/St
Lu-174m	-	1.E-07	9.E-08	-	4.E+03	3.E+03	/BS/St
Lu-174	-	5.E-08	7.E-08	-	2.E+03	2.E+03	/BS/St
Lu-176m	-	1.E-05	1.E-05	-	4.E+05	4.E+05	/St/St
Lu-176	-	2.E-09	3.E-09	-	7.E+01	1.E+02	/BS/St
Lu-177m	-	5.E-08	3.E-08	-	2.E+03	1.E+03	/BS/St
Lu-177	-	9.E-07	9.E-07	-	3.E+04	3.E+04	/St/St
Lu-178m	-	8.E-05	7.E-05	-	3.E+06	3.E+06	/St/St
Lu-178	-	5.E-05	5.E-05	-	2.E+06	2.E+06	/St/St
Lu-179	-	8.E-06	6.E-06	-	3.E+05	2.E+05	/St/St
Hf-170	2.E-06	2.E-06	-	9.E+04	7.E+04	-	St/St/
Hf-172	4.E-09	2.E-08	-	1.E+02	6.E+02	-	BS/BS/
Hf-173	5.E-06	5.E-06	-	2.E+05	2.E+05	-	St/St/
Hf-175	4.E-07	5.E-07	-	2.E+04	2.E+04	-	BS/St/
Hf-177m	2.E-05	4.E-05	-	9.E+05	1.E+06	-	St/St/
Hf-178m	6.E-10	2.E-09	-	2.E+01	8.E+01	-	BS/BS/
Hf-179m	1.E-07	3.E-07	-	5.E+03	9.E+03	-	BS/St/
Hf-180m	9.E-06	1.E-05	-	3.E+05	4.E+05	-	St/St/
Hf-181	7.E-08	2.E-07	-	3.E+03	7.E+03	-	BS/St/
Hf-182m	4.E-05	6.E-05	-	1.E+06	2.E+06	-	St/St/
Hf-182	3.E-10	1.E-09	-	1.E+01	5.E+01	-	BS/BS/
Hf-183	2.E-05	2.E-05	-	7.E+05	8.E+05	-	St/St/
Hf-184	3.E-06	3.E-06	-	1.E+05	1.E+05	-	St/St/
Ta-172	-	5.E-05	4.E-05	-	2.E+06	2.E+06	/St/St
Ta-173	-	8.E-06	7.E-06	-	3.E+05	3.E+05	/St/St
Ta-174	-	4.E-05	4.E-05	-	1.E+06	1.E+06	/St/St
Ta-175	-	7.E-06	6.E-06	-	3.E+05	2.E+05	/St/St
Ta-176	-	5.E-06	5.E-06	-	2.E+05	2.E+05	/St/St
Ta-177	-	8.E-06	7.E-06	-	3.E+05	3.E+05	/St/St
Ta-178	-	4.E-05	3.E-05	-	1.E+06	1.E+06	/St/St
Ta-179	-	2.E-06	4.E-07	-	8.E+04	1.E+04	/St/St
Ta-180m	-	3.E-05	2.E-05	-	1.E+06	9.E+05	/St/St
Ta-180	-	2.E-07	1.E-08	-	7.E+03	4.E+02	/St/St
Ta-182m	-	2.E-04	2.E-04	-	8.E+06	6.E+06	/St/St
Ta-182	-	1.E-07	6.E-08	-	5.E+03	2.E+03	/St/St
Ta-183	-	5.E-07	4.E-07	-	2.E+04	2.E+04	/St/St
Ta-184	-	2.E-06	2.E-06	-	8.E+04	7.E+04	/St/St
Ta-185	-	3.E-05	3.E-05	-	1.E+06	1.E+06	/St/St

Radionuclide	Inhaled air-lung retention class ³			Inhaled air-lung retention class ³			Stochastic or organ ¹
	μCi/ml			Bq/m ³			
	D	W	Y	D	W	Y	(D/ W/ Y)
Ta-186	—	1.E-04	9.E-05	—	4.E+06	3.E+06	/St/St
W-176	2.E-05	—	—	8.E+05	—	—	St/ /
W-177	4.E-05	—	—	1.E+06	—	—	St/ /
W-178	8.E-06	—	—	3.E+05	—	—	St/ /
W-179	7.E-04	—	—	3.E+07	—	—	St/ /
W-181	1.E-05	—	—	5.E+05	—	—	St/ /
W-185	3.E-06	—	—	1.E+05	—	—	St/ /
W-187	4.E-06	—	—	2.E+05	—	—	St/ /
W-188	5.E-07	—	—	2.E+04	—	—	St/ /
Re-177	1.E-04	2.E-04	—	4.E+06	5.E+06	—	St/St/
Re-178	1.E-04	1.E-04	—	4.E+06	4.E+06	—	St/St/
Re-181	4.E-06	4.E-06	—	1.E+05	1.E+05	—	St/St/
Re-182 (64 h)	1.E-06	9.E-07	—	4.E+04	3.E+04	—	St/St/
Re-182 (12 h)	5.E-06	6.E-06	—	2.E+05	2.E+05	—	St/St/
Re-184m	1.E-06	2.E-07	—	5.E+04	7.E+03	—	St/St/
Re-184	2.E-06	6.E-07	—	6.E+04	2.E+04	—	St/St/
Re-186m	7.E-07	6.E-08	—	3.E+04	2.E+03	—	SW/St/
Re-186	1.E-06	7.E-07	—	5.E+04	3.E+04	—	St/St/
Re-187	3.E-04	4.E-05	—	1.E+07	2.E+06	—	SW/St/
Re-188m	6.E-05	6.E-05	—	2.E+06	2.E+06	—	St/St/
Re-188	1.E-06	1.E-06	—	4.E+04	4.E+04	—	St/St/
Re-189	2.E-06	2.E-06	—	8.E+04	7.E+04	—	St/St/
Os-180	2.E-04	2.E-04	2.E-04	6.E+06	8.E+06	7.E+06	St/St/St
Os-181	2.E-05	2.E-05	2.E-05	7.E+05	7.E+05	7.E+05	St/St/St
Os-182	2.E-06	2.E-06	2.E-06	9.E+04	7.E+04	6.E+04	St/St/St
Os-185	2.E-07	3.E-07	3.E-07	8.E+03	1.E+04	1.E+04	St/St/St
Os-189m	1.E-04	9.E-05	7.E-05	4.E+06	3.E+06	3.E+06	St/St/St
Os-191m	1.E-05	9.E-06	7.E-06	4.E+05	3.E+05	3.E+05	St/St/St
Os-191	9.E-07	7.E-07	6.E-07	3.E+04	3.E+04	2.E+04	St/St/St
Os-193	2.E-06	1.E-06	1.E-06	7.E+04	5.E+04	4.E+04	St/St/St
Os-194	2.E-08	2.E-08	3.E-09	7.E+02	9.E+02	1.E+02	St/St/St
Ir-182	6.E-05	6.E-05	5.E-05	2.E+06	2.E+06	2.E+06	St/St/St
Ir-184	1.E-05	1.E-05	1.E-05	4.E+05	5.E+05	4.E+05	St/St/St
Ir-185	5.E-06	5.E-06	4.E-06	2.E+05	2.E+05	2.E+05	St/St/St
Ir-186	3.E-06	3.E-06	2.E-06	1.E+05	1.E+05	9.E+04	St/St/St
Ir-187	1.E-05	1.E-05	1.E-05	5.E+05	5.E+05	4.E+05	St/St/St
Ir-188	2.E-06	2.E-06	1.E-06	7.E+04	6.E+04	5.E+04	St/St/St
Ir-189	2.E-06	2.E-06	2.E-06	7.E+04	6.E+04	6.E+04	St/St/St
Ir-190m	8.E-05	9.E-05	8.E-05	3.E+06	3.E+06	3.E+06	St/St/St
Ir-190	4.E-07	4.E-07	4.E-07	1.E+04	2.E+04	1.E+04	St/St/St
Ir-192m	4.E-08	9.E-08	6.E-09	1.E+03	3.E+03	2.E+02	St/St/St
Ir-192	1.E-07	2.E-07	9.E-08	4.E+03	6.E+03	3.E+03	St/St/St
Ir-194m	4.E-08	7.E-08	4.E-08	2.E+03	3.E+03	2.E+03	St/St/St
Ir-194	1.E-06	8.E-07	8.E-07	5.E+04	3.E+04	3.E+04	St/St/St
Ir-195m	1.E-05	1.E-05	9.E-06	4.E+05	4.E+05	3.E+05	St/St/St
Ir-195	2.E-05	2.E-05	2.E-05	6.E+05	8.E+05	7.E+05	St/St/St
Pt-186	2.E-05	—	—	6.E+05	—	—	St/ /
Pt-188	7.E-07	—	—	3.E+04	—	—	St/ /
Pt-189	1.E-05	—	—	4.E+05	—	—	St/ /
Pt-191	3.E-06	—	—	1.E+05	—	—	St/ /
Pt-193m	2.E-06	—	—	9.E+04	—	—	St/ /
Pt-193	1.E-05	—	—	4.E+05	—	—	St/ /
Pt-195m	2.E-06	—	—	7.E+04	—	—	St/ /
Pt-197m	2.E-05	—	—	7.E+05	—	—	St/ /
Pt-197	4.E-06	—	—	2.E+05	—	—	St/ /
Pt-199	6.E-05	—	—	2.E+06	—	—	St/ /
Pt-200	1.E-06	—	—	5.E+04	—	—	St/ /
Au-193	1.E-05	8.E-06	8.E-06	4.E+05	3.E+05	3.E+05	St/St/St
Au-194	3.E-06	2.E-06	2.E-06	1.E+05	9.E+04	8.E+04	St/St/St
Au-195	5.E-06	6.E-07	2.E-07	2.E+05	2.E+04	6.E+03	St/St/St
Au-198m	1.E-06	5.E-07	5.E-07	4.E+04	2.E+04	2.E+04	St/St/St
Au-198	2.E-06	7.E-07	7.E-07	6.E+04	3.E+04	3.E+04	St/St/St
Au-199	4.E-06	2.E-06	2.E-06	1.E+05	6.E+04	6.E+04	St/St/St
Au-200m	1.E-06	1.E-06	1.E-06	5.E+04	4.E+04	4.E+04	St/St/St
Au-200	3.E-05	3.E-05	3.E-05	1.E+06	1.E+06	1.E+06	St/St/St
Au-201	9.E-05	1.E-04	9.E-05	3.E+06	4.E+06	4.E+06	St/St/St
Hg-193m (Org)	6.E-06	—	—	2.E+05	—	—	St/ /
Hg-193m (Inorg)	4.E-06	3.E-06	—	1.E+05	1.E+05	—	St/St/
Hg-193m (Vapor)	—	4.E-06	—	—	1.E+05	—	/St/ /
Hg-193 (Org)	3.E-05	—	—	1.E+06	—	—	St/ /
Hg-193 (Inorg)	2.E-05	2.E-05	—	7.E+05	6.E+05	—	St/St/

Radionuclide	Inhaled air-lung retention class ³			Inhaled air-lung retention class ³			Stochastic or organ ¹
	μCi/ml			Bq/m ³			
	D	W	Y	D	W	Y	(D/ W/ Y)
Hg-193 (Vapor) ...	—	1.E-05	—	—	5.E+05	—	/St/
Hg-194 (Org)	1.E-08	—	—	4.E+02	—	—	St/ /
Hg-194 (Inorg)	2.E-08	5.E-08	—	7.E+02	2.E+03	—	St/St/
Hg-194 (Vapor) ...	—	1.E-08	—	—	5.E+02	—	/St/
Hg-195m (Org) ...	3.E-06	—	—	9.E+04	—	—	St/ /
Hg-195m (Inorg) ...	2.E-06	2.E-06	—	8.E+04	6.E+04	—	St/St/
Hg-195m (Vapor) ...	—	-2.E-06	—	—	6.E+04	—	/St/
Hg-195 (Org)	2.E-05	—	—	7.E+05	—	—	St/ /
Hg-195 (Inorg)	1.E-05	1.E-05	—	5.E+05	5.E+05	—	St/St/
Hg-195 (Vapor) ...	—	1.E-05	—	—	5.E+05	—	/St/
Hg-197m (Org) ...	4.E-06	—	—	1.E+05	—	—	St/ /
Hg-197m (Inorg) ...	3.E-06	2.E-06	—	1.E+05	8.E+04	—	St/St/
Hg-197m (Vapor) ...	—	2.E-06	—	—	8.E+04	—	/St/
Hg-197 (Org)	6.E-06	—	—	2.E+05	—	—	St/ /
Hg-197 (Inorg)	5.E-06	4.E-06	—	2.E+05	1.E+05	—	St/St/
Hg-197 (Vapor) ...	—	3.E-05	—	—	1.E+05	—	/St/
Hg-199m (Org) ...	7.E-05	—	—	3.E+06	—	—	St/ /
Hg-199m (Inorg) ...	6.E-05	7.E-05	—	2.E+06	3.E+06	—	St/St/
Hg-199m (Vapor) ...	—	3.E-05	—	—	1.E+06	—	/St/
Hg-203 (Org)	3.E-07	—	—	1.E+04	—	—	St/ /
Hg-203 (Inorg)	5.E-07	5.E-07	—	2.E+04	2.E+04	—	St/St/
Hg-203 (Vapor) ...	—	3.E-07	—	—	1.E+04	—	/St/
Tl-194m	6.E-05	—	—	2.E+06	—	—	St/ /
Tl-194	3.E-04	—	—	9.E+06	—	—	St/ /
Tl-195	5.E-05	—	—	2.E+06	—	—	St/ /
Tl-197	5.E-05	—	—	2.E+06	—	—	St/ /
Tl-198m	2.E-05	—	—	9.E+05	—	—	St/ /
Tl-198	1.E-05	—	—	5.E+05	—	—	St/ /
Tl-199	3.E-05	—	—	1.E+06	—	—	St/ /
Tl-200	5.E-06	—	—	2.E+05	—	—	St/ /
Tl-201	9.E-06	—	—	3.E+05	—	—	St/ /
Tl-202	2.E-06	—	—	8.E+04	—	—	St/ /
Tl-204	9.E-07	—	—	3.E+04	—	—	St/ /
Pb-195m	8.E-05	—	—	3.E+06	—	—	St/ /
Pb-198	3.E-05	—	—	1.E+06	—	—	St/ /
Pb-199	3.E-05	—	—	1.E+06	—	—	St/ /
Pb-200	3.E-06	—	—	1.E+05	—	—	St/ /
Pb-201	9.E-06	—	—	3.E+05	—	—	St/ /
Pb-202m	1.E-05	—	—	4.E+05	—	—	St/ /
Pb-202	2.E-08	—	—	8.E+02	—	—	St/ /
Pb-203	4.E-06	—	—	2.E+05	—	—	St/ /
Pb-205	6.E-07	—	—	2.E+04	—	—	St/ /
Pb-209	2.E-05	—	—	9.E+05	—	—	St/ /
Pb-210	1.E-10	—	—	4.E+00	—	—	BS/ /
Pb-211	3.E-07	—	—	1.E+04	—	—	St/ /
Pb-212	1.E-08	—	—	5.E+02	—	—	St/ /
Pb-214	3.E-07	—	—	1.E+04	—	—	St/ /
Bi-200	3.E-05	4.E-05	—	1.E+06	2.E+06	—	St/St/
Bi-201	1.E-05	2.E-05	—	4.E+05	6.E+05	—	St/St/
Bi-202	2.E-05	3.E-05	—	6.E+05	1.E+06	—	St/St/
Bi-203	3.E-06	2.E-06	—	1.E+05	9.E+04	—	St/St/
Bi-205	1.E-06	5.E-07	—	4.E+04	2.E+04	—	St/St/
Bi-206	6.E-07	4.E-07	—	2.E+04	1.E+04	—	St/St/
Bi-207	7.E-07	2.E-07	—	3.E+04	5.E+03	—	St/St/
Bi-210m	2.E-09	3.E-10	—	7.E+01	1.E+01	—	K /St/
Bi-210	1.E-07	1.E-08	—	4.E+03	4.E+02	—	K /St/
Bi-212	1.E-07	1.E-07	—	4.E+03	4.E+03	—	St/St/
Bi-213	1.E-07	2.E-07	—	5.E+03	5.E+03	—	St/St/
Bi-214	3.E-07	4.E-07	—	1.E+04	1.E+04	—	St/St/
Po-203	3.E-05	4.E-05	—	1.E+06	1.E+06	—	St/St/
Po-205	2.E-05	3.E-05	—	6.E+05	1.E+06	—	St/St/
Po-207	1.E-05	1.E-05	—	4.E+05	4.E+05	—	St/St/
Po-210	3.E-10	3.E-10	—	1.E+01	1.E+01	—	E /St/
At-207	1.E-06	9.E-07	—	4.E+04	3.E+04	—	St/St/
At-211	3.E-08	2.E-08	—	1.E+03	8.E+02	—	St/St/
Rn-220	8.E-09 ⁴	— ⁴	— ⁴	3.E+02 ⁴	— ⁴	— ⁴	— ⁴
Rn-222	3.E-08 ⁴	— ⁴	— ⁴	1.E+03 ⁴	— ⁴	— ⁴	— ⁴
Fr-222	2.E-07	—	—	7.E+03	—	—	St/ /
Fr-223	3.E-07	—	—	1.E+04	—	—	St/ /
Ra-223	—	3.E-10	—	—	1.E+01	—	/St/
Ra-224	—	7.E-10	—	—	3.E+01	—	/St/

Radionuclide	Inhaled air-lung retention class ³			Inhaled air-lung retention class ³			Stochastic or organ ¹
	μCi/ml			Bq/m ³			
	D	W	Y	D	W	Y	(D/ W/ Y)
Ra-225	-	3.E-10	-	-	1.E+01	-	/St/
Ra-226	-	3.E-10	-	-	1.E+01	-	/St/
Ra-227	-	6.E-06	-	-	2.E+05	-	/BS/
Ra-228	-	5.E-10	-	-	2.E+01	-	/St/
Ac-224	1.E-08	2.E-08	2.E-08	4.E+02	8.E+02	7.E+02	BS/St/St
Ac-225	1.E-10	3.E-10	3.E-10	4.E+00	1.E+01	1.E+01	BS/St/St
Ac-226	1.E-09	2.E-09	2.E-09	5.E+01	8.E+01	7.E+01	BS/St/St
Ac-227	2.E-13	7.E-13	2.E-12	7.E-03	3.E-02	6.E-02	BS/BS/St
Ac-228	4.E-09	2.E-08	2.E-08	2.E+02	6.E+02	7.E+02	BS/BS/St
Th-226	-	7.E-08	6.E-08	-	2.E+03	2.E+03	/St/St
Th-227	-	1.E-10	1.E-10	-	5.E+00	5.E+00	/St/St
Th-228	-	4.E-12	7.E-12	-	2.E-01	3.E-01	/BS/St
Th-229	-	4.E-13	1.E-12	-	1.E-02	4.E-02	/BS/BS
Th-230	-	3.E-12	7.E-12	-	9.E-02	2.E-01	/BS/BS
Th-231	-	3.E-06	3.E-06	-	1.E+05	1.E+05	/St/St
Th-232	-	5.E-13	1.E-12	-	2.E-02	4.E-02	/BS/BS
Th-234	-	9.E-08	6.E-08	-	3.E+03	2.E+03	/St/St
Pa-227	-	5.E-08	4.E-08	-	2.E+03	2.E+03	/St/St
Pa-228	-	5.E-09	5.E-09	-	2.E+02	2.E+02	/BS/St
Pa-230	-	2.E-09	1.E-09	-	7.E+01	5.E+01	/St/St
Pa-231	-	7.E-13	2.E-12	-	2.E-02	6.E-02	/BS/BS
Pa-232	-	9.E-09	2.E-08	-	3.E+02	9.E+02	/BS/BS
Pa-233	-	3.E-07	2.E-07	-	1.E+04	9.E+03	/St/St
Pa-234	-	3.E-06	3.E-06	-	1.E+05	1.E+05	/St/St
U-230	2.E-10	1.E-10	1.E-10	6.E+00	5.E+00	4.E+00	BS/St/St
U-231	3.E-06	2.E-06	2.E-06	1.E+05	9.E+04	7.E+04	St/St/St
U-232	9.E-11	2.E-10	3.E-12	3.E+00	6.E+00	1.E-01	BS/St/St
U-233	5.E-10	3.E-10	2.E-11	2.E+01	1.E+01	6.E-01	BS/St/St
U-234	5.E-10	3.E-10	2.E-11	2.E+01	1.E+01	6.E-01	BS/St/St
U-235	6.E-10	3.E-10	2.E-11	2.E+01	1.E+01	6.E-01	BS/St/St
U-236	6.E-10	3.E-10	2.E-11	2.E+01	1.E+01	6.E-01	BS/St/St
U-237	1.E-06	7.E-07	6.E-07	4.E+04	3.E+04	2.E+04	St/St/St
U-238	6.E-10	3.E-10	2.E-11	2.E+01	1.E+01	6.E-01	BS/St/St
U-239	8.E-05	7.E-05	6.E-05	3.E+06	3.E+06	2.E+06	St/St/St
U-240	2.E-06	1.E-06	1.E-06	6.E+04	4.E+04	4.E+04	St/St/St
Np-232	-	1.E-06	-	-	4.E+04	-	/BS/
Np-233	-	1.E-03	-	-	5.E+07	-	/St/
Np-234	-	1.E-06	-	-	4.E+04	-	/St/
Np-235	-	5.E-07	-	-	2.E+04	-	/BS/
Np-236 (1.E+05 yr)	-	1.E-11	-	-	4.E-01	-	/BS/
Np-236 (22 h)	-	2.E-08	-	-	6.E+02	-	/BS/
Np-237	-	2.E-12	-	-	9.E-02	-	/BS/
Np-238	-	4.E-08	-	-	1.E+03	-	/BS/
Np-239	-	1.E-06	-	-	4.E+04	-	/St/
Np-240	-	3.E-05	-	-	1.E+06	-	/St/
Pu-234	-	9.E-08	8.E-08	-	3.E+03	3.E+03	/St/St
Pu-235	-	1.E-03	1.E-03	-	5.E+07	4.E+07	/St/St
Pu-236	-	7.E-12	1.E-11	-	3.E-01	6.E-01	/BS/St
Pu-237	-	1.E-06	1.E-06	-	5.E+04	5.E+04	/St/St
Pu-238	-	3.E-12	7.E-12	-	9.E-02	3.E-01	/BS/BS
Pu-239	-	2.E-12	6.E-12	-	8.E-02	2.E-01	/BS/BS
Pu-240	-	2.E-12	6.E-12	-	8.E-02	2.E-01	/BS/BS
Pu-241	-	1.E-10	3.E-10	-	4.E+00	1.E+01	/BS/BS
Pu-242	-	2.E-12	6.E-12	-	9.E-02	2.E-01	/BS/BS
Pu-243	-	1.E-05	1.E-05	-	5.E+05	6.E+05	/St/St
Pu-244	-	2.E-12	6.E-12	-	9.E-02	2.E-01	/BS/BS
Pu-245	-	2.E-06	2.E-06	-	7.E+04	6.E+04	/St/St
Am-237	-	1.E-04	-	-	4.E+06	-	/St/
Am-238	-	1.E-06	-	-	4.E+04	-	/BS/
Am-239	-	5.E-06	-	-	2.E+05	-	/St/
Am-240	-	1.E-06	-	-	4.E+04	-	/St/
Am-241	-	2.E-12	-	-	8.E-02	-	/BS/
Am-242m	-	2.E-12	-	-	8.E-02	-	/BS/
Am-242	-	3.E-08	-	-	1.E+03	-	/BS/
Am-243	-	2.E-12	-	-	8.E-02	-	/BS/
Am-244m	-	2.E-06	-	-	6.E+04	-	/BS/
Am-244	-	7.E-08	-	-	3.E+03	-	/BS/
Am-245	-	3.E-05	-	-	1.E+06	-	/St/
Am-246m	-	7.E-05	-	-	3.E+06	-	/St/
Am-246	-	4.E-05	-	-	2.E+06	-	/St/

Radionuclide	Inhaled air-lung retention class ³			Inhaled air-lung retention class ³			Stochastic or organ ¹
	μCi/ml			Bq/m ³			
	D	W	Y	D	W	Y	(D/ W/ Y)
Cm-238	—	4.E-07	—	—	2.E+04	—	/St/
Cm-240	—	2.E-10	—	—	8.E+00	—	/BS/
Cm-241	—	9.E-09	—	—	4.E+02	—	/BS/
Cm-242	—	1.E-10	—	—	4.E+00	—	/BS/
Cm-243	—	3.E-12	—	—	1.E-01	—	/BS/
Cm-244	—	4.E-12	—	—	2.E-01	—	/BS/
Cm-245	—	2.E-12	—	—	8.E-02	—	/BS/
Cm-246	—	2.E-12	—	—	8.E-02	—	/BS/
Cm-247	—	2.E-12	—	—	9.E-02	—	/BS/
Cm-248	—	6.E-13	—	—	2.E-02	—	/BS/
Cm-249	—	6.E-06	—	—	2.E+05	—	/BS/
Bk-245	—	5.E-07	—	—	2.E+04	—	/St/
Bk-246	—	1.E-06	—	—	5.E+04	—	/St/
Bk-247	—	2.E-12	—	—	8.E-02	—	/BS/
Bk-249	—	9.E-10	—	—	3.E+01	—	/BS/
Bk-250	—	2.E-07	—	—	7.E+03	—	/BS/
Cf-244	—	2.E-07	2.E-07	—	9.E+03	9.E+03	/St/St
Cf-246	—	4.E-09	4.E-09	—	2.E+02	1.E+02	/St/St
Cf-248	—	4.E-11	5.E-11	—	1.E+00	2.E+00	/BS/St
Cf-249	—	2.E-12	6.E-12	—	8.E-02	2.E-01	/BS/BS
Cf-250	—	5.E-12	1.E-11	—	2.E-01	4.E-01	/BS/St
Cf-251	—	2.E-12	5.E-12	—	8.E-02	2.E-01	/BS/BS
Cf-252	—	1.E-11	2.E-11	—	4.E-01	6.E-01	/BS/St
Cf-253	—	8.E-10	7.E-10	—	3.E+01	3.E+01	/St/St
Cf-254	—	9.E-12	7.E-12	—	3.E-01	3.E-01	/St/St
Es-250	—	3.E-07	—	—	1.E+04	—	/BS/
Es-251	—	4.E-07	—	—	2.E+04	—	/BS/
Es-253	—	6.E-10	—	—	2.E+01	—	/St/
Es-254m	—	4.E-09	—	—	2.E+02	—	/St/
Es-254	—	4.E-11	—	—	2.E+00	—	/BS/
Fm-252	—	6.E-09	—	—	2.E+02	—	/St/
Fm-253	—	4.E-09	—	—	2.E+02	—	/St/
Fm-254	—	4.E-08	—	—	2.E+03	—	/St/
Fm-255	—	9.E-09	—	—	3.E+02	—	/St/
Fm-257	—	1.E-10	—	—	4.E+00	—	/E /
Md-257	—	4.E-08	—	—	2.E+03	—	/St/
Md-258	—	1.E-10	—	—	4.E+00	—	/BS/

Footnotes for Appendix A

¹ A determination of whether the DACs are controlled by stochastic (St) or nonstochastic (organ) dose, or if they both give the same result (E), for each lung retention class, is given in this column. The key to the organ notation for nonstochastic dose is: BS= Bone surface, K= Kidney, L= Liver, SW= Stomach wall, and T= Thyroid. A blank indicates that no calculations were performed for the lung retention class shown.

² The ICRP identifies tritiated water and carbon as having immediate uptake and distribution; therefore no solubility classes are designated. For the purposes of this table, the DAC values are shown as being constant, independent of solubility class. For tritiated water, the inhalation DAC values allow for an additional 50% absorption through the skin, as described in ICRP Publication No. 30: Limits for Intakes of Radionuclides by Workers. For elemental tritium, the DAC values are based solely on consideration of the dose-equivalent rate to the tissues of the lung from inhaled tritium gas contained within the lung, without absorption in the tissues.

³ A dash indicates no values given for this data category.

⁴ These values are appropriate for protection from radon combined with its short-lived daughters and are based on information given in ICRP Publication 32: Limits for Inhalation of Radon Daughters by Workers and Federal Guidance Report No. 11: Limiting Values of Radionuclide Intake and Air Concentrations, and Dose Conversion Factors for Inhalation, Submersion, and Ingestion (EPA 520/1-88-020). The values given are for 100% equilibrium concentration conditions of the radon daughters with the parent. To allow for an actual measured equilibrium concentration or a demonstrated equilibrium concentration, the values given in this table should be multiplied by the ratio (100%/actual %) or (100%/demonstrated %), respectively. Alternatively, the DAC values for Rn-220 and Rn-222 may be replaced by 1 WL* and 1/3 WL*, respectively, for appropriate limiting of daughter concentrations. Because of the dosimetric considerations for radon, no f₁ or lung clearance values are listed.

*A "Working Level" (WL) is any combination of short-lived radon daughters, in one liter of air without regard to the degree of equilibrium, that will result in the ultimate emission of 1.3 E+05 MeV of alpha energy.

[58 FR 65485, Dec. 14, 1993, as amended at 63 FR 59687, Nov. 4, 1998]

APPENDIX B TO PART 835 [RESERVED]
 APPENDIX C TO PART 835—DERIVED AIR CONCENTRATIONS (DAC) FOR WORKERS FROM EXTERNAL EXPOSURE DURING IMMERSION IN A CONTAMINATED ATMOSPHERIC CLOUD

a. The data presented in appendix C are to be used for controlling occupational exposures in accordance with §835.209, identifying the need for air monitoring in accordance with §835.403, and identifying the need for posting of airborne radioactivity areas in accordance with §835.603(d).

b. The air immersion DAC values shown in this appendix are based on a stochastic dose limit of 5 rems (0.05 Sv) per year or a nonstochastic (organ) dose limit of 50 rems (0.5 Sv) per year. Four columns of information are presented: (1) Radionuclide; (2) half-life in units of seconds (s), minutes (min), hours (h), days (d), or years (yr); (3) air immersion DAC in units of $\mu\text{Ci/ml}$; and (4) air immersion DAC in units of Bq/m^3 . The data are listed by radionuclide in order of increasing atomic mass. The air immersion DACs were calculated for a continuous, non-shielded exposure via immersion in a semi-infinite atmospheric cloud. The DACs listed in this appendix may be modified to allow for submersion in a cloud of finite dimensions.

c. The DAC value for air immersion listed for a given radionuclide is determined either by a yearly limit on effective dose equivalent, which provides a limit on stochastic radiation effects, or by a limit on yearly dose equivalent to any organ, which provides a limit on nonstochastic radiation effects. For most of the radionuclides listed, the DAC value is determined by the yearly limit on effective dose equivalent. Thus, the few cases where the DAC value is determined by the yearly limit on shallow dose equivalent to the skin are indicated in the table by an appropriate footnote. Again, the DACs listed in

this appendix account only for immersion in a semi-infinite cloud and do not account for inhalation or ingestion exposures.

d. Three classes of radionuclides are included in the air immersion DACs as described below.

(1) *Class 1.* The first class of radionuclides includes selected noble gases and short-lived activation products that occur in gaseous form. For these radionuclides, inhalation doses are negligible compared to the external dose from immersion in an atmospheric cloud.

(2) *Class 2.* The second class of radionuclides includes those for which a DAC value for inhalation has been calculated, but for which the DAC value for external exposure to a contaminated atmospheric cloud is more restrictive (i.e., results in a lower DAC value). These radionuclides generally have half-lives of a few hours or less, or are eliminated from the body following inhalation sufficiently rapidly to limit the inhalation dose.

(3) *Class 3.* The third class of radionuclides includes selected isotopes with relatively short half-lives. These radionuclides typically have half-lives that are less than 10 minutes, they do not occur as a decay product of a longer lived radionuclide, or they lack sufficient decay data to permit internal dose calculations. These radionuclides are also typified by a radioactive emission of highly intense, high-energy photons and rapid removal from the body following inhalation.

e. The DAC values are given for individual radionuclides. For known mixtures of radionuclides, determine the sum of the ratio of the observed concentration of a particular radionuclide and its corresponding DAC for all radionuclides in the mixture. If this sum exceeds unity (1), then the DAC has been exceeded. For unknown radionuclides, the most restrictive DAC (lowest value) for those isotopes not known to be absent shall be used.

Radionuclide	Half-Life	Air Immersion DAC	
		($\mu\text{Ci/ml}$)	(Bq/m^3)
C-11	20.48 min	4.E-06	1.E+05
N-13	9.97 min	4.E-06	1.E+05
N-16	7.13 s	7.E-07	3.E+04
O-15	122.24 s	4.E-06	1.E+05
F-18 ¹	109.74 min	4.E-06	1.E+05
Na-24 ¹	15.00 h	9.E-07	3.E+04
Mg-27 ²	9.458 min	5.E-06	2.E+05
Al-28 ²	2.240 min	2.E-06	7.E+04
Cl-38 ¹	37.21 min	3.E-06	1.E+05
Ar-37	35.02 d	3.E+00	1.E+11
Ar-39	269 yr	2.E-04 ³	7.E+06 ³
Ar-41	1.827 h	3.E-06	1.E+05
K-43 ¹	22.6 h	5.E-06	2.E+05
Ca-492	8.719 min	1.E-06	4.E+04
Sc-44 ¹	3.927 h	2.E-06	7.E+04
Sc-46m ²	18.72 s	5.E-05	2.E+06
Ti-45 ¹	3.08 h	5.E-06	2.E+05
Ti-51 ²	5.752 min	1.E-05	4.E+05

Radionuclide	Half-Life	Air Immersion DAC	
		($\mu\text{Ci/ml}$)	(Bq/m^3)
V-52 ²	3.75 min	3.E-06	1.E+05
Cr-49 ¹	42.09 min	5.E-06	2.E+05
Mn-52m ¹	21.4 min	2.E-06	7.E+04
Mn-56 ¹	2.5785 h	2.E-06	7.E+04
Mn-57 ²	1.47 min	6.E-05	2.E+06
Co-60m ¹	10.47 min	1.E-03	4.E+07
Ni-57 ^{1,4}	36.08 h	2.E-06	7.E+04
Ni-65 ^{1,5}	2.520 h	8.E-06	3.E+05
Cu-61 ¹	3.408 h	5.E-06	2.E+05
Cu-62 ²	9.74 min	5.E-06	2.E+05
Ga-66 ¹	9.40 h	2.E-06	7.E+04
Ga-68 ¹	68.0 min	5.E-06	2.E+05
Ga-72 ¹	14.1 h	1.E-06	4.E+04
Se-73 ¹	7.15 h	4.E-06	1.E+05
Br-77 ¹	57.04 h	1.E-05 ⁶	4.E+05 ⁶
Br-80 ¹	17.4 min	5.E-05	2.E+06
Br-82 ¹	35.30 h	1.E-06	4.E+04
Br-84 ¹	31.80 min	2.E-06	7.E+04
Br-85 ²	172 s	5.E-05	2.E+06
Kr-79	35.04 h	2.E-05	7.E+05
Kr-81	2.1E+05 yr	5.E-04	2.E+07
Kr-83m	1.83 h	5.E-02	2.E+09
Kr-85	10.72 yr	1.E-04 ³	4.E+06 ³
Kr-85m	4.48 h	3.E-05	1.E+06
Kr-87	76.3 min	5.E-06	2.E+05
Kr-88	2.84 h	2.E-06	7.E+04
Kr-89	3.16 min	2.E-06	7.E+04
Kr-90	32.32 s	3.E-06	1.E+05
Rb-81 ¹	4.58 h	8.E-06	3.E+05
Rb-82 ²	1.25 min	2.E-06	7.E+04
Rb-88 ¹	17.8 min	7.E-06	3.E+05
Rb-89 ¹	15.44 min	2.E-06	7.E+04
Rb-90 ²	157 s	2.E-06	7.E+04
Rb-90m ²	258 s	1.E-06	4.E+04
Sr-85m ¹	67.66 min	2.E-05	7.E+04
Sr-87m ¹	2.805 h	6.E-05	2.E+06
Sr-92 ¹	2.71 h	3.E-06	1.E+05
Sr-93 ²	7.3 min	2.E-06	7.E+04
Y-86 ¹	14.74 h	1.E-06	4.E+04
Y-90m ¹	3.19 h	5.E-06 ⁶	2.E+05 ⁶
Y-91m ¹	49.71 min	9.E-06	3.E+05
Nb-90 ¹	14.60 h	1.E-07	4.E+03
Nb-94m ²	6.26 min	9.E-04	3.E+07
Nb-97 ¹	72.1 min	7.E-06	3.E+05
Nb-97m ¹	60 s	6.E-06	2.E+05
Mo-91 ²	15.9 min	4.E-06	1.E+05
Mo-101 ¹	14.61 min	3.E-06	1.E+05
Tc-95 ¹	20.0 h	5.E-06	2.E+05
Tc-96m ¹	51.5 min	1.E-04	4.E+06
Tc-99m ¹	6.02 h	3.E-05	1.E+06
Tc-101 ¹	14.2 min	1.E-05	4.E+05
Ru-105 ¹	4.44 h	5.E-06	2.E+05
Rh-105m ²	45 s	1.E-04	4.E+06
Rh-106 ²	29.92 s	2.E-05	7.E+05
Ag-108 ²	2.37 min	2.E-04	7.E+06
Ag-109m ²	39.6 s	1.E-03	4.E+07
Ag-110 ²	24.57 s	9.E-05	3.E+06
Cd-111m ²	48.7 min	1.E-05	4.E+05
Cd-117 ¹	2.49 h	4.E-06	1.E+05
Cd-117m ¹	3.36 h	2.E-06	7.E+04
In-113m ¹	1.658 h	2.E-05	7.E+05
In-114 ²	71.9 s	1.E-04	4.E+06
In-116m ¹	54.15 min	2.E-06	7.E+04
In-117 ¹	43.8 min	7.E-06	3.E+05
Sb-117 ¹	2.80 h	3.E-05	1.E+06
Sb-126m ¹	19.0 min	3.E-06	1.E+05
Sb-129 ¹	4.40 h	3.E-06	1.E+05
Te-133 ¹	12.45 min	5.E-06	2.E+05
Te-133m ¹	55.4 min	2.E-06	7.E+04
Te-134 ¹	41.8 min	5.E-06	2.E+05
I-122 ²	3.62 min	5.E-06	2.E+05
I-128 ¹	24.99 min	5.E-05	2.E+06

Radionuclide	Half-Life	Air Immersion DAC	
		($\mu\text{Ci/ml}$)	(Bq/m^3)
I-132 ¹	2.30 h	2.E-06	7.E+04
I-134 ¹	52.6 min	1.E-06	4.E+04
I-135 ¹	6.61 h	7.E-07 ⁶	3.E+04 ⁶
I-136 ²	83 s	1.E-06	4.E+04
Xe-122	20.1 h	8.E-05	3.E+06
Xe-123	2.14 h	7.E-06	3.E+05
Xe-125	16.8 h	2.E-05	7.E+05
Xe-127	36.406 d	1.E-05	4.E+05
Xe-129m	8.89 d	2.E-04	7.E+06
Xe-131m	11.84 d	5.E-04	2.E+07
Xe-133	5.245 d	1.E-04	4.E+06
Xe-133m	2.19 d	1.E-04	4.E+06
Xe-135	9.11 h	2.E-05	7.E+05
Xe-135m	15.36 min	1.E-05	4.E+05
Xe-137	3.83 min	2.E-05	7.E+05
Xe-138	14.13 min	4.E-06	1.E+05
Cs-126 ²	1.64 min	4.E-06	1.E+05
Cs-129 ¹	32.06 h	1.E-05 ⁶	4.E+05 ⁶
Cs-138 ¹	32.2 min	2.E-06	7.E+04
Cs-139 ²	9.40 min	1.E-05	4.E+05
Ba-137m ²	2.552 min	7.E-06	3.E+05
Ba-141 ¹	18.27 min	5.E-06	2.E+05
Ba-142 ¹	10.70 min	5.E-06	2.E+05
La-142 ¹	95.4 min	1.E-06	4.E+04
Pr-144m ²	7.2 min	9.E-04	3.E+07
Nd-149 ¹	1.73 h	1.E-05	4.E+05
Gd-162 ²	9.7 min	1.E-05	4.E+05
Td-162 ²	7.76 min	4.E-06	1.E+05
Dy-157 ¹	8.06 h	1.E-05	4.E+05
Re-182m ¹	12.7 h	4.E-06	1.E+05
Os-190m ²	9.9 min	3.E-06	1.E+05
Ir-190m ¹	3.2 h	8.E-05 ⁶	3.E+06 ⁶
Au-195m ²	30.6 s	2.E-05	7.E+05
Tl-200 ¹	26.1 h	3.E-06	1.E+05
Tl-207 ²	4.77 min	4.E-05 ³	1.E+06 ³
Tl-208 ²	3.053 min	1.E-06	4.E+04
Tl-209 ²	2.20 min	2.E-06	7.E+04
Tl-210 ²	1.30 min	1.E-06	4.E+04
Pb-204m ²	66.9 min	2.E-06	7.E+04
Bi-211 ²	2.13 min	1.E-04	4.E+06
Po-211 ²	0.516 s	5.E-04	2.E+07
Th-233 ²	22.3 min	1.E-04	4.E+06
Pa-234 ¹	6.70 h	2.E-06	7.E+04
Pa-234m ²	1.17 min	4.E-05 ³	1.E+06 ³
U-239 ¹	23.40 min	8.E-05 ⁶	3.E+06 ⁶
Np-240 ¹	65 min	4.E-06	1.E+05
Np-240m ²	7.4 min	1.E-05	4.E+05
Am-246 ¹	25.0 min	4.E-06	1.E+05

¹ Committed effective dose equivalent from inhalation is calculated in ICRP Publication 30, but the DAC value for external exposure to a contaminated atmospheric cloud is more restrictive than the DAC value for inhalation.

² Committed effective dose equivalent from inhalation is not calculated in ICRP Publication 30, but DAC value for external exposure to contaminated cloud should be more restrictive than DAC value for inhalation due to relatively short half-life of radionuclide.

³ DAC value is determined by limit on annual shallow dose equivalent to skin, rather than yearly limit on effective dose equivalent.

⁴ DAC value applies to radionuclide in vapor form only; DAC value for inhalation is more restrictive for radionuclide in inorganic form.

⁵ DAC value applies to radionuclide in inorganic or vapor form.

⁶ DAC value for exposure to contaminated atmospheric cloud is the same as DAC value for inhalation.

[58 FR 65485, Dec. 14, 1993, as amended at 63 FR 59687, Nov. 4, 1998]

APPENDIX D TO PART 835—SURFACE CONTAMINATION VALUES

The data presented in appendix D are to be used in identifying the need for posting of

contamination and high contamination areas in accordance with §§835.603(e) and (f) and identifying the need for surface contamination monitoring and control in accordance with §§835.1101 and 835.1102.

SURFACE CONTAMINATION VALUES ¹ IN DPM/100 CM ²

Radionuclide	Removable ^{2, 4}	Total (Fixed + Removable) ^{2, 3}
U-nat, U-235, U-238, and associated decay products	7,000	75,000
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	20	500
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200	1,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above ⁵	1,000	5,000
Tritium and tritiated compounds ⁶	10,000	N/A

¹ The values in this appendix, with the exception noted in footnote 5, apply to radioactive contamination deposited on, but not incorporated into the interior or matrix of, the contaminated item. Where surface contamination by both alpha and beta-gamma-emitting nuclides exists, the limits established for alpha and beta-gamma-emitting nuclides apply independently.

² As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

³ The levels may be averaged over one square meter provided the maximum surface activity in any area of 100 cm² is less than three times the value specified. For purposes of averaging, any square meter of surface shall be considered to be above the surface contamination value if: (1) From measurements of a representative number of sections it is determined that the average contamination level exceeds the applicable value; or (2) it is determined that the sum of the activity of all isolated spots or particles in any 100 cm² area exceeds three times the applicable value.

⁴ The amount of removable radioactive material per 100 cm² of surface area should be determined by swiping the area with dry filter or soft absorbent paper, applying moderate pressure, and then assessing the amount of radioactive material on the swipe with an appropriate instrument of known efficiency. (Note—The use of dry material may not be appropriate for tritium.) When removable contamination on objects of surface area less than 100 cm² is determined, the activity per unit area shall be based on the actual area and the entire surface shall be wiped. It is not necessary to use swiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.

⁵ This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.

⁶ Tritium contamination may diffuse into the volume or matrix of materials. Evaluation of surface contamination shall consider the extent to which such contamination may migrate to the surface in order to ensure the surface contamination value provided in this appendix is not exceeded. Once this contamination migrates to the surface, it may be removable, not fixed; therefore, a "Total" value does not apply.

⁷ (alpha)

[58 FR 65485, Dec. 14, 1993, as amended at 63 FR 59688, Nov. 4, 1998]

APPENDIX E TO PART 835—VALUES FOR ESTABLISHING SEALED RADIOACTIVE SOURCE ACCOUNTABILITY AND RADIOACTIVE MATERIAL POSTING AND LABELING REQUIREMENTS

radioactive sources as defined at §835.2(a), establishing the need for radioactive material area posting in accordance with §835.603(g), and establishing the need for radioactive material labeling in accordance with §835.605.

The data presented in this appendix E are to be used for identifying accountable sealed

NOTE: The data are listed in alphabetical order by nuclide.

Nuclide	Activity (μCi)	Nuclide	Activity (μCi)	Nuclide	Activity (μCi)
Ac-227	1.5E+00	H-3	1.6E+08	Re-184m	1.5E+02
Ag-105	2.1E+06	Hf-172	3.1E+04	Re-186m	2.8E+05
Ag-108m	1.8E+01	Hf-175	1.8E+06	Rh-101	2.5E+05
Ag-110m	2.2E+01	Hf-178m	4.1E+03	Rh-102	8.3E+04
Al-26	1.6E+01	Hf-181	3.5E+02	Rh-102m	2.1E+05
Am-241	2.3E+01	Hf-182	3.0E+03	Ru-103	4.4E+02
Am-242m	2.4E+01	Hg-194	3.5E+04	Ru-106	2.1E+04
Am-243	2.3E+01	Hg-203	4.9E+02	S-35	4.0E+06
As-73	5.4E+02	Ho-166m	2.2E+01	Sb-124	9.1E+01
Au-195	4.8E+02	I-125	3.5E+02	Sb-125	6.8E+01
Ba-133	5.2E+01	I-129	1.8E+02	Sc-46	6.2E+01
Be-10	2.8E+04	In-114m	7.8E+02	Se-75	6.4E+01
Be-7	3.2E+03	Ir-192	1.4E+02	Se-79	1.0E+06
Bi-207	1.7E+01	Ir-192m	2.6E+04	Si-32	9.9E+03
Bi-208	1.5E+01	Ir-194m	2.7E+01	Sm-145	9.1E+05
Bi-210m	1.3E+03	K-40	2.8E+02	Sm-146	1.2E+02
Bk-247	1.7E+01	La-137	1.1E+05	Sm-151	2.5E+05
Bk-249	7.2E+03	Lu-173	4.4E+05	Sn-113	3.1E+02
C-14	4.8E+06	Lu-174	2.5E+05	Sn-119m	3.3E+02
Ca-41	7.4E+06	Lu-174m	3.9E+05	Sn-121m	8.7E+05
Ca-45	1.5E+06	Lu-177m	5.8E+01	Sn-123	1.3E+04
Cd-109	1.6E+02	Md-258	6.0E+02	Sn-126	1.8E+02
Cd-113m	6.5E+03	Mn-53	2.0E+07	Sr-85	1.2E+02
Cd-115m	1.0E+04	Mn-54	6.5E+01	Sr-89	2.4E+05

Nuclide	Activity (μCi)	Nuclide	Activity (μCi)	Nuclide	Activity (μmCi)
Ce-139	2.4E+02	Mo-93	7.7E+01	Sr-90	7.7E+03
Ce-141	2.4E+03	Na-22	1.9E+01	Ta-179	1.5E+06
Ce-144	1.5E+03	Nb-91	7.0E+01	Ta-182	7.3E+01
Cf-248	2.0E+02	Nb-91m	3.6E+02	Tb-157	2.5E+03
Cf-249	1.7E+01	Nb-92	1.8E+01	Tb-158	3.9E+04
Cf-250	3.8E+01	Nb-93m	4.4E+02	Tb-160	1.2E+02
Cf-251	1.7E+01	Nb-94	2.3E+01	Tc-95m	1.3E+02
Cf-252	6.4E+01	Nb-95	3.4E+02	Tc-97	8.1E+01
Cf-254	3.4E+01	Ni-59	7.5E+06	Tc-97m	3.6E+02
Cl-36	4.6E+05	Ni-63	3.2E+06	Tc-98	2.5E+01
Cm-241	6.8E+04	Np-235	1.2E+02	Tc-99	6.8E+06
Cm-242	5.8E+02	Np-236	2.2E+01	Te-121m	1.9E+02
Cm-243	3.3E+01	Np-237	1.9E+01	Te-123m	2.8E+02
Cm-244	4.0E+01	Os-185	1.4E+02	Te-125m	4.4E+02
Cm-245	2.2E+01	Os-194	1.5E+04	Te-127m	8.0E+02
Cm-246	2.2E+01	Pa-231	7.8E+00	Te-129m	2.3E+03
Cm-247	2.4E+01	Pb-202	1.0E+05	Th-228	2.9E+01
Cm-248	6.0E+00	Pb-205	9.1E+01	Th-229	4.7E+00
Cm-250	1.1E+00	Pb-210	9.2E+01	Th-230	3.1E+01
Co-56	4.0E+01	Pd-107	7.8E+05	Th-232	6.1E+00
Co-57	2.3E+02	Pm-143	1.3E+02	Ti-44	1.6E+02
Co-58	1.4E+02	Pm-144	2.9E+01	Ti-204	2.2E+04
Co-60	1.8E+01	Pm-145	2.6E+02	Tm-170	8.4E+03
Cs-134	2.7E+01	Pm-146	4.5E+01	Tm-171	2.8E+04
Cs-135	2.2E+06	Pm-147	2.5E+05	U-232	1.5E+01
Cs-137	6.0E+01	Pm-148m	1.1E+02	U-233	7.4E+01
Dy-159	4.1E+06	Po-209	6.3E+03	U-234	7.5E+01
Es-254	6.3E+01	Po-210	1.1E+03	U-235	6.7E+01
Es-255	4.6E+04	Pt-193	4.4E+07	U-236	8.0E+01
Eu-148	7.0E+05	Pu-236	6.9E+01	U-238	8.4E+01
Eu-149	5.3E+06	Pu-237	3.3E+02	V-49	2.9E+07
Eu-152	3.1E+01	Pu-238	2.5E+01	W-181	1.1E+03
Eu-154	3.1E+01	Pu-239	2.3E+01	W-185	3.9E+06
Eu-155	3.7E+02	Pu-240	2.3E+01	W-188	6.4E+04
Fe-55	3.7E+06	Pu-241	1.2E+03	Y-88	3.4E+01
Fe-59	2.0E+02	Pu-242	2.4E+01	Y-91	5.0E+04
Fe-60	1.3E+04	Pu-244	2.5E+01	Yb-169	5.5E+02
Fm-257	4.3E+02	Ra-226	1.2E+03	Zn-65	1.1E+02
Gd-146	2.6E+05	Ra-228	2.1E+03	Zr-88	1.2E+02
Gd-148	3.0E+01	Rb-83	9.2E+01	Zr-93	3.1E+04
Gd-151	1.1E+06	Rb-84	2.0E+02	Zr-95	2.0E+02
Gd-153	2.1E+02	Re-183	5.4E+02		
Ge-68	5.7E+02	Re-184	2.6E+02		

Any alpha emitting radionuclide not listed above and mixtures of alpha emitters of unknown composition have a value of 10 microcuries.

Any radionuclide other than alpha emitting radionuclides not listed above and mixtures of beta emitters of unknown composition have a value of 100 microcuries.

NOTE: Where there is involved a combination of radionuclides in known amounts, derive the value for the combination as follows: determine, for each radionuclide in the combination, the ratio between the quantity present in the combination and the value otherwise established for the specific radionuclide when not in combination. If the sum of such ratios for all radionuclides in the combination exceeds unity (1), then the accountability criterion has been exceeded.

[63 FR 59688, Nov. 4, 1998]

PART 840—EXTRAORDINARY NUCLEAR OCCURRENCES

Sec.

840.1 Scope and purpose.

840.2 Procedures.

840.3 Determination of extraordinary nuclear occurrence.

840.4 Criterion I—Substantial discharge of radioactive material or substantial radiation levels offsite.

840.5 Criterion II—Substantial damages to persons offsite or property offsite.

AUTHORITY: Sec. 161 of the Atomic Energy Act of 1954, Pub. L. 83-703, 68 Stat. 919 (42 U.S.C. 2201); sec. 170 of the Atomic Energy Act of 1954, Pub. L. 85-256, 71 Stat. 576, as amended by Pub. L. 89-645, 80 Stat. 891 (42 U.S.C. 2210); Department of Energy Organization Act, Pub. L. 95-91, 91 Stat. 565-613 (42 U.S.C. 7101-7352).