

Radionuclide	Occupational 40-hr. Week	
	Water uc/ml	Air uc/ml
Column	A	B
Actinium 227 (sol.)	6×10^{-5}	2×10^{-12}
(insol.)	9×10^{-3}	3×10^{-11}
Actinium 228 (sol.)	3×10^{-3}	8×10^{-8}
(insol.)	3×10^{-3}	2×10^{-8}
Americium 241 (sol.)	10^{-4}	6×10^{-12}
(insol.)	8×10^{-4}	10^{-10}
Americium 242m (sol.)	1×10^{-4}	6×10^{-12}
(insol.)	3×10^{-3}	3×10^{-10}
Americium 242 (sol.)	4×10^{-3}	4×10^{-8}
(insol.)	4×10^{-3}	5×10^{-8}
Americium 243 (sol.)	10^{-4}	6×10^{-12}
(insol.)	8×10^{-4}	10^{-10}
Americium 244 (sol.)	1×10^{-1}	4×10^{-6}
(insol.)	1×10^{-1}	2×10^{-5}
Antimony 122 (sol.)	8×10^{-4}	2×10^{-7}
(insol.)	8×10^{-4}	10^{-7}
Antimony 124 (sol.)	7×10^{-4}	2×10^{-7}
(insol.)	7×10^{-4}	2×10^{-8}
Antimony 125 (sol.)	3×10^{-3}	5×10^{-7}
(insol.)	3×10^{-3}	3×10^{-8}
Argon 37 (imm.)	...	6×10^{-3}
Argon 41 (imm.)	...	2×10^{-6}
Arsenic 73 (sol.)	0.01	2×10^{-6}
(insol.)	0.01	4×10^{-7}
Arsenic 74 (sol.)	2×10^{-3}	3×10^{-7}
(insol.)	2×10^{-3}	10^{-7}
Arsenic 76 (sol.)	6×10^{-4}	10^{-7}
(insol.)	6×10^{-4}	10^{-7}
Arsenic (sol.)	2×10^{-3}	5×10^{-7}
(insol.)	2×10^{-3}	4×10^{-7}
Astatine 211 (sol.)	5×10^{-5}	7×10^{-9}
(insol.)	2×10^{-3}	3×10^{-8}
Barium 131 (sol.)	5×10^{-3}	10^{-6}
(insol.)	5×10^{-3}	4×10^{-7}
Barium 140 (sol.)	8×10^{-4}	10^{-7}
(insol.)	7×10^{-4}	4×10^{-8}
Berkelium 249 (sol.)	0.02	9×10^{-10}
(insol.)	0.02	10^{-7}
Berkelium 250 (sol.)	6×10^{-3}	1×10^{-7}
(insol.)	6×10^{-3}	1×10^{-6}
Beryllium 7 (sol.)	0.05	6×10^{-6}
(insol.)	0.05	10^{-6}
Bismuth 206 (sol.)	10^{-3}	2×10^{-7}
(insol.)	10^{-3}	10^{-7}
Bismuth 207 (sol.)	2×10^{-3}	2×10^{-7}
(insol.)	2×10^{-3}	10^{-8}
Bismuth 210 (sol.)	10^{-3}	6×10^{-9}
(insol.)	10^{-3}	6×10^{-9}

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Radionuclide	Occupational 40-hr. Week		Radionuclide			
	Water uc/ml A	Air uc/ml B				
Column			Cobalt 58m	(sol.)	0.08	2x10 ⁻⁵
Bismuth 212	(sol.) 0.01	10 ⁻⁷		(insol.)	0.06	9x10 ⁻⁶
	(insol.) 0.01	2x10 ⁻⁷	Cobalt 58	(sol.)	4x10 ⁻³	8x10 ⁻⁷
Bromine 82	(sol.) 8x10 ⁻³	10 ⁻⁶		(insol.)	3x10 ⁻³	5x10 ⁻⁸
	(insol.) 10 ⁻³	2x10 ⁻⁷	Cobalt 60	(sol.)	10 ⁻³	3x10 ⁻⁷
Cadmium 109	(sol.) 5x10 ⁻³	5x10 ⁻⁸		(insol.)	10 ⁻³	9x10 ⁻⁹
	(insol.) 5x10 ⁻³	7x10 ⁻⁸	Copper 64	(sol.)	0.01	2x10 ⁻⁶
Cadmium 115m	(sol.) 7x10 ⁻⁴	4x10 ⁻⁸		(insol.)	6x10 ⁻³	10 ⁻⁶
	(insol.) 7x10 ⁻⁴	4x10 ⁻⁸	Curium 242	(sol.)	7x10 ⁻⁴	10 ⁻¹⁰
Cadmium 115	(sol.) 10 ⁻³	2x10 ⁻⁷		(insol.)	7x10 ⁻⁴	2x10 ⁻¹⁰
	(insol.) 10 ⁻³	2x10 ⁻⁷	Curium 243	(sol.)	10 ⁻⁴	6x10 ⁻¹²
Calcium 45	(sol.) 3x10 ⁻⁴	3x10 ⁻⁸		(insol.)	7x10 ⁻⁴	10 ⁻¹⁰
	(insol.) 5x10 ⁻³	10 ⁻⁷	Curium 244	(sol.)	2x10 ⁻⁴	9x10 ⁻¹²
Calcium 47	(sol.) 10 ⁻³	2x10 ⁻⁷		(insol.)	8x10 ⁻⁴	10 ⁻¹⁰
	(insol.) 10 ⁻³	2x10 ⁻⁷	Curium 245	(sol.)	10 ⁻⁴	5x10 ⁻¹²
Californium 249	(sol.) 10 ⁻⁴	2x10 ⁻¹²		(insol.)	8x10 ⁻⁴	10 ⁻¹⁰
	(insol.) 7x10 ⁻⁴	10 ⁻¹⁰	Curium 246	(sol.)	10 ⁻⁴	5x10 ⁻¹²
Californium 250	(sol.) 4x10 ⁻⁴	5x10 ⁻¹²		(insol.)	8x10 ⁻⁴	10 ⁻¹⁰
	(insol.) 7x10 ⁻⁴	10 ⁻¹⁰	Curium 247	(sol.)	1x10 ⁻⁴	5x10 ⁻¹²
Californium 251	(sol.) 1x10 ⁻⁴	2x10 ⁻¹²		(insol.)	6x10 ⁻⁴	1x10 ⁻¹⁰
	(insol.) 8x10 ⁻⁴	1x10 ⁻¹⁰	Curium 248	(sol.)	1x10 ⁻⁵	6x10 ⁻¹³
Californium 252	(sol.) 7x10 ⁻⁴	2x10 ⁻¹¹		(insol.)	4x10 ⁻⁵	1x10 ⁻¹¹
	(insol.) 7x10 ⁻⁴	10 ⁻¹⁰	Curium 249	(sol.)	6x10 ⁻²	1x10 ⁻⁵
Californium 253	(sol.) 4x10 ⁻³	8x10 ⁻¹⁰		(insol.)	6x10 ⁻²	1x10 ⁻⁵
	(insol.) 4x10 ⁻³	8x10 ⁻¹⁰	Dysprosium 165	(sol.)	0.01	3x10 ⁻⁶
Californium 254	(sol.) 4x10 ⁻⁶	5x10 ⁻¹²		(insol.)	0.01	2x10 ⁻⁶
	(insol.) 4x10 ⁻⁶	5x10 ⁻¹²	Dysprosium 166	(sol.)	10 ⁻³	2x10 ⁻⁷
Carbon 14	(sol.) 0.02	4x10 ⁻⁶		(insol.)	10 ⁻³	2x10 ⁻⁷
	(insol.) . . .	5x10 ⁻⁵	Einsteinium 253	(sol.)	7x10 ⁻⁴	8x10 ⁻¹⁰
Cerium 141	(sol.) 3x10 ⁻³	4x10 ⁻⁷		(insol.)	7x10 ⁻⁴	6x10 ⁻¹⁰
	(insol.) 3x10 ⁻³	2x10 ⁻⁷	Einsteinium 254m	(sol.)	5x10 ⁻⁴	5x10 ⁻⁹
Cerium 143	(sol.) 10 ⁻³	3x10 ⁻⁷		(insol.)	5x10 ⁻⁴	6x10 ⁻⁹
	(insol.) 10 ⁻³	2x10 ⁻⁷	Einsteinium 254	(sol.)	4x10 ⁻⁴	2x10 ⁻¹¹
Cerium 144	(sol.) 3x10 ⁻⁴	10 ⁻⁸		(insol.)	4x10 ⁻⁴	1x10 ⁻¹⁰
	(insol.) 3x10 ⁻⁴	6x10 ⁻⁹	Einsteinium 255	(sol.)	8x10 ⁻⁴	5x10 ⁻¹⁰
Cesium 131	(sol.) 0.07	10 ⁻⁵		(insol.)	8x10 ⁻⁴	4x10 ⁻¹⁰
	(insol.) 0.03	3x10 ⁻⁶	Erbium 169	(sol.)	3x10 ⁻³	6x10 ⁻⁷
Cesium 134m	(sol.) 0.2	4x10 ⁻⁵		(insol.)	3x10 ⁻³	4x10 ⁻⁷
	(insol.) 0.03	6x10 ⁻⁶	Erbium 171	(sol.)	3x10 ⁻³	7x10 ⁻⁷
Cesium 134	(sol.) 3x10 ⁻⁴	4x10 ⁻⁸		(insol.)	3x10 ⁻³	6x10 ⁻⁷
	(insol.) 10 ⁻³	10 ⁻⁸	Europium 152	(9.2 hr)		
Cesium 135	(sol.) 3x10 ⁻³	5x10 ⁻⁷		(sol.)	2x10 ⁻³	4x10 ⁻⁷
	(insol.) 7x10 ⁻³	9x10 ⁻⁸		(insol.)	2x10 ⁻³	3x10 ⁻⁷
Cesium 136	(sol.) 2x10 ⁻³	4x10 ⁻⁷	Europium 152	(13 yr.)		
	(insol.) 2x10 ⁻³	2x10 ⁻⁷		(sol.)	2x10 ⁻³	10 ⁻⁸
Cesium 137	(sol.) 4x10 ⁻⁴	6x10 ⁻⁸		(insol.)	2x10 ⁻³	2x10 ⁻⁸
	(insol.) 10 ⁻³	10 ⁻⁸	Europium 154	(sol.)	6x10 ⁻⁴	4x10 ⁻⁹
Chlorine 36	(sol.) 2x10 ⁻³	4x10 ⁻⁷		(insol.)	6x10 ⁻⁴	7x10 ⁻⁹
	(insol.) 2x10 ⁻³	2x10 ⁻⁸	Europium 155	(sol.)	6x10 ⁻³	9x10 ⁻⁸
Chlorine 38	(sol.) 0.01	3x10 ⁻⁶		(insol.)	6x10 ⁻³	7x10 ⁻⁸
	(insol.) 0.01	2x10 ⁻⁶	Fermium 254	(sol.)	4x10 ⁻³	6x10 ⁻⁸
Chromium 51	(sol.) 0.05	10 ⁻⁵		(insol.)	4x10 ⁻³	7x10 ⁻⁸
	(insol.) 0.05	2x10 ⁻⁶	Fermium 255	(sol.)	1x10 ⁻³	2x10 ⁻⁸
Cobalt 57	(sol.) 0.02	3x10 ⁻⁶		(insol.)	1x10 ⁻³	1x10 ⁻⁸
	(insol.) 0.01	2x10 ⁻⁷	Fermium 256	(sol.)	3x10 ⁻⁵	3x10 ⁻⁹
				(insol.)	3x10 ⁻⁵	2x10 ⁻⁹

Radionuclide	Occupational 40-hr. Week		Iron 55	(sol.)	0.02	9x10 ⁻⁷
	Water uc/ml	Air uc/ml				
Column	A	B	Iron 59	(insol.)	0.07	10 ⁻⁶
Fluorine 18	(sol.) 0.02	5x10 ⁻⁶	(sol.)	(insol.)	2x10 ⁻³	10 ⁻⁷
	(insol.) 0.01	3x10 ⁻⁶			2x10 ⁻³	5x10 ⁻⁸
Gadolinium 153	(sol.) 6x10 ⁻³	2x10 ⁻⁷	Krypton 85m	(imm.)	...	6x10 ⁻⁶
	(insol.) 6x10 ⁻³	9x10 ⁻⁸	Krypton 85	(imm.)	...	10 ⁻⁵
Gadolinium 159	(sol.) 2x10 ⁻³	5x10 ⁻⁷	Krypton 87	(imm.)	...	10 ⁻⁶
	(insol.) 2x10 ⁻³	4x10 ⁻⁷	Lanthanum 140	(sol.)	7x10 ⁻⁴	2x10 ⁻⁷
Gallium 72	(sol.) 10 ⁻³	2x10 ⁻⁷		(insol.)	7x10 ⁻⁴	10 ⁻⁷
	(insol.) 10 ⁻³	2x10 ⁻⁷	Lead 203	(sol.)	0.01	3x10 ⁻⁶
Germanium 71	(sol.) 0.05	10 ⁻⁵		(insol.)	0.01	2x10 ⁻⁶
	(insol.) 0.05	6x10 ⁻⁶	Lead 210	(sol.)	4x10 ⁻⁶	10 ⁻¹⁰
Gold 196	(sol.) 5x10 ⁻³	10 ⁻⁶		(insol.)	5x10 ⁻³	2x10 ⁻¹⁰
	(insol.) 4x10 ⁻³	6x10 ⁻⁷	Lead 212	(sol.)	6x10 ⁻⁴	2x10 ⁻⁸
Gold 198	(sol.) 2x10 ⁻³	3x10 ⁻⁷		(insol.)	5x10 ⁻⁴	2x10 ⁻⁸
	(insol.) 10 ⁻³	2x10 ⁻⁷	Lutetium 177	(sol.)	3x10 ⁻³	6x10 ⁻⁷
Gold 199	(sol.) 5x10 ⁻³	10 ⁻⁶		(insol.)	3x10 ⁻³	5x10 ⁻⁷
	(insol.) 4x10 ⁻³	8x10 ⁻⁷	Manganese 52	(sol.)	10 ⁻³	2x10 ⁻⁷
Hafnium 181	(sol.) 2x10 ⁻³	4x10 ⁻⁸		(insol.)	9x10 ⁻⁴	10 ⁻⁷
	(insol.) 2x10 ⁻³	7x10 ⁻⁸	Manganese 54	(sol.)	4x10 ⁻³	4x10 ⁻⁷
Holmium 166	(sol.) 9x10 ⁻⁴	2x10 ⁻⁷		(insol.)	3x10 ⁻³	4x10 ⁻⁸
	(insol.) 9x10 ⁻⁴	2x10 ⁻⁷	Manganese 56	(sol.)	4x10 ⁻³	8x10 ⁻⁷
Hydrogen 3	(sol., insol.)	5x10 ⁻⁶		(insol.)	3x10 ⁻³	5x10 ⁻⁷
	(imm.)	2x10 ⁻³	Mercury 197m	(sol.)	6x10 ⁻³	7x10 ⁻⁷
Indium 113m	(sol.) 0.04	8x10 ⁻⁶		(insol.)	5x10 ⁻³	8x10 ⁻⁷
	(insol.) 0.04	7x10 ⁻⁶	Mercury 197	(sol.)	9x10 ⁻³	10 ⁻⁶
Indium 114m	(sol.) 5x10 ⁻⁴	10 ⁻⁷		(insol.)	0.01	3x10 ⁻⁶
	(insol.) 5x10 ⁻⁴	2x10 ⁻⁸	Mercury 203	(sol.)	5x10 ⁻⁴	7x10 ⁻⁸
Indium 115m	(sol.) 0.01	2x10 ⁻⁶		(insol.)	3x10 ⁻³	10 ⁻⁷
	(insol.) 0.01	2x10 ⁻⁶	Molybdenum 99	(sol.)	5x10 ⁻³	7x10 ⁻⁷
Indium 115	(sol.) 3x10 ⁻³	2x10 ⁻⁷		(insol.)	10 ³	2x10 ⁻⁷
	(insol.) 3x10 ⁻³	3x10 ⁻⁸	Neodymium 144	(sol.)	2x10 ⁻³	8x10 ⁻¹¹
Iodine 125	(sol.) 4x10 ⁻³	5x10 ⁻⁹		(insol.)	2x10 ⁻³	3x10 ⁻¹⁰
	(insol.) 6x10 ⁻³	2x10 ⁻⁷	Neodymium 147	(sol.)	2x10 ⁻³	4x10 ⁻⁷
Iodine 126	(sol.) 5x10 ⁻⁵	8x10 ⁻⁹		(insol.)	2x10 ⁻³	2x10 ⁻⁷
	(insol.) 3x10 ⁻⁷	3x10 ⁻⁷	Neodymium 149	(sol.)	8x10 ⁻³	2x10 ⁻⁶
Iodine 129	(sol.) 10 ⁻⁵	2x10 ⁻⁹		(insol.)	8x10 ⁻³	10 ⁻⁶
	(insol.) 6x10 ⁻³	7x10 ⁻⁸	Neptunium 237	(sol.)	9x10 ⁻⁵	4x10 ⁻¹²
Iodine 131	(sol.) 6x10 ⁻⁵	9x10 ⁻⁹		(insol.)	9x10 ⁻⁴	10 ⁻¹⁰
	(insol.) 2x10 ⁻³	3x10 ⁻⁷	Neptunium 239	(sol.)	4x10 ⁻³	8x10 ⁻⁷
Iodine 132	(sol.) 2x10 ⁻³	2x10 ⁻⁷		(insol.)	4x10 ⁻³	7x10 ⁻⁷
	(insol.) 5x10 ⁻³	9x10 ⁻⁷	Nickel 59	(sol.)	6x10 ⁻³	5x10 ⁻⁷
Iodine 133	(sol.) 2x10 ⁻⁴	3x10 ⁻⁸		(insol.)	0.06	8x10 ⁻⁷
	(insol.) 10 ⁻³	2x10 ⁻⁷	Nickel 63	(sol.)	8x10 ⁻⁴	6x10 ⁻⁸
Iodine 134	(sol.) 4x10 ⁻³	5x10 ⁻⁷		(insol.)	0.02	3x10 ⁻⁷
	(insol.) 0.02	3x10 ⁻⁶	Nickel 65	(sol.)	4x10 ⁻³	9x10 ⁻⁷
Iodine 135	(sol.) 7x10 ⁻⁴	10 ⁻⁷		(insol.)	3x10 ⁻³	5x10 ⁻⁷
	(insol.) 2x10 ⁻³	4x10 ⁻⁷	Niobium 93m	(sol.)	0.01	10 ⁻⁷
Iridium 190	(sol.) 6x10 ⁻³	10 ⁻⁶		(insol.)	0.01	2x10 ⁻⁷
	(insol.) 5x10 ⁻³	4x10 ⁻⁷	Niobium 95	(sol.)	3x10 ⁻³	5x10 ⁻⁷
Iridium 192	(sol.) 10 ³	10 ⁻⁷		(insol.)	3x10 ⁻³	10 ⁻⁷
	(insol.) 10 ⁻³	3x10 ⁻⁸	Niobium 97	(sol.)	0.03	6x10 ⁻⁶
Iridium 194	(sol.) 10 ⁻³	2x10 ⁻⁷		(insol.)	0.03	5x10 ⁻⁶
	(insol.) 9x10 ⁻⁴	2x10 ⁻⁷	Osmium 185	(sol.)	2x10 ⁻³	5x10 ⁻⁷
				(insol.)	2x10 ⁻³	5x10 ⁻⁸

(b) In any case where there is a mixture in air or water of more than one radionuclide, the limiting values for purposes of this section shall be determined as follows:

1. If the identity and concentration of each radionuclide in the mixture are known, the limiting values shall be derived as follows:

i. Determine, for each radionuclide in the mixture, the ratio between the quantity present in the mixture and the limit otherwise established in this section for the specific radionuclide when not in a mixture.

ii. The sum of such ratios for all the radionuclides in the mixture may not exceed "1" ("unity").

iii. For example, if radionuclides A, B, and C are present in concentrations, C_a , C_b , and C_c , and if the applicable MPC's are MPC_a and MPC_b and MPC_c respectively, then the concentrations shall be limited so that the following relationship exists:

$$\frac{C_a}{MPC_a} + \frac{C_b}{MPC_b} + \frac{C_c}{MPC_c} < 1$$

2. If either the identity or the concentration of any radionuclide in the mixture is not known, the limiting values for purposes of this section are:

i. For purposes of Column A — 3×10^{-7}

ii. For purposes of Column B — 1×10^{-12}

3. If any of the conditions specified in this paragraph are met, the corresponding values specified in this paragraph may be used in lieu of those specified in paragraph 2 of this subsection.

i. If the identity of each radionuclide in the mixture is known but the concentration of one or more of the radionuclides in the mixture is not known, the concentration limit for the mixture is the limit specified in subsection (a) of this Section for the radionuclide in the mixture having the lowest concentration limit;

ii. If the identity of each radionuclide in the mixture is not known, but it is known that certain radionuclides specified in subsection (a) of this Section are not present in the mixture, the concentration limit for the mixture is the lowest concentration limit specified in subsection (a) of this Section for any radionuclide which is not known to be absent from the mixture; or

Radionuclide	Occupational 40-hr. Week		
	Water uc/ml A	Air uc/ml B	
Ytterbium 175	(sol.)	3×10^{-3}	7×10^{-7}
	(insol.)	3×10^{-3}	6×10^{-7}
Yttrium 90	(sol.)	6×10^{-4}	10^{-7}
	(insol.)	6×10^{-4}	10^{-7}
Yttrium 91m	(sol.)	0.1	2×10^{-5}
	(insol.)	0.1	2×10^{-5}
Yttrium 91	(sol.)	8×10^{-4}	4×10^{-8}
	(insol.)	8×10^{-4}	3×10^{-8}
Yttrium 92	(sol.)	2×10^{-3}	4×10^{-7}
	(insol.)	2×10^{-3}	3×10^{-7}
Yttrium 93	(sol.)	8×10^{-4}	2×10^{-7}
	(insol.)	8×10^{-4}	10^{-7}
Zinc 65	(sol.)	3×10^{-3}	10^{-7}
	(insol.)	5×10^{-3}	6×10^{-8}
Zinc 69m	(sol.)	2×10^{-3}	4×10^{-7}
	(insol.)	2×10^{-3}	3×10^{-7}
Zinc 69	(sol.)	0.05	7×10^{-6}
	(insol.)	0.05	9×10^{-6}
Zirconium 93	(sol.)	0.02	10^{-7}
	(insol.)	0.02	3×10^{-7}
Zirconium 95	(sol.)	2×10^{-3}	10^{-7}
	(insol.)	2×10^{-3}	3×10^{-8}
Zirconium 97	(sol.)	5×10^{-4}	10^{-7}
	(insol.)	5×10^{-4}	9×10^{-8}
Unidentified Radionuclides		3×10^{-7}	1×10^{-12}

Abbreviations— sol. = soluble
 insol. = insoluble
 imm. = immersion
 m = metastable

iii.

c. Element (atomic number) and isotope	Table I		Table II	
	Col. 1 Air (uc/ml)	Col. 2 Water (uc/ml)	Col. 1 Air (uc/ml)	Col. 2 Water (uc/ml)
If it is known that Sr 90, I 129, Pb 210, Po 210, At 211, Ra 223, Ra 224, Ra 226, Ac 227, Ra 228, Th 230, Pa 231, Th 232, and Th-nat are not present	.....	9x10 ⁻⁵	.....	3x10 ⁻⁶
If it is known that Sr 90, I 129, Pb 210, Po 210, Ra 223, Ra 226, Ra 228, Pa 231, and Th-nat are not present	.....	6x10 ⁻⁵	.....	2x10 ⁻⁶
If it is known that Sr 90, Pb 210, Ra 226 and Ra 228 are not present	.....	2x10 ⁻⁵	.....	6x10 ⁻⁷
If it is known that Ra 226 and Ra 228 are not present	.....	3x10 ⁻⁶	.....	1x10 ⁻⁷
If it is known that alpha-emitters and Sr 90, I 129, Pb 210, Ac 227, Ra 228, Pa 230, Pu 241 and Bk 249 are not present	3x10 ⁻¹⁰	.....	1x10 ⁻¹⁰	.....
If it is known that alpha-emitters and Pb 210, Ac 227, Ra 228 and Pu 241 are not present	3x10 ⁻¹⁰	.....	1x10 ⁻¹¹	.....
If it is known that alpha-emitters and Ac 227 are not present	3x10 ⁻¹¹	.....	1x10 ⁻¹²	.....
If it is known that Ac 227, Th 230, Pa 231, Pu 238, Pu 239, Pu 240, Pu 242, and Cf 249 are not present	3x10 ⁻¹²	.....	1x10 ⁻¹³	.....
If Pa 231, Pu 239, Pu 240, Pu 242 and Cf 249 are not present	2x10 ⁻¹²	.....	7x10 ⁻¹⁴	.....

4. If the mixture of radionuclides consists of uranium and its daughter products in ore dust prior to chemical processing of the uranium ore, the values specified in this paragraph may be used in lieu of those determined in accordance with (b)1 above, or those specified in (b)2 and 3 above.

i. For purposes of subsection (a) of this Section, Column B, 1×10^{-10} uc/ml gross alpha activity; or 2.5×10^{-11} uc/ml natural uranium; or 75 micrograms per cubic meter of air natural uranium.

Amended by R.2005 d.156, effective May 16, 2005.
See: 36 N.J.R. 2336(a), 37 N.J.R. 1826(a).
Rewrote the section.

7:28-6.6 Dose equivalent to an embryo/fetus

(a) The State licensee or registrant shall ensure that the dose equivalent to the embryo/fetus during the entire pregnancy, due to the occupational exposure of a declared pregnant woman, does not exceed 0.5 rem (five mSv). Recordkeeping shall meet the requirements set forth at N.J.A.C. 7:28-8.1.

(b) The State licensee or registrant shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit in (a) above.

(c) The dose equivalent to the embryo/fetus is the sum of:

1. The deep-dose equivalent to the declared pregnant woman; and
2. The dose equivalent to the embryo/fetus resulting from radionuclides in the embryo/fetus and radionuclides in the declared pregnant woman.

(d) If the dose equivalent to the embryo/fetus is found to have exceeded 0.5 rem (five mSv), or is within 0.05 rem (0.5 mSv) of this dose, by the time the woman declares the pregnancy to the State licensee or registrant, the State licensee or registrant shall be deemed to be in compliance with (a) above if the additional dose equivalent to the embryo/fetus does not exceed 0.05 rem (0.5 mSv) during the remainder of the pregnancy.

New Rule, R.2005 d.156, effective May 16, 2005.
See: 36 N.J.R. 2336(a), 37 N.J.R. 1826(a).

SUBCHAPTER 7. RADIATION SURVEYS AND PERSONNEL MONITORING

7:28-7.1 Surveys inside controlled areas

(a) The State licensee or registrant shall ensure that controlled areas shall be surveyed by, or under the direction of, a qualified individual to determine if the installation is maintained and operations are conducted in compliance with this Chapter.

(b) The State licensee or registrant shall ensure that radiation levels shall be determined with the use of suitable instruments and methods.

(c) The State licensee or registrant shall ensure that surveys shall be made of the air for radioactive content when the average concentrations may exceed 1/4 the amount specified in N.J.A.C. 7:28-6.5(a), Column B, or prorated values when more than one isotope is present.

58	Cerium-141	W, see ¹³⁴ Ce	1E-9	—	—
		LLI wall	—	3E-5	3E-4
		Y, see ¹³⁴ Ce	8E-10	—	—
58	Cerium-143	W, see ¹³⁴ Ce	3E-9	—	—
		LLI wall	—	2E-5	2E-4
		Y, see ¹³⁴ Ce	2E-9	—	—
58	Cerium-144	W, see ¹³⁴ Ce	4E-11	—	—
		LLI wall	—	3E-6	3E-5
		Y, see ¹³⁴ Ce	2E-11	—	—
59	Praseodymium-136	W, all compounds except those given for Y	3E-7	—	—
		St wall	—	1E-3	1E-2
		Y, oxides, hydroxides, carbides, and fluorides	3E-7	—	—
59	Praseodymium-137	W, see ¹³⁶ Pr	2E-7	5E-4	5E-3
		Y, see ¹³⁶ Pr	2E-7	—	—
59	Praseodymium-138m	W, see ¹³⁶ Pr	8E-8	1E-4	1E-3
		Y, see ¹³⁶ Pr	6E-8	—	—
59	Praseodymium-139	W, see ¹³⁶ Pr	2E-7	6E-4	6E-3
		Y, see ¹³⁶ Pr	2E-7	—	—
59	Praseodymium-142m	W, see ¹³⁶ Pr	2E-7	1E-3	1E-2
		Y, see ¹³⁶ Pr	2E-7	—	—
59	Praseodymium-142	W, see ¹³⁶ Pr	3E-9	1E-5	1E-4
		Y, see ¹³⁶ Pr	3E-9	—	—
59	Praseodymium-143	W, see ¹³⁶ Pr	1E-9	—	—
		LLI wall	—	2E-5	2E-4
		Y, see ¹³⁶ Pr	9E-10	—	—
59	Praseodymium-144	W, see ¹³⁶ Pr	2E-7	—	—
		St wall	—	6E-4	6E-3
		Y, see ¹³⁶ Pr	2E-7	—	—
59	Praseodymium-145	W, see ¹³⁶ Pr	1E-8	4E-5	4E-4
		Y, see ¹³⁶ Pr	1E-8	—	—
59	Praseodymium-147	W, see ¹³⁶ Pr	3E-7	—	—
		St wall	—	1E-3	1E-2
		Y, see ¹³⁶ Pr	3E-7	—	—
60	Neodymium-136	W, all compounds except those given for Y	8E-8	2E-4	2E-3
		Y, oxides, hydroxides, carbides, and fluorides	8E-8	—	—
60	Neodymium-138	W, see ¹³⁶ Nd	9E-9	3E-5	3E-4
		Y, see ¹³⁶ Nd	7E-9	—	—
60	Neodymium-139m	W, see ¹³⁶ Nd	2E-8	7E-5	7E-4
		Y, see ¹³⁶ Nd	2E-8	—	—
60	Neodymium-139	W, see ¹³⁶ Nd	5E-7	1E-3	1E-2
		Y, see ¹³⁶ Nd	4E-7	—	—
60	Neodymium-141	W, see ¹³⁶ Nd	1E-6	2E-3	2E-2
		Y, see ¹³⁶ Nd	9E-7	—	—
60	Neodymium-147	W, see ¹³⁶ Nd	1E-9	—	—
		LLI wall	—	2E-5	2E-4
		Y, see ¹³⁶ Nd	1E-9	—	—

60	Neodymium-149	W, see ¹³⁶ Nd Y, see ¹³⁶ Nd	4E-8 3E-8	1E-4 —	1E-3 —
60	Neodymium-151	W, see ¹³⁶ Nd Y, see ¹³⁶ Nd	3E-7 3E-7	9E-4 —	9E-3 —
61	Promethium-141	W, all compounds except those given for Y St wall Y, oxides, hydroxides, carbides, and fluorides	3E-7 — 2E-7	— 8E-4 —	— 8E-3 —
61	Promethium-143	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	8E-10 1E-9	7E-5 —	7E-4 —
61	Promethium-144	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	2E-10 2E-10	2E-5 —	2E-4 —
61	Promethium-145	W, see ¹⁴¹ Pm Bone surf Y, see ¹⁴¹ Pm	— 3E-10 3E-10	1E-4 — —	1E-3 — —
61	Promethium-146	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	7E-11 6E-11	2E-5 —	2E-4 —
61	Promethium-147	W, see ¹⁴¹ Pm LLI wall Y, see ¹⁴¹ Pm	— 3E-10 2E-10	— 7E-5 —	— 7E-4 —
61	Promethium-148m	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	4E-10 5E-10	1E-5 —	1E-4 —
61	Promethium-148	W, see ¹⁴¹ Pm LLI wall Y, see ¹⁴¹ Pm	8E-10 — 7E-10	— 7E-6 —	— 7E-5 —
61	Promethium-149	W, see ¹⁴¹ Pm LLI wall Y, see ¹⁴¹ Pm	3E-9 — 2E-9	— 2E-5 —	— 2E-4 —
61	Promethium-150	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	3E-8 2E-8	7E-5 —	7E-4 —
61	Promethium-151	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	5E-9 4E-9	2E-5 —	2E-4 —
62	Samarium-141m	W, all compounds	1E-7	4E-4	4E-3
62	Samarium-141	W, all compounds St wall	2E-7 —	— 8E-4	— 8E-3
62	Samarium-142	W, all compounds	4E-8	1E-4	1E-3
62	Samarium-145	W, all compounds	7E-10	8E-5	8E-4
62	Samarium-146	W, all compounds Bone surf	— 9E-14	— 3E-7	— 3E-6
62	Samarium-147	W, all compounds Bone surf	— 1E-13	— 4E-7	— 4E-6
62	Samarium-151	W, all compounds LLI wall	— 2E-10	— 2E-4	— 2E-3
62	Samarium-153	W, all compounds LLI wall	4E-9 —	— 3E-5	— 3E-4
62	Samarium-155	W, all compounds St wall	3E-7 —	— 1E-3	— 1E-2
62	Samarium-156	W, all compounds	1E-8	7E-5	7E-4

63	Europium-145	W, all compounds	3E-9	2E-5	2E-4
63	Europium-146	W, all compounds	2E-9	1E-5	1E-4
63	Europium-147	W, all compounds	2E-9	4E-5	4E-4
63	Europium-148	W, all compounds	5E-10	1E-5	1E-4
63	Europium-149	W, all compounds	4E-9	2E-4	2E-3
63	Europium-150 (12.62 h)	W, all compounds	1E-8	4E-5	4E-4
63	Europium-150 (34.2 y)	W, all compounds	3E-11	1E-5	1E-4
63	Europium-152m	W, all compounds	9E-9	4E-5	4E-4
63	Europium-152	W, all compounds	3E-11	1E-5	1E-4
63	Europium-154	W, all compounds	3E-11	7E-6	7E-5
63	Europium-155	W, all compounds	—	5E-5	5E-4
		Bone surf	2E-10	—	—
63	Europium-156	W, all compounds	6E-10	8E-6	8E-5
63	Europium-157	W, all compounds	7E-9	3E-5	3E-4
63	Europium-158	W, all compounds	8E-8	3E-4	3E-3
64	Gadolinium-145	D, all compounds except those given for W	2E-7	—	—
		St wall	—	6E-4	6E-3
		W, oxides, hydroxides, and fluorides	2E-7	—	—
64	Gadolinium-146	D, see ¹⁴⁵ Gd	2E-10	2E-5	2E-4
		W, see ¹⁴⁵ Gd	4E-10	—	—
64	Gadolinium-147	D, see ¹⁴⁵ Gd	6E-9	3E-5	3E-4
		W, see ¹⁴⁵ Gd	5E-9	—	—
64	Gadolinium-149	D, see ¹⁴⁵ Gd	3E-9	4E-5	4E-4
		W, see ¹⁴⁵ Gd	3E-9	—	—
64	Gadolinium-151	D, see ¹⁴⁵ Gd	—	9E-5	9E-4
		Bone surf	9E-10	—	—
		W, see ¹⁴⁵ Gd	2E-9	—	—
64	Gadolinium-152	D, see ¹⁴⁵ Gd	—	—	—
		Bone surf	3E-14	4E-7	4E-6
		W, see ¹⁴⁵ Gd	—	—	—
		Bone surf	1E-13	—	—
64	Gadolinium-153	D, see ¹⁴⁵ Gd	—	6E-5	6E-4
		Bone surf	3E-10	—	—
		W, see ¹⁴⁵ Gd	8E-10	—	—
64	Gadolinium-159	D, see ¹⁴⁵ Gd	1E-8	4E-5	4E-4
		W, see ¹⁴⁵ Gd	8E-9	—	—
65	Terbium-147	W, all compounds	5E-8	1E-4	1E-3
65	Terbium-149	W, all compounds	1E-9	7E-5	7E-4
65	Terbium-150	W, all compounds	3E-8	7E-5	7E-4
65	Terbium-151	W, all compounds	1E-8	5E-5	5E-4
65	Terbium-153	W, all compounds	1E-8	7E-5	7E-4
65	Terbium-154	W, all compounds	6E-9	2E-5	2E-4

65	Terbium-155	W, all compounds	1E-8	8E-5	8E-4
65	Terbium-156m (5.0 h)	W, all compounds	4E-8	2E-4	2E-3
65	Terbium-156m (24.4 h)	W, all compounds	1E-8	1E-4	1E-3
65	Terbium-156	W, all compounds	2E-9	1E-5	1E-4
65	Terbium-157	W, all compounds LLI wall	— 8E-10	— 7E-4	— 7E-3
65	Terbium-158	W, all compounds	3E-11	2E-5	2E-4
65	Terbium-160	W, all compounds	3E-10	1E-5	1E-4
65	Terbium-161	W, all compounds LLI wall	2E-9 —	— 3E-5	— 3E-4
66	Dysprosium-155	W, all compounds	4E-8	1E-4	1E-3
66	Dysprosium-157	W, all compounds	9E-8	3E-4	3E-3
66	Dysprosium-159	W, all compounds	3E-9	2E-4	2E-3
66	Dysprosium-165	W, all compounds	6E-8	2E-4	2E-3
66	Dysprosium-166	W, all compounds LLI wall	1E-9 —	— 1E-5	— 1E-4
67	Holmium-155	W, all compounds	2E-7	6E-4	6E-3
67	Holmium-157	W, all compounds	2E-6	4E-3	4E-2
67	Holmium-159	W, all compounds	1E-63	E-3	3E-2
67	Holmium-161	W, all compounds	6E-7	1E-3	1E-2
67	Holmium-162m	W, all compounds	4E-7	7E-4	7E-3
67	Holmium-162	W, all compounds St wall	3E-6 —	— 1E-2	— 1E-1
67	Holmium-164m	W, all compounds	4E-7	1E-3	1E-2
67	Holmium-164	W, all compounds St wall	9E-7 —	— 3E-3	— 3E-2
67	Holmium-166m	W, all compounds	9E-12	9E-6	9E-5
67	Holmium-166	W, all compounds LLI wall	2E-9 —	— 1E-5	— 1E-4
67	Holmium-167	W, all compounds	8E-8	2E-4	2E-3
68	Erbium-161	W, all compounds	9E-8	2E-4	2E-3
68	Erbium-165	W, all compounds	3E-7	9E-4	9E-3
68	Erbium-169	W, all compounds LLI wall	4E-9 —	— 5E-5	— 5E-4
68	Erbium-171	W, all compounds	1E-8	5E-5	5E-4
68	Erbium-172	W, all compounds LLI wall	2E-9 —	— 2E-5	— 2E-4
69	Thulium-162	W, all compounds St wall	4E-7 —	— 1E-3	— 1E-2
69	Thulium-166	W, all compounds	2E-8	6E-5	6E-4
69	Thulium-167	W, all compounds LLI wall	3E-9 —	— 3E-5	— 3E-4

79	Gold-200	D, see ^{193}Au	9E-8	4E-4	4E-3
		W, see ^{193}Au	1E-7	—	—
		Y, see ^{193}Au	1E-7	—	—
79	Gold-201	D, see ^{193}Au	3E-7	—	—
		St wall	—	1E-3	1E-2
		W, see ^{193}Au	3E-7	—	—
		Y, see ^{193}Au	3E-7	—	—
80	Mercury-193m	Vapor	1E-8	—	—
		Organic D	2E-8	6E-5	6E-4
		D, sulfates	1E-8	4E-5	4E-4
		W, oxides, hydroxides, halides, nitrates, and sulfides	1E-8	—	—
80	Mercury-193	Vapor	4E-8	—	—
		Organic D	9E-8	3E-4	3E-3
		D, see $^{193\text{m}}\text{Hg}$	6E-8	2E-4	2E-3
		W, see $^{193\text{m}}\text{Hg}$	6E-8	—	—
80	Mercury-194	Vapor	4E-11	—	—
		Organic D	4E-11	2E-7	2E-6
		D, see $^{193\text{m}}\text{Hg}$	6E-11	1E-5	1E-4
		W, see $^{193\text{m}}\text{Hg}$	2E-10	—	—
80	Mercury-195m	Vapor	6E-9	—	—
		Organic D	8E-9	4E-5	4E-4
		D, see $^{193\text{m}}\text{Hg}$	7E-9	3E-5	3E-4
		W, see $^{193\text{m}}\text{Hg}$	5E-9	—	—
80	Mercury-195	Vapor	4E-8	—	—
		Organic D	6E-8	2E-4	2E-3
		D, see $^{193\text{m}}\text{Hg}$	5E-8	2E-4	2E-3
		W, see $^{193\text{m}}\text{Hg}$	5E-8	—	—
80	Mercury-197m	Vapor	7E-9	—	—
		Organic D	1E-8	5E-5	5E-4
		D, see $^{193\text{m}}\text{Hg}$	1E-8	4E-5	4E-4
		W, see $^{193\text{m}}\text{Hg}$	7E-9	—	—
80	Mercury-197	Vapor	1E-8	—	—
		Organic D	2E-8	9E-5	9E-4
		D, see $^{193\text{m}}\text{Hg}$	2E-8	8E-5	8E-4
		W, see $^{193\text{m}}\text{Hg}$	1E-8	—	—
80	Mercury-199m	Vapor	1E-7	—	—
		Organic D	2E-7	—	—
		St wall	—	1E-3	1E-2
		D, see $^{193\text{m}}\text{Hg}$	2E-7	8E-4	8E-3
		W, see $^{193\text{m}}\text{Hg}$	2E-7	—	—
80	Mercury-203	Vapor	1E-9	—	—
		Organic D	1E-9	7E-6	7E-5
		D, see $^{193\text{m}}\text{Hg}$	2E-9	3E-5	3E-4
		W, see $^{193\text{m}}\text{Hg}$	2E-9	—	—
81	Thallium-194m	D, all compounds	2E-7	—	—
		St wall	—	1E-3	1E-2
81	Thallium-194	D, all compounds	8E-7	—	—
		St wall	—	4E-3	4E-2
81	Thallium-195	D, all compounds	2E-7	9E-4	9E-3
81	Thallium-197	D, all compounds	2E-7	1E-3	1E-2

81	Thallium-198m	D, all compounds	8E-8	4E-4	4E-3
81	Thallium-198	D, all compounds	5E-8	3E-4	3E-3
81	Thallium-199	D, all compounds	1E-7	9E-4	9E-3
81	Thallium-200	D, all compounds	2E-8	1E-4	1E-3
81	Thallium-201	D, all compounds	3E-8	2E-4	2E-3
81	Thallium-202	D, all compounds	7E-9	5E-5	5E-4
81	Thallium-204	D, all compounds	3E-9	2E-5	2E-4
82	Lead-195m	D, all compounds	3E-7	8E-4	8E-3
82	Lead-198	D, all compounds	9E-8	4E-4	4E-3
82	Lead-199	D, all compounds	1E-7	3E-4	3E-3
82	Lead-200	D, all compounds	9E-9	4E-5	4E-4
82	Lead-201	D, all compounds	3E-8	1E-4	1E-3
82	Lead-202m	D, all compounds	4E-8	1E-4	1E-3
82	Lead-202	D, all compounds	7E-11	2E-6	2E-5
82	Lead-203	D, all compounds	1E-8	7E-5	7E-4
82	Lead-205	D, all compounds	2E-9	5E-5	5E-4
82	Lead-209	D, all compounds	8E-8	3E-4	3E-3
82	Lead-210	D, all compounds	—	—	—
		Bone surf	6E-13	1E-8	1E-7
82	Lead-211	D, all compounds	9E-10	2E-4	2E-3
82	Lead-212	D, all compounds	5E-11	—	—
		Bone surf	—	2E-6	2E-5
82	Lead-214	D, all compounds	1E-9	1E-4	1E-3
83	Bismuth-200	D, nitrates	1E-7	4E-4	4E-3
		W, all other compounds	1E-7	—	—
83	Bismuth-201	D, see ²⁰⁰ Bi	4E-8	2E-4	2E-3
		W, see ²⁰⁰ Bi	5E-8	—	—
83	Bismuth-202	D, see ²⁰⁰ Bi	6E-8	2E-4	2E-3
		W, see ²⁰⁰ Bi	1E-7	—	—
83	Bismuth-203	D, see ²⁰⁰ Bi	9E-9	3E-5	3E-4
		W, see ²⁰⁰ Bi	9E-9	—	—
83	Bismuth-205	D, see ²⁰⁰ Bi	3E-9	2E-5	2E-4
		W, see ²⁰⁰ Bi	2E-9	—	—
83	Bismuth-206	D, see ²⁰⁰ Bi	2E-9	9E-6	9E-5
		W, see ²⁰⁰ Bi	1E-9	—	—
83	Bismuth-207	D, see ²⁰⁰ Bi	2E-9	1E-5	1E-4
		W, see ²⁰⁰ Bi	5E-10	—	—
83	Bismuth-210m	D, see ²⁰⁰ Bi	—	—	—
		Kidneys	9E-12	8E-7	8E-6
		W, see ²⁰⁰ Bi	9E-13	—	—
83	Bismuth-210	D, see ²⁰⁰ Bi	—	1E-5	1E-4
		Kidneys	5E-10	—	—
		W, see ²⁰⁰ Bi	4E-11	—	—

83	Bismuth-212	D, see ²⁰⁰ Bi W, see ²⁰⁰ Bi	3E-10 4E-10	7E-5 —	7E-4 —
83	Bismuth-213	D, see ²⁰⁰ Bi W, see ²⁰⁰ Bi	4E-10 5E-10	1E-4 —	1E-3 —
83	Bismuth-214	D, see ²⁰⁰ Bi St wall W, see ²⁰⁰ Bi	1E-9 — 1E-9	— 3E-4 —	— 3E-3 —
84	Polonium-203	D, all compounds except those given for W W, oxides, hydroxides, and nitrates	9E-8 1E-7	3E-4 —	3E-3 —
84	Polonium-205	D, see ²⁰³ Po W, see ²⁰³ Po	5E-8 1E-7	3E-4 —	3E-3 —
84	Polonium-207	D, see ²⁰³ Po W, see ²⁰³ Po	3E-8 4E-8	1E-4 —	1E-3 —
84	Polonium-210	D, see ²⁰³ Po W, see ²⁰³ Po	9E-13 9E-13	4E-8 —	4E-7 —
85	Astatine-207	D, halides W	4E-9 3E-9	8E-5 —	8E-4 —
85	Astatine-211	D, halides W	1E-10 8E-11	2E-6 —	2E-5 —
86	Radon-220	With daughters removed With daughters present	2E-8 3E-11	— —	— —
86	Radon-222	With daughters removed With daughters present	1E-8 1E-10	— —	— —
87	Francium-222	D, all compounds	6E-10	3E-5	3E-4
87	Francium-223	D, all compounds	1E-9	8E-6	8E-5
88	Radium-223	W, all compounds Bone surf	9E-13 —	— 1E-7	— 1E-6
88	Radium-224	W, all compounds Bone surf	2E-12 —	— 2E-7	— 2E-6
88	Radium-225	W, all compounds Bone surf	9E-13 —	— 2E-7	— 2E-6
88	Radium-226	W, all compounds Bone surf	9E-13 —	— 6E-8	— 6E-7
88	Radium-227	W, all compounds Bone surf	— 3E-8	— 3E-4	— 3E-3
88	Radium-228	W, all compounds Bone surf	2E-12 —	— 6E-8	— 6E-7
89	Actinium-224	D, all compounds except those given for W and Y LLI wall W, halides and nitrates Y, oxides and hydroxides	— 5E-11 7E-11 6E-11	— 3E-5 — —	— 3E-4 — —
89	Actinium-225	D, see ²²⁴ Ac LLI wall W, see ²²⁴ Ac Y, see ²²⁴ Ac	— 7E-13 9E-13 9E-13	— 7E-7 — —	— 7E-6 — —

89	Actinium-226	D, see ²²⁴ Ac	—	—	—
		LLI wall	5E-12	2E-6	2E-5
		W, see ²²⁴ Ac	7E-12	—	—
		Y, see ²²⁴ Ac	6E-12	—	—
89	Actinium-227	D, see ²²⁴ Ac	—	—	—
		Bone surf	1E-15	5E-9	5E-8
		W, see ²²⁴ Ac	—	—	—
		Bone surf	4E-15	—	—
89	Actinium-228	Y, see ²²⁴ Ac	6E-15	—	—
		D, see ²²⁴ Ac	—	3E-5	3E-4
		Bone surf	2E-11	—	—
		W, see ²²⁴ Ac	—	—	—
90	Thorium-226	Bone surf	8E-11	—	—
		Y, see ²²⁴ Ac	6E-11	—	—
		W, all compounds except those given for Y	2E-10	—	—
		St wall	—	7E-5	7E-4
90	Thorium-227	Y, oxides and hydroxides	2E-10	—	—
		W, see ²²⁶ Th	5E-13	2E-6	2E-5
		Y, see ²²⁶ Th	5E-13	—	—
		W, see ²²⁶ Th	—	—	—
90	Thorium-228	Bone surf	3E-14	2E-7	2E-6
		Y, see ²²⁶ Th	2E-14	—	—
		W, see ²²⁶ Th	—	—	—
		Bone surf	3E-15	2E-8	2E-7
90	Thorium-229	Y, see ²²⁶ Th	—	—	—
		Bone surf	4E-15	—	—
		W, see ²²⁶ Th	—	—	—
		Bone surf	2E-14	1E-7	1E-6
90	Thorium-230	Y, see ²²⁶ Th	—	—	—
		Bone surf	3E-14	—	—
		W, see ²²⁶ Th	—	—	—
		Bone surf	9E-9	5E-5	5E-4
90	Thorium-231	Y, see ²²⁶ Th	9E-9	—	—
		W, see ²²⁶ Th	—	—	—
		Bone surf	4E-15	3E-8	3E-7
		Y, see ²²⁶ Th	—	—	—
90	Thorium-232	Bone surf	6E-15	—	—
		W, see ²²⁶ Th	3E-10	—	—
		LLI wall	—	5E-6	5E-5
		Y, see ²²⁶ Th	2E-10	—	—
91	Protactinium-227	W, all compounds except those given for Y	2E-10	5E-5	5E-4
		Y, oxides and hydroxides	1E-10	—	—
		W, see ²²⁷ Pa	—	2E-5	2E-4
		Bone surf	3E-11	—	—
91	Protactinium-228	Y, see ²²⁷ Pa	2E-11	—	—
		W, see ²²⁷ Pa	7E-12	—	—
		Bone surf	—	1E-5	1E-4
		Y, see ²²⁷ Pa	5E-12	—	—
91	Protactinium-230	W, see ²²⁷ Pa	—	—	—
		Bone surf	6E-15	6E-9	6E-8
		Y, see ²²⁷ Pa	—	—	—
		Bone surf	8E-15	—	—
91	Protactinium-231	W, see ²²⁷ Pa	—	—	—
		Bone surf	6E-15	6E-9	6E-8
		Y, see ²²⁷ Pa	—	—	—
		Bone surf	8E-15	—	—

99	Einsteinium-253	W, all compounds	2E-12	2E-6	2E-5
99	Einsteinium-254m	W, all compounds LLI wall	1E-11 —	— 4E-6	— 4E-5
99	Einsteinium-254	W, all compounds Bone surf	— 2E-13	— 2E-7	— 2E-6
100	Fermium-252	W, all compounds	2E-11	6E-6	6E-5
100	Fermium-253	W, all compounds	1E-11	1E-5	1E-4
100	Fermium-254	W, all compounds	1E-10	4E-5	4E-4
100	Fermium-255	W, all compounds	3E-11	7E-6	7E-5
100	Fermium-257	W, all compounds Bone surf	— 3E-13	— 5E-7	— 5E-6
101	Mendelevium-257	W, all compounds Bone surf	— 1E-10	1E-4 —	1E-3 —
101	Mendelevium-258	W, all compounds Bone surf	— 5E-13	— 6E-7	— 6E-6
—	Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life less than 2 hours	Submersion [#]	1E-9	—	—
—	Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life greater than 2 hours		1E-12	1E-8	1E-7
—	Any single radionuclide not listed above that decays by alpha emission or spontaneous fission, or any mixture for which either the identity or the concentration of any radionuclide in the mixture is not known. . . .		1E-15	2E-9	2E-8

Footnotes:

[#] "Submersion" means that values given are for submersion in a hemispherical semi-infinite cloud of airborne material.

Note:

1. If the identity of each radionuclide in the mixture is not known, but it is known that certain radionuclides specified in this section are not present in the mixture, the effluent and sewage concentrations for the mixture are the lowest values specified in this section for any radionuclide that is not known to be absent from the mixture; or

If it is known that Ac-227-D,W,Y, Th-229-W,Y,

Th-232-W,Y, Pa-231-W,Y, Cm-248-W, and

Cm-250-W are not present

1E-14 — —

If, in addition, it is known that Sm-146-W,

Gd-148-D,W, Gd-152-D, Th-228-W,Y, Th-230-W,Y,

U-232-Y, U-233-Y, U-234-Y, U-235-Y, U-236-Y,

U-238-Y, U-Nat-Y, Np-236-W, Np-237-W, Pu-236-W,Y,

Pu-238-W,Y, Pu-239-W,Y, Pu-240-W,Y, Pu-242-W,Y,

Pu-244-W,Y, Am-241-W, Am-242m-W, Am-243-W,

Cm-243-W, Cm-244-W, Cm-245-W, Cm-246-W,

Cm-247-W, Bk-247-W, Cf-249-W,Y, Cf-250-W,Y,

Cf-251-W,Y, Cf-252-W,Y, and Cf-254-W,Y

are not present

1E-13 — —

If, in addition, it is known that Sm-147-W,

Gd-152-W, Pb-210-D, Bi-210m-W, Po-210-D,W,

Ra-223-W, Ra-225-W, Ra-226-W, Ac-225-D,W,Y,

Th-227-W,Y, U-230-D,W,Y, U-232-D,W, U-Nat-W,

Pu-241-W, Cm-240-W, Cm-242-W, Cf-248-W,Y,

Es-254-W, Fm-257-W, and Md-258-W are not

present

1E-12 — —

If, in addition it is known that Fe-60,

Sr-90, Cd-113m, Cd-113, In-115, I-129,

Cs-134, Sm-145, Sm-147, Gd-148, Gd-152,

Hg-194 (organic), Bi-210m, Ra-223, Ra-224,

Ra-225, Ac-225, Th-228, Th-230, U-233, U-234,

U-235, U-236, U-238, U-Nat, Cm-242, Cf-248,

Es-254, Fm-257, and Md-258 are not present

— 1E-6 1E-5

2. If the identity and concentration of each radionuclide in a mixture are known, the limiting values should be derived as follows: determine, for each radionuclide in the mixture, the ratio between the concentration present in the mixture and the concentration otherwise established in Appendix A for the specific radionuclide when not in a mixture. The sum of such ratios for all of the radionuclides in the mixture may not exceed "1" (i.e., "unity").

Example: If radionuclides "A," "B," and "C" are present in concentrations C_A , C_B , and C_C , and if the applicable effluent concentrations (EC) are EC_A , EC_B , and EC_C , respectively, then the concentrations shall be limited so that the following relationship exists:

$$\frac{C_A}{EC_A} + \frac{C_B}{EC_B} + \frac{C_C}{EC_C} \leq 1$$

New Rule, R.2005 d.156, effective May 16, 2005.

See: 36 N.J.R. 2336(a), 37 N.J.R. 1826(a).

7:28-12.2 Applicability

- (a) The standards in this subchapter are applicable to:

1. Remediation of radioactive contamination of real property by any technologically enhanced naturally occurring radioactive materials;

2. Remediation of radioactive contamination of real property by accelerator-produced radionuclides; and

SUBCHAPTER 12. REMEDIATION STANDARDS FOR RADIOACTIVE MATERIALS

7:28-12.1 Purpose and scope

The purpose of this subchapter is to establish minimum standards for the remediation of real property contaminated by radioactive materials. This subchapter also provides direction on remediating a site contaminated with radioactive materials with regard to sampling, surveying, and laboratory requirements, remedial action selection, and remedial action requirements.