~~PART D~~

~~APPENDIX A~~

~~OTHER CONTROLS OF CONCENTRATIONS OF RADIOACTIVE MATERIAL IN AIR~~

~~Please refer to 56 FR 23400, May 21, 1991, as amended at 60 FR 20185, April 25, 1995.~~

~~PART D~~

~~APPENDIX B~~

~~ANNUAL LIMITS ON INTAKE (ALI) AND DERIVED AIR CONCENTRATIONS (DAC) OF RADIONUCLIDES FOR OCCUPATIONAL EXPOSURE; EFFLUENT CONCENTRATIONS; CONCENTRATIONS FOR RELEASE TO SANITARY SEWERAGE~~

~~Introduction~~

~~For each radionuclide, Table I indicates the chemical form which is to be used for selecting the appropriate ALI or DAC value. The ALIs and DACs for inhalation are given for an aerosol with an activity median aerodynamic diameter (AMAD) of 1 μm, micron, and for three classes (D,W,Y) of radioactive material, which refer to their retention (approximately days, weeks or years) in the pulmonary region of the lung. This classification applies to a range of clearance half-times for D if less than 10 days, for W from 10 to 100 days, and for Y greater than 100 days. The class (D, W, or Y) given in the column headed "Class" applies only to the inhalation ALIs and DACs given in Table I, column 2 and 3. Table II provides concentration limits for airborne and liquid effluents released to the general environment. Table III provides concentration limits for discharges to sanitary sewerage.~~

~~Note: The values in Tables I, II, and III are presented in the computer "E" notation. In this notation a value of 6E-02 represents a value of 6×10^{-2} or 0.06, 6E+2 represents 6×10^{2} or 600, and 6E+0 represents 6×10^{0} or 6.~~

~~Table I "Occupational Values"~~

~~Note that the columns in Table I of this appendix captioned "Oral Ingestion ALI," "Inhalation ALI," and "DAC," are applicable to occupational exposure to radioactive material.~~

~~The ALIs in this appendix are the annual intakes of given radionuclide by "reference man" which would result in either (1) a committed effective equivalent dose (H) of 0.05 Sv (5 rem), stochastic ALI, or (2) a committed equivalent dose (H) of 0.5 Sv (50 rem) to an organ or tissue, non-stochastic ALI. The stochastic ALIs were derived to result in a risk, due to irradiation of organs and tissues, comparable to the risk associated with deep equivalent dose (H) to the whole body of 0.05 Sv (5 rem). The derivation includes multiplying the committed equivalent dose (H) to an organ or tissue by a tissue tissue weighting factor, w_T. This tissue tissue weighting factor is the proportion of the risk of stochastic effects resulting from irradiation of the organ or tissue, T, to the total risk of stochastic effects when the whole body is irradiated uniformly. The values of w_T are listed under the definition of tissue tissue weighting factor in D.3. The non-stochastic ALIs were derived to avoid non-stochastic effects, such as prompt damage to tissue or reduction in organ function.~~

~~A value of $w_T = 0.06$ is applicable to each of the 5 organs or tissues in the "remainder" category receiving the highest equivalent dose (H)s, and the equivalent dose (H)s of all other remaining tissues may be disregarded. The following portions of the GI tract -- stomach, small intestine, upper large intestine, and lower large intestine -- are to be treated as 4 separate organs.~~

~~Note that the equivalent dose (H)s for an extremity, skin and lens of the eye are not considered in computing the committed effective equivalent dose (H), but are subject to limits that must be met separately.~~

~~When an ALI is defined by the stochastic dose limit, this value alone is given. When an ALI is determined by the non-stochastic dose limit to an organ, the organ or tissue to which the limit applies is shown, and the ALI for the stochastic limit is shown in parentheses. Abbreviated organ or tissue designations are used:~~

~~LLI wall = lower large intestine wall;~~
~~St wall = stomach wall;~~
~~Blad wall = bladder wall; and~~
~~Bone surf = bone surface.~~

~~The use of the ALIs listed first, the more limiting of the stochastic and non-stochastic ALIs, will ensure that non-stochastic effects are avoided and that the risk of stochastic effects is limited to an acceptably low value. If, in a particular situation involving a radionuclide for which the non-stochastic ALI is limiting, use of that non-stochastic ALI is considered unduly conservative, the licensee may use the stochastic ALI to determine the committed effective equivalent dose (H). However, the licensee shall also ensure that the 0.5 Sv (50 rem) equivalent dose (H) limit for any organ or tissue is not exceeded by the sum of the external deep equivalent dose (H) plus the internal committed equivalent dose (H) to that organ, not the effective dose. For the case where there is no external dose contribution, this would be demonstrated if the sum of the fractions of the nonstochastic ALIs (ALI_{ns}) that contribute to the committed equivalent dose (H) to the organ receiving the highest dose does not exceed unity, that is, Σ (intake (in μCi) of each radionuclide/ALI_{ns}) $\leq$ 1.0. If there is an external deep equivalent dose (H) contribution of H_d, then this sum must be less than 1 - (H_d/50), instead of $\leq$ 1.0.~~

~~Note that the equivalent dose (H)s for an extremity, skin, and lens of the eye are not considered in computing the committed effective equivalent dose (H), but are subject to limits that must be met separately.~~

~~The derived air concentration (DAC) values are derived limits intended to control chronic occupational exposures. The relationship between the DAC and the ALI is given by:~~

~~DAC = ALI(in μCi)/(2000 hours per working year x 60 minutes/hour x 2×10^4 ml per minute) = [ALI/2.4×10^9] μCi/ml,~~

~~where 2×10^4 ml is the volume of air breathed per minute at work by reference man under working conditions of light work.~~

~~The DAC values relate to 1 of 2 modes of exposure: either external submersion or the internal committed equivalent dose (H)s resulting from inhalation of radioactive materials. DACs based upon submersion are for immersion in a semi-infinite cloud of uniform concentration and apply to each radionuclide separately.~~

~~The ALI and DAC values include contributions to exposure by the single radionuclide named and any in-growth of daughter radionuclides produced in the body by decay of the parent. However, intakes that~~

include both the parent and daughter radionuclides should be treated by the general method appropriate for mixtures.

The values of ALI and DAC do not apply directly when the individual both ingests and inhales a radionuclide, when the individual is exposed to a mixture of radionuclides by either inhalation or ingestion or both, or when the individual is exposed to both internal and external irradiation. See D.202. When an individual is exposed to radioactive materials which fall under several of the translocation classifications of the same radionuclide, such as, Class D, Class W, or Class Y, the exposure may be evaluated as if it were a mixture of different radionuclides.

It should be noted that the classification of a compound as Class D, W, or Y is based on the chemical form of the compound and does not take into account the radiological half-life of different radionuclides. For this reason, values are given for Class D, W, and Y compounds, even for very short-lived radionuclides.

Table II "Effluent Concentrations"

The columns in Table II of this appendix captioned "Effluents," "Air" and "Water" are applicable to the assessment and control of dose to the public, particularly in the implementation of the provisions of D.302. The concentration values given in Columns 1 and 2 of Table II are equivalent to the radionuclide concentrations which, if inhaled or ingested continuously over the course of a year, would produce a total effective equivalent dose (H) of 0.5 mSv (0.05 rem).

Consideration of non-stochastic limits has not been included in deriving the air and water effluent concentration limits because non-stochastic effects are presumed not to occur at or below the dose levels established for individual members of the public. For radionuclides, where the non-stochastic limit was governing in deriving the occupational DAC, the stochastic ALI was used in deriving the corresponding airborne effluent limit in Table II. For this reason, the DAC and airborne effluent limits are not always proportional as was the case in Appendix A of Part D of the eighth edition of Volume I of the *Suggested State Regulations for Control of Radiation*.

The air concentration values listed in Table II, Column 1 were derived by one of two methods. For those radionuclides for which the stochastic limit is governing, the occupational stochastic inhalation ALI was divided by 2.4×10^9 (ml), relating the inhalation ALI to the DAC, as explained above, and then divided by a factor of 300. The factor of 300 includes the following components: a factor of 50 to relate the 0.05 Sv (5 rem) annual occupational dose limit to the 1 mSv (0.1 rem) limit for members of the public, a factor of 3 to adjust for the difference in exposure time and the inhalation rate for a worker and that for members of the public; and a factor of 2 to adjust the occupational values, derived for adults, so that they are applicable to other age groups.

For those radionuclides for which submersion, that is external dose, is limiting, the occupational DAC in Table I, Column 3 was divided by 219. The factor of 219 is composed of a factor of 50, as described above, and a factor of 4.38 relating occupational exposure for 2,000 hours per year to full-time exposure (8,760 hours per year). Note that an additional factor of 2 for age considerations is not warranted in the submersion case.

The water concentrations were derived by taking the most restrictive occupational stochastic oral ingestion ALI and dividing by 7.3×10^7. The factor of 7.3×10^7 (ml) includes the following components: the factors of 50 and 2 described above and a factor of 7.3×10^5 (ml) which is the annual water intake of reference man.

Note 2 of this appendix provides groupings of radionuclides which are applicable to unknown mixtures of radionuclides. These groupings, including occupational inhalation ALIs and DACs, air and water effluent concentrations and releases to sewer, require demonstrating that the most limiting radionuclides in successive classes are absent. The limit for the unknown mixture is defined when the presence of one of the listed radionuclides cannot be definitely excluded as being present either from knowledge of the radionuclide composition of the source or from actual measurements.

Table III "Releases to Sewers"

The monthly average concentrations for release to sanitary sewerage are applicable to the provisions in D.1003. The concentration values were derived by taking the most restrictive occupational stochastic oral ingestion ALI and dividing by 7.3×10^6 (ml). The factor of 7.3×10^6 (ml) is composed of a factor of 7.3×10^5 (ml), the annual water intake by reference man, and a factor of 10, such that the concentrations, if the sewage released by the licensee were the only source of water ingested by a reference man during a year, would result in a committed effective equivalent dose (H) of 5 mSv (0.5 rem).

List of Elements

Name	Symbol	Atomic Number	Name	Symbol	Atomic Number
Actinium	Ac	89	Chromium	Cr	24
Aluminum	A	13	Cobalt	Co	27
Americium	Am	95	Copper	Cu	29
Antimony	Sb	51	Curium	Cm	96
Argon	Ar	18	Dysprosium	Dy	66
Arsenic	As	33	Einsteinium	Es	99
Astatine	At	85	Erbium	Er	68
Barium	Ba	56	Europium	Eu	63
Berkelium	Bk	97	Fermium	Fm	100
Beryllium	Be	4	Fluorine	F	9
Bismuth	Bi	83	Francium	Fr	87
Bromine	Br	35	Gadolinium	Gd	64
Cadmium	Cd	48	Gallium	Ga	31
Calcium	Ca	20	Germanium	Ge	32
Californium	Cf	98	Gold	Au	79
Carbon	C	6	Hafnium	Hf	72
Cerium	Ce	58	Holmium	Ho	67
Cesium	Cs	55	Hydrogen	H	1
Chlorine	Cl	17	Indium	In	49

List of Elements *(Continued)*

Name	Symbol	Atomic Number
Iodine	I	53
Iridium	Ir	77
Iron	Fe	26
Krypton	Kr	36
Lanthanum	La	57
Lead	Pb	82
Lutetium	Lu	71
Magnesium	Mg	12
Manganese	Mn	25
Mendelevium	Md	101
Mercury	Hg	80
Molybdenum	Mo	42
Neodymium	Nd	60
Neptunium	Np	93
Nickel	Ni	28
Niobium	Nb	41
Osmium	Os	76
Palladium	Pd	46
Phosphorus	P	15
Platinum	Pt	78
Plutonium	Pu	94
Polonium	Po	84
Potassium	K	19
Praseodymium	Pr	59
Promethium	Pm	61
Protactinium	Pa	91
Radium	Ra	88
Radon	Rn	86
Rhenium	Re	75
Rhodium	Rh	45
Rubidium	Rb	37
Ruthenium	Ru	44
Samarium	Sm	62
Scandium	Sc	21
Selenium	Se	34
Silicon	Si	14
Silver	Ag	47
Sodium	Na	11
Strontium	Sr	38
Sulfur	S	16
Tantalum	Ta	73
Technetium	Tc	43
Tellurium	Te	52
Terbium	Tb	65
Thallium	Tl	81
Thorium	Th	90
Thulium	Tm	69
Tin	Sn	50
Titanium	Ti	22
Tungsten	W	74
Uranium	U	92
Vanadium	V	23
Xenon	Xe	54
Ytterbium	Yb	70
Yttrium	Y	39
Zinc	Zn	30
Zirconium	Zr	40

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage

Atomic No.	Radionuclide	Class	Table I Occupational Values: Col. 1 Oral Ingestion ALI (µCi)*	Table I Occupational Values: Col. 2 Inhalation ALI (µCi)	Table I Occupational Values: Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations: Col. 1 Air (µCi/ml)	Table II Effluent Concentrations: Col. 2 Water (µCi/ml)	Table III Releases to Sewers: Monthly Average Concentration (µCi/ml)
1	Hydrogen-3	Water, DAC includes skin absorption	8E+4	8E+4	2E-5	1E-7	1E-3	1E-2
		Gas (HT or T_2) Submersion[a]: Use above values as HT and T_2 oxidize in air and in the body to HTO.						
4	Beryllium-7	W, all compounds except those given for Y	4E+4	2E+4	9E-6	3E-8	6E-4	6E-3
		Y, oxides, halides, and nitrates	--	2E+4	8E-6	3E-8	--	--
4	Beryllium-10	W, see ^{7}Be	1E+3	2E+2	6E-8	2E-10	--	--
			LLI wall (1E+3)	--	--	--	2E-5	2E-4
		Y, see ^{7}Be	--	1E+1	6E-9	2E-11	--	--
6	Carbon-11[b]	Monoxide	--	1E+6	5E-4	2E-6	--	--
		Dioxide	--	6E+5	3E-4	9E-7	--	--
		Compounds	4E+5	4E+5	2E-4	6E-7	6E-3	6E-2
6	Carbon-14	Monoxide	--	2E+6	7E-4	2E-6	--	--
		Dioxide	--	2E+5	9E-5	3E-7	--	--
		Compounds	2E+3	2E+3	1E-6	3E-9	3E-5	3E-4
9	Fluorine-18[b]	D, fluorides of H, Li, Na, K, Rb, Cs, and Fr	5E+4	7E+4	3E-5	1E-7	--	--
			St wall (5E+4)	--	--	--	7E-4	7E-3
		W, fluorides of Be, Mg, Ca, Sr, Ba, Ra, Al, Ga, In, Tl, As, Sb, Bi, Fe, Ru, Os, Co, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, Sc, Y, Ti, Zr, V, Nb, Ta, Mn, Tc, and Re	--	9E+4	4E-5	1E-7	--	--
		Y, lanthanum fluoride	--	8E+4	3E-5	1E-7	--	--
11	Sodium-22	D, all compounds	4E+2	6E+2	3E-7	9E-10	6E-6	6E-5
11	Sodium-24	D, all compounds	4E+3	5E+3	2E-6	7E-9	5E-5	5E-4
12	Magnesium-28	D, all compounds except those given for W	7E+2	2E+3	7E-7	2E-9	9E-6	9E-5
		W, oxides, hydroxides, carbides, halides, and nitrates	--	1E+3	5E-7	2E-9	--	--

* To convert µCi to kBq; multiply the µCi value by 37.

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
13	Aluminum-26	D, all compounds except those given for W	4E+2	6E+1	3E-8	9E-11	6E-6	6E-5
		W, oxides, hydroxides, carbides, halides, and nitrates	--	9E+1	4E-8	1E-10	--	--
14	Silicon-31	D, all compounds except those given for W and Y	9E+3	3E+4	1E-5	4E-8	1E-4	1E-3
		W, oxides, hydroxides, carbides, and nitrates	--	3E+4	1E-5	5E-8	--	--
		Y, aluminosilicate glass	--	3E+4	1E-5	4E-8	--	--
14	Silicon-32	D, see ^{31}Si	2E+3	2E+2	1E-7	3E-10	--	--
			LLI wall (3E+3)	--	--	--	4E-5	4E-4
		W, see ^{31}Si	--	1E+2	5E-8	2E-10	--	--
		Y, see ^{31}Si	--	5E+0	2E-9	7E-12	--	--
15	Phosphorus-32	D, all compounds except phosphates given for W	6E+2	9E+2	4E-7	1E-9	9E-6	9E-5
		W, phosphates of Zn^{2+}, S^{3+}, Mg^{2+}, Fe^{3+}, Bi^{3+}, and lanthanides	--	4E+2	2E-7	5E-10	--	--
15	Phosphorus-33	D, see ^{32}P	6E+3	8E+3	4E-6	1E-8	8E-5	8E-4
		W, see ^{32}P	--	3E+3	1E-6	4E-9	--	--
16	Sulfur-35	Vapor	--	1E+4	6E-6	2E-8	--	--
		D, sulfides and sulfates except those given for W	1E+4	2E+4	7E-6	2E-8	--	--
			LLI wall (8E+3)	--	--	--	1E-4	1E-3
		W, elemental sulfur, sulfides of Sr, Ba, Ge, Sn, Pb, As, Sb, Bi, Cu, Ag, Au, Zn, Cd, Hg, W, and Mo. Sulfates of Ca, Sr, Ba, Ra, As, Sb, and Bi	6E+3 --	2E+3	9E-7	3E-9	--	--
17	Chlorine-36	D, chlorides of H, Li, Na, K, Rb, Cs, and Fr	2E+3	2E+3	1E-6	3E-9	2E-5	2E-4
		W, chlorides of lanthanides, Be, Mg, Ca, Sr, Ba, Ra, Al, Ga, In, Tl, Ge, Sn, Pb, As, Sb, Bi, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, Sc, Y, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Mn, Tc, and Re	--	2E+2	1E-7	3E-10	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
17	Chlorine-38[b/]	D, see ^{36}Cl	2E+4	4E+4	2E-5	6E-8	--	--
			St wall (3E+4)	--	--	--	3E-4	3E-3
		W, see ^{36}Cl	--	5E+4	2E-5	6E-8	--	--
17	Chlorine-39[b/]	D, see ^{36}Cl	2E+4	5E+4	2E-5	7E-8	--	--
			St wall (4E+4)	--	--	--	5E-4	5E-3
		W, see ^{36}Cl	--	6E+4	2E-5	8E-8	--	--
18	Argon-37	Submersion[a/]	--	--	1E+0	6E-3	--	--
18	Argon-39	Submersion[a/]	--	--	2E-4	8E-7	--	--
18	Argon-41	Submersion[a/]	--	--	3E-6	1E-8	--	--
19	Potassium-40	D, all compounds	3E+2	4E+2	2E-7	6E-10	4E-6	4E-5
19	Potassium-42	D, all compounds	5E+3	5E+3	2E-6	7E-9	6E-5	6E-4
19	Potassium-43	D, all compounds	6E+3	9E+3	4E-6	1E-8	9E-5	9E-4
19	Potassium-44[b/]	D, all compounds	2E+4	7E+4	3E-5	9E-8	--	--
			St wall (4E+4)	--	--	--	5E-4	5E-3
19	Potassium-45[b/]	D, all compounds	3E+4	1E+5	5E-5	2E-7	--	--
			St wall (5E+4)	--	--	--	7E-4	7E-3
20	Calcium-41	W, all compounds	3E+3	4E+3	2E-6	--	--	--
			Bone surf (4E+3)	Bone surf (4E+3)	--	5E-9	6E-5	6E-4
20	Calcium-45	W, all compounds	2E+3	8E+2	4E-7	1E-9	2E-5	2E-4
20	Calcium-47	W, all compounds	8E+2	9E+2	4E-7	1E-9	1E-5	1E-4
21	Scandium-43	Y, all compounds	7E+3	2E+4	9E-6	3E-8	1E-4	1E-3
21	Scandium-44m	Y, all compounds	5E+2	7E+2	3E-7	1E-9	7E-6	7E-5
21	Scandium-44	Y, all compounds	4E+3	1E+4	5E-6	2E-8	5E-5	5E-4
21	Scandium-46	Y, all compounds	9E+2	2E+2	1E-7	3E-10	1E-5	1E-4
21	Scandium-47	Y, all compounds	2E+3	3E+3	1E-6	4E-9	--	--
			LLI wall (3E+3)	--	--	--	4E-5	4E-4
21	Scandium-48	Y, all compounds	8E+2	1E+3	6E-7	2E-9	1E-5	1E-4

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
21	Scandium-49[b/]	Y, all compounds	2E+4	5E+4	2E-5	8E-8	3E-4	3E-3
22	Titanium-44	D, all compounds except those given for W and Y	3E+2	1E+1	5E-9	2E-11	4E-6	4E-5
		W, oxides, hydroxides, carbides, halides, and nitrates	--	3E+1	1E-8	4E-11	--	--
		Y, SrTi0	--	6E+0	2E-9	8E-12	--	--
22	Titanium-45	D, see ^{44}Ti	9E+3	3E+4	1E-5	3E-8	1E-4	1E-3
		W, see ^{44}Ti	--	4E+4	1E-5	5E-8	--	--
		Y, see ^{44}Ti	--	3E+4	1E-5	4E-8	--	--
23	Vanadium-47[b/]	D, all compounds except those given for W	3E+4	8E+4	3E-5	1E-7	--	--
			St wall (3E+4)	--	--	--	4E-4	4E-3
		W, oxides, hydroxides, carbides, and halides	--	1E+5	4E-5	1E-7	--	--
23	Vanadium-48	D, see ^{47}V	6E+2	1E+3	5E-7	2E-9	9E-6	9E-5
		W, see ^{47}V	--	6E+2	3E-7	9E-10	--	--
23	Vanadium-49	D, see ^{47}V	7E+4	3E+4	1E-5	--	--	--
			LLI wall (9E+4)	Bone surf (3E+4)	--	5E-8	1E-3	1E-2
		W, see ^{47}V	--	2E+4	8E-6	2E-8	--	--
24	Chromium-48	D, all compounds except those given for W and Y	6E+3	1E+4	5E-6	2E-8	8E-5	8E-4
		W, halides and nitrates	--	7E+3	3E-6	1E-8	--	--
		Y, oxides and hydroxides	--	7E+3	3E-6	1E-8	--	--
24	Chromium-49[b/]	D, see ^{48}Cr	3E+4	8E+4	4E-5	1E-7	4E-4	4E-3
		W, see ^{48}Cr	--	1E+5	4E-5	1E-7	--	--
		Y, see ^{48}Cr	--	9E+4	4E-5	1E-7	--	--
24	Chromium-51	D, see ^{48}Cr	4E+4	5E+4	2E-5	6E-8	5E-4	5E-3
		W, see ^{48}Cr	--	2E+4	1E-5	3E-8	--	--
		Y, see ^{48}Cr	--	2E+4	8E-6	3E-8	--	--
25	Manganese-51[b/]	D, all compounds except those given for W	2E+4	5E+4	2E-5	7E-8	3E-4	3E-3
		W, oxides, hydroxides, halides, and nitrates	--	6E+4	3E-5	8E-8	--	--
25	Manganese-52m[b/]	D, see ^{51}Mn	3E+4	9E+4	4E-5	1E-7	--	--
			St wall (4E+4)	--	--	--	5E-4	5E-3
		W, see ^{51}Mn	--	1E+5	4E-5	1E-7	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (μCi)	ALI (μCi)	DAC (μCi/ml)	Air (μCi/ml)	Water (μCi/ml)	Concentration (μCi/ml)
25	Manganese-52	D, see ^{51}Mn	7E+2	1E+3	5E-7	2E-9	1E-5	1E-4
		W, see ^{51}Mn	--	9E+2	4E-7	1E-9	--	--
25	Manganese-53	D, see ^{51}Mn	5E+4	1E+4	5E-6	□	7E-4	7E-3
			--	Bone surf (2E+4)	--	3E-8	--	--
		W, see ^{51}Mn	--	1E+4	5E-6	2E-8	--	--
25	Manganese-54	D, see ^{51}Mn	2E+3	9E+2	4E-7	1E-9	3E-5	3E-4
		W, see ^{51}Mn	--	8E+2	3E-7	1E-9	--	--
25	Manganese-56	D, see ^{51}Mn	5E+3	2E+4	6E-6	2E-8	7E-5	7E-4
		W, see ^{51}Mn	--	2E+4	9E-6	3E-8	--	--
26	Iron-52	D, all compounds except those given for W	9E+2	3E+3	1E-6	4E-9	1E-5	1E-4
		W, oxides, hydroxides, and halides	--	2E+3	1E-6	3E-9	--	--
26	Iron-55	D, see ^{52}Fe	9E+3	2E+3	8E-7	3E-9	1E-4	1E-3
		W, see ^{52}Fe	--	4E+3	2E-6	6E-9	--	--
26	Iron-59	D, see ^{52}Fe	8E+2	3E+2	1E-7	5E-10	1E-5	1E-4
		W, see ^{52}Fe	--	5E+2	2E-7	7E-10	--	--
26	Iron-60	D, see ^{52}Fe	3E+1	6E+0	3E-9	9E-12	4E-7	4E-6
		W, see ^{52}Fe	--	2E+1	8E-9	3E-11	--	--
27	Cobalt-55	W, all compounds except those given for Y	1E+3	3E+3	1E-6	4E-9	2E-5	2E-4
		Y, oxides, hydroxides, halides, and nitrates	--	3E+3	1E-6	4E-9	--	--
27	Cobalt-56	W, see ^{55}Co	5E+2	3E+2	1E-7	4E-10	6E-6	6E-5
		Y, see ^{55}Co	4E+2	2E+2	8E-8	3E-10	--	--
27	Cobalt-57	W, see ^{55}Co	8E+3	3E+3	1E-6	4E-9	6E-5	6E-4
		Y, see ^{55}Co	4E+3	7E+2	3E-7	9E-10	--	--
27	Cobalt-58m	W, see ^{55}Co	6E+4	9E+4	4E-5	1E-7	8E-4	8E-3
		Y, see ^{55}Co	--	6E+4	3E-5	9E-8	--	--
27	Cobalt-58	W, see ^{55}Co	2E+3	1E+3	5E-7	2E-9	2E-5	2E-4
		Y, see ^{55}Co	1E+3	7E+2	3E-7	1E-9	--	--
27	Cobalt-60m[b]	W, see ^{55}Co	1E+6	4E+6	2E-3	6E-6	--	--
			St wall (1E+6)	--	--	--	2E-2	2E-1
		Y, see ^{55}Co	--	3E+6	1E-3	4E-6	--	--

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
27	Cobalt-60	W, see ^{55}Co	5E+2	2E+2	7E-8	2E-10	3E-6	3E-5
		Y, see ^{55}Co	2E+2	3E+1	1E-8	5E-11	---	--
27	Cobalt-61[b/]	W, see ^{55}Co	2E+4	6E+4	3E-5	9E-8	3E-4	3E-3
		Y, see ^{55}Co	2E+4	6E+4	2E-5	8E-8	--	--
27	Cobalt-62m[b/]	W, see ^{55}Co	4E+4	2E+5	7E-5	2E-7	--	--
			St wall (5E+4)	--	--	--	7E-4	7E-3
		Y, see ^{55}Co	--	2E+5	6E-5	2E-7	--	--
28	Nickel-56	D, all compounds except those given for W	1E+3	2E+3	8E-7	3E-9	2E-5	2E-4
		W, oxides, hydroxides, and carbides	--	1E+3	5E-7	2E-9	--	--
		Vapor	--	1E+3	5E-7	2E-9	--	--
28	Nickel-57	D, see ^{56}Ni	2E+3	5E+3	2E-6	7E-9	2E-5	2E-4
		W, see ^{56}Ni	--	3E+3	1E-6	4E-9	--	--
		Vapor	--	6E+3	3E-6	9E-9	--	--
28	Nickel-59	D, see ^{56}Ni	2E+4	4E+3	2E-6	5E-9	3E-4	3E-3
		W, see ^{56}Ni	--	7E+3	3E-6	1E-8	--	--
		Vapor	--	2E+3	8E-7	3E-9	--	--
28	Nickel-63	D, see ^{56}Ni	9E+3	2E+3	7E-7	2E-9	1E-4	1E-3
		W, see ^{56}Ni	--	3E+3	1E-6	4E-9	--	--
		Vapor	--	8E+2	3E-7	1E-9	--	--
28	Nickel-65	D, see ^{56}Ni	8E+3	2E+4	1E-5	3E-8	1E-4	1E-3
		W, see ^{56}Ni	--	3E+4	1E-5	4E-8	--	--
		Vapor	--	2E+4	7E-6	2E-8	--	--
28	Nickel-66	D, see ^{56}Ni	4E+2	2E+3	7E-7	2E-9	--	--
			LLI wall (5E+2)	--	--	--	6E-6	6E-5
		W, see ^{56}Ni	--	6E+2	3E-7	9E-10	--	--
		Vapor	--	3E+3	1E-6	4E-9	--	--
29	Copper-60[b/]	D, all compounds except those given for W and Y	3E+4	9E+4	4E-5	1E-7	--	--
			St wall (3E+4)	--	--	--	4E-4	4E-3
		W, sulfides, halides, and nitrates	--	1E+5	5E-5	2E-7	--	--
		Y, oxides and hydroxides	--	1E+5	4E-5	1E-7	--	--
29	Copper-61	D, see ^{60}Cu	1E+4	3E+4	1E-5	4E-8	2E-4	2E-3
		W, see ^{60}Cu	--	4E+4	2E-5	6E-8	--	--
		Y, see ^{60}Cu	--	4E+4	1E-5	5E-8	--	--

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
29	Copper-64	D, see ^{60}Cu	1E+4	3E+4	1E-5	4E-8	2E-4	2E-3
		W, see ^{60}Cu	--	2E+4	1E-5	3E-8	--	--
		Y, see ^{60}Cu	--	2E+4	9E-6	3E-8	--	--
29	Copper-67	D, see ^{60}Cu	5E+3	8E+3	3E-6	1E-8	6E-5	6E-4
		W, see ^{60}Cu	--	5E+3	2E-6	7E-9	--	--
		Y, see ^{60}Cu	--	5E+3	2E-6	6E-9	--	--
30	Zinc-62	Y, all compounds	1E+3	3E+3	1E-6	4E-9	2E-5	2E-4
30	Zinc-63[b/]	Y, all compounds	2E+4	7E+4	3E-5	9E-8	--	--
			St wall (3E+4)	--	--	--	3E-4	3E-3
30	Zinc-65	Y, all compounds	4E+2	3E+2	1E-7	4E-10	5E-6	5E-5
30	Zinc-69m	Y, all compounds	4E+3	7E+3	3E-6	1E-8	6E-5	6E-4
30	Zinc-69[b/]	Y, all compounds	6E+4	1E+5	6E-5	2E-7	8E-4	8E-3
30	Zinc-71m	Y, all compounds	6E+3	2E+4	7E-6	2E-8	8E-5	8E-4
30	Zinc-72	Y, all compounds	1E+3	1E+3	5E-7	2E-9	1E-5	1E-4
31	Gallium-65[b/]	D, all compounds except those given for W	5E+4	2E+5	7E-5	2E-7	--	--
			St wall (6E+4)	--	--	--	9E-4	9E-3
		W, oxides, hydroxides, carbides, halides, and nitrates	--	2E+5	8E-5	3E-7	--	--
31	Gallium-66	D, see ^{65}Ga	1E+3	4E+3	1E-6	5E-9	1E-5	1E-4
		W, see ^{65}Ga	--	3E+3	1E-6	4E-9	--	--
31	Gallium-67	D, see ^{65}Ga	7E+3	1E+4	6E-6	2E-8	1E-4	1E-3
		W, see ^{65}Ga	--	1E+4	4E-6	1E-8	--	--
31	Gallium-68[b/]	D, see ^{65}Ga	2E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{65}Ga	--	5E+4	2E-5	7E-8	--	--
31	Gallium-70[b/]	D, see ^{65}Ga	5E+4	2E+5	7E-5	2E-7	--	--
			St wall (7E+4)	--	--	--	1E-3	1E-2
		W, see ^{65}Ga	--	2E+5	8E-5	3E-7	--	--
31	Gallium-72	D, see ^{65}Ga	1E+3	4E+3	1E-6	5E-9	2E-5	2E-4
		W, see ^{65}Ga	--	3E+3	1E-6	4E-9	--	--
31	Gallium-73	D, see ^{65}Ga	5E+3	2E+4	6E-6	2E-8	7E-5	7E-4
		W, see ^{65}Ga	--	2E+4	6E-6	2E-8	--	--

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
32	Germanium-66	D, all compounds except those given for W	2E+4	3E+4	1E-5	4E-8	3E-4	3E-3
		W, oxides, sulfides, and halides	--	2E+4	8E-6	3E-8	--	--
32	Germanium-67[b]	D, see ^{66}Ge	3E+4	9E+4	4E-5	1E-7	--	--
			St wall (4E+4)	--	--	--	6E-4	6E-3
		W, see ^{66}Ge	--	1E+5	4E-5	1E-7	--	--
32	Germanium-68	D, see ^{66}Ge	5E+3	4E+3	2E-6	5E-9	6E-5	6E-4
		W, see ^{66}Ge	--	1E+2	4E-8	1E-10	--	--
32	Germanium-69	D, see ^{66}Ge	1E+4	2E+4	6E-6	2E-8	2E-4	2E-3
		W, see ^{66}Ge	--	8E+3	3E-6	1E-8	--	--
32	Germanium-71	D, see ^{66}Ge	5E+5	4E+5	2E-4	6E-7	7E-3	7E-2
		W, see ^{66}Ge	--	4E+4	2E-5	6E-8	--	--
32	Germanium-75[b]	D, see ^{66}Ge	4E+4	8E+4	3E-5	1E-7	--	--
			St wall (7E+4)	--	--	--	9E-4	9E-3
		W, see ^{66}Ge	--	8E+4	4E-5	1E-7	--	--
32	Germanium-77	D, see ^{66}Ge	9E+3	1E+4	4E-6	1E-8	1E-4	1E-3
		W, see ^{66}Ge	--	6E+3	2E-6	8E-9	--	--
32	Germanium-78[b]	D, see ^{66}Ge	2E+4	2E+4	9E-6	3E-8	--	--
			St wall (2E+4)	--	--	--	3E-4	3E-3
		W, see ^{66}Ge	--	2E+4	9E-6	3E-8	--	--
33	Arsenic-69[b]	W, all compounds	3E+4	1E+5	5E-5	2E-7	--	--
			St wall (4E+4)	--	--	--	6E-4	6E-3
33	Arsenic-70[b]	W, all compounds	1E+4	5E+4	2E-5	7E-8	2E-4	2E-3
33	Arsenic-71	W, all compounds	4E+3	5E+3	2E-6	6E-9	5E-5	5E-4
33	Arsenic-72	W, all compounds	9E+2	1E+3	6E-7	2E-9	1E-5	1E-4
33	Arsenic-73	W, all compounds	8E+3	2E+3	7E-7	2E-9	1E-4	1E-3
33	Arsenic-74	W, all compounds	1E+3	8E+2	3E-7	1E-9	2E-5	2E-4
33	Arsenic-76	W, all compounds	1E+3	1E+3	6E-7	2E-9	1E-5	1E-4

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
33	Arsenic-77	W, all compounds	4E+3	5E+3	2E-6	7E-9	--	--
			LLI wall (5E+3)	--	--	--	6E-5	6E-4
33	Arsenic-78[b/]	W, all compounds	8E+3	2E+4	9E-6	3E-8	1E-4	1E-3
34	Selenium-70[b/]	D, all compounds except those given for W	2E+4	4E+4	2E-5	5E-8	1E-4	1E-3
		W, oxides, hydroxides, carbides, and elemental Se	1E+4	4E+4	2E-5	6E-8	--	--
34	Selenium-73m[b/]	D, see ^{70}Se	6E+4	2E+5	6E-5	2E-7	4E-4	4E-3
		W, see ^{70}Se	3E+4	1E+5	6E-5	2E-7	--	--
34	Selenium-73	D, see ^{70}Se	3E+3	1E+4	5E-6	2E-8	4E-5	4E-4
		W, see ^{70}Se	--	2E+4	7E-6	2E-8	--	--
34	Selenium-75	D, see ^{70}Se	5E+2	7E+2	3E-7	1E-9	7E-6	7E-5
		W, see ^{70}Se	--	6E+2	3E-7	8E-10	--	--
34	Selenium-79	D, see ^{70}Se	6E+2	8E+2	3E-7	1E-9	8E-6	8E-5
		W, see ^{70}Se	--	6E+2	2E-7	8E-10	--	--
34	Selenium-81m[b/]	D, see ^{70}Se	4E+4	7E+4	3E-5	9E-8	3E-4	3E-3
		W, see ^{70}Se	2E+4	7E+4	3E-5	1E-7	--	--
34	Selenium-81[b/]	D, see ^{70}Se	6E+4	2E+5	9E-5	3E-7	--	--
			St wall (8E+4)	--	--	--	1E-3	1E-2
		W, see ^{70}Se	--	2E+5	1E-4	3E-7	--	--
34	Selenium-83[b/]	D, see ^{70}Se	4E+4	1E+5	5E-5	2E-7	4E-4	4E-3
		W, see ^{70}Se	3E+4	1E+5	5E-5	2E-7	--	--
35	Bromine-74m[b/]	D, bromides of H, Li, Na, K, Rb, Cs, and Fr	1E+4	4E+4	2E-5	5E-8	--	--
			St wall (2E+4)	--	--	--	3E-4	3E-3
		W, bromides of lanthanides, Be, Mg, Ca, Sr, Ba, Ra, Al, Ga, In, Tl, Ge, Sn, Pb, As, Sb, Bi, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, Sc, Y, Ti, Zr, Hf, V, Nb, Ta, Mn, Tc, and Re	--	4E+4	2E-5	6E-8	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
35	Bromine-74[b/]	D, see ^{74m}Br	2E+4	7E+4	3E-5	1E-7	--	--
			St wall (4E+4)	--	--	--	5E-4	5E-3
		W, see ^{74m}Br	--	8E+4	4E-5	1E-7	--	--
35	Bromine-75[b/]	D, see ^{74m}Br	3E+4	5E+4	2E-5	7E-8	--	--
			St wall (4E+4)	--	--	--	5E-4	5E-3
		W, see ^{74m}Br	--	5E+4	2E-5	7E-8	--	--
35	Bromine-76	D, see ^{74m}Br	4E+3	5E+3	2E-6	7E-9	5E-5	5E-4
		W, see ^{74m}Br	--	4E+3	2E-6	6E-9	--	--
35	Bromine-77	D, see ^{74m}Br	2E+4	2E+4	1E-5	3E-8	2E-4	2E-3
		W, see ^{74m}Br	--	2E+4	8E-6	3E-8	--	--
35	Bromine-80m	D, see ^{74m}Br	2E+4	2E+4	7E-6	2E-8	3E-4	3E-3
		W, see ^{74m}Br	--	1E+4	6E-6	2E-8	--	--
35	Bromine-80[b/]	D, see ^{74m}Br	5E+4	2E+5	8E-5	3E-7	--	--
			St wall (9E+4)	--	--	--	1E-3	1E-2
		W, see ^{74m}Br	--	2E+5	9E-5	3E-7	--	--
35	Bromine-82	D, see ^{74m}Br	3E+3	4E+3	2E-6	6E-9	4E-5	4E-4
		W, see ^{74m}Br	--	4E+3	2E-6	5E-9	--	--
35	Bromine-83	D, see ^{74m}Br	5E+4	6E+4	3E-5	9E-8	--	--
			St wall (7E+4)	--	--	--	9E-4	9E-3
		W, see ^{74m}Br	--	6E+4	3E-5	9E-8	--	--
35	Bromine-84[b/]	D, see ^{74m}Br	2E+4	6E+4	2E-5	8E-8	--	--
			St wall (3E+4)	--	--	--	4E-4	4E-3
		W, see ^{74m}Br	--	6E+4	3E-5	9E-8	--	--
36	Krypton-74[b/]	Submersion[a/]	--	--	3E-6	1E-8	--	--
36	Krypton-76	Submersion[a/]	--	--	9E-6	4E-8	--	--
36	Krypton-77[b/]	Submersion[a/]	--	--	4E-6	2E-8	--	--
36	Krypton-79	Submersion[a/]	--	--	2E-5	7E-8	--	--
36	Krypton-81	Submersion[a/]	--	--	7E-4	3E-6	--	--
36	Krypton-83m[b/]	Submersion[a/]	--	--	1E-2	5E-5	--	--
36	Krypton-85m	Submersion[a/]	--	--	2E-5	1E-7	--	--

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
36	Krypton-85	Submersion[a]	--	--	1E-4	7E-7	--	--
36	Krypton-87[b]	Submersion[a]	--	--	5E-6	2E-8	--	--
36	Krypton-88	Submersion[a]	--	--	2E-6	9E-9	--	--
37	Rubidium-79[b]	D, all compounds	4E+4	1E+5	5E-5	2E-7	--	--
			St wall (6E+4)	--	--	--	8E-4	8E-3
37	Rubidium-81m[b]	D, all compounds	2E+5	3E+5	1E-4	5E-7	--	--
			St wall (3E+5)	--	--	--	4E-3	4E-2
37	Rubidium-81	D, all compounds	4E+4	5E+4	2E-5	7E-8	5E-4	5E-3
37	Rubidium-82m	D, all compounds	1E+4	2E+4	7E-6	2E-8	2E-4	2E-3
37	Rubidium-83	D, all compounds	6E+2	1E+3	4E-7	1E-9	9E-6	9E-5
37	Rubidium-84	D, all compounds	5E+2	8E+2	3E-7	1E-9	7E-6	7E-5
37	Rubidium-86	D, all compounds	5E+2	8E+2	3E-7	1E-9	7E-6	7E-5
37	Rubidium-87	D, all compounds	1E+3	2E+3	6E-7	2E-9	1E-5	1E-4
37	Rubidium-88[b]	D, all compounds	2E+4	6E+4	3E-5	9E-8	--	--
			St wall (3E+4)	-	--	--	4E-4	4E-3
37	Rubidium-89[b]	D, all compounds	4E+4	1E+5	6E-5	2E-7	--	--
			St wall (6E+4)	-	--	--	9E-4	9E-3
38	Strontium-80[b]	D, all soluble compounds except $SrTiO_3$	4E+3	1E+4	5E-6	2E-8	6E-5	6E-4
		Y, all insoluble compounds and $SrTi0_3$	--	1E+4	5E-6	2E-8	--	--
38	Strontium-81[b]	D, see ^{80}Sr	3E+4	8E+4	3E-5	1E-7	3E-4	3E-3
		Y, see ^{80}Sr	2E+4	8E+4	3E-5	1E-7	--	--
38	Strontium-82	D, see ^{80}Sr	3E+2	4E+2	2E-7	6E-10	--	--
			LLI wall (2E+2)	--	--	--	3E-6	3E-5
		Y, see ^{80}Sr	2E+2	9E+1	4E-8	1E-10	--	--
38	Strontium-83	D, see ^{80}Sr	3E+3	7E+3	3E-6	1E-8	3E-5	3E-4
		Y, see ^{80}Sr	2E+3	4E+3	1E-6	5E-9	--	--
38	Strontium-85m[b]	D, see ^{80}Sr	2E+5	6E+5	3E-4	9E-7	3E-3	3E-2
		Y, see ^{80}Sr	--	8E+5	4E-4	1E-6	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
38	Strontium-85	D, see ^{80}Sr	3E+3	3E+3	1E-6	4E-9	4E-5	4E-4
		Y, see ^{80}Sr	--	2E+3	6E-7	2E-9	--	--
38	Strontium-87m	D, see ^{80}Sr	5E+4	1E+5	5E-5	2E-7	6E-4	6E-3
		Y, see ^{80}Sr	4E+4	2E+5	6E-5	2E-7	--	--
38	Strontium-89	D, see ^{80}Sr	6E+2	8E+2	4E-7	1E-9	--	--
			LLI wall (6E+2)	--	--	--	8E-6	8E-5
		Y, see ^{80}Sr	5E+2	1E+2	6E-8	2E-10	--	--
38	Strontium-90	D, see ^{80}Sr	3E+1	2E+1	8E-9	--	--	--
			Bone surf (4E+1)	Bone surf (2E+1)	--	3E-11	5E-7	5E-6
		Y, see ^{80}Sr	--	4E+0	2E-9	6E-12	--	--
38	Strontium-91	D, see ^{80}Sr	2E+3	6E+3	2E-6	8E-9	2E-5	2E-4
		Y, see ^{80}Sr	--	4E+3	1E-6	5E-9	--	--
38	Strontium-92	D, see ^{80}Sr	3E+3	9E+3	4E-6	1E-8	4E-5	4E-4
		Y, see ^{80}Sr	--	7E+3	3E-6	9E-9	--	--
39	Yttrium-86m[b/]	W, all compounds except those given for Y	2E+4	6E+4	2E-5	8E-8	3E-4	3E-3
		Y, oxides and hydroxides	--	5E+4	2E-5	8E-8	--	--
39	Yttrium-86	W, see ^{86m}Y	1E+3	3E+3	1E-6	5E-9	2E-5	2E-4
		Y, see ^{86m}Y	--	3E+3	1E-6	5E-9	--	--
39	Yttrium-87	W, see ^{86m}Y	2E+3	3E+3	1E-6	5E-9	3E-5	3E-4
		Y, see ^{86m}Y	--	3E+3	1E-6	5E-9	--	--
39	Yttrium-88	W, see ^{86m}Y	1E+3	3E+2	1E-7	3E-10	1E-5	1E-4
		Y, see ^{86m}Y	--	2E+2	1E-7	3E-10	--	--
39	Yttrium-90m	W, see ^{86m}Y	8E+3	1E+4	5E-6	2E-8	1E-4	1E-3
		Y, see ^{86m}Y	--	1E+4	5E-6	2E-8	--	--
39	Yttrium-90	W, see ^{86m}Y	4E+2	7E+2	3E-7	9E-10	--	--
			LLI wall (5E+2)	--	--	--	7E-6	7E-5
		Y, see ^{86m}Y	--	6E+2	3E-7	9E-10	--	--
39	Yttrium-91m[b/]	W, see ^{86m}Y	1E+5	2E+5	1E-4	3E-7	2E-3	2E-2
		Y, see ^{86m}Y	--	2E+5	7E-5	2E-7	--	--
39	Yttrium-91	W, see ^{86m}Y	5E+2	2E+2	7E-8	2E-10	--	--
			LLI wall (6E+2)	--	--	--	8E-6	8E-5
		Y, see ^{86m}Y	--	1E+2	5E-8	2E-10	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
39	Yttrium-92	W, see ^{86m}Y	3E+3	9E+3	4E-6	1E-8	4E-5	4E-4
		Y, see ^{86m}Y	--	8E+3	3E-6	1E-8	--	--
39	Yttrium-93	W, see ^{86m}Y	1E+3	3E+3	1E-6	4E-9	2E-5	2E-4
		Y, see ^{86m}Y	--	2E+3	1E-6	3E-9	--	--
39	Yttrium-94[b/]	W, see ^{86m}Y	2E+4	8E+4	3E-5	1E-7	--	--
			St wall (3E+4)	--	--	--	4E-4	4E-3
		Y, see ^{86m}Y	--	8E+4	3E-5	1E-7	--	--
39	Yttrium-95[b/]	W, see ^{86m}Y	4E+4	2E+5	6E-5	2E-7	--	--
			St wall (5E+4)	--	--	--	7E-4	7E-3
		Y, see ^{86m}Y	--	1E+5	6E-5	2E-7	--	--
40	Zirconium-86	D, all compounds except those given for W and Y	1E+3	4E+3	2E-6	6E-9	2E-5	2E-4
		W, oxides, hydroxides, halides, and nitrates	--	3E+3	1E-6	4E-9	--	--
		Y, carbide	--	2E+3	1E-6	3E-9	--	--
40	Zirconium-88	D, see ^{86}Zr	4E+3	2E+2	9E-8	3E-10	5E-5	5E-4
		W, see ^{86}Zr	--	5E+2	2E-7	7E-10	--	--
		Y, see ^{86}Zr	--	3E+2	1E-7	4E-10	--	--
40	Zirconium-89	D, see ^{86}Zr	2E+3	4E+3	1E-6	5E-9	2E-5	2E-4
		W, see ^{86}Zr	--	2E+3	1E-6	3E-9	--	--
		Y, see ^{86}Zr	--	2E+3	1E-6	3E-9	--	--
40	Zirconium-93	D, see ^{86}Zr	1E+3	6E+0	3E-9	--	--	--
			Bone surf (3E+3)	Bone surf (2E+1)	--	2E-11	4E-5	4E-4
		W, see ^{86}Zr	--	2E+1	1E-8	--	--	--
			--	Bone surf (6E+1)	--	9E-11	--	--
		Y, see ^{86}Zr	--	6E+1	2E-8	--	--	--
			--	Bone surf (7E+1)	--	9E-11	--	--
40	Zirconium-95	D, see ^{86}Zr	1E+3	1E+2	5E-8	--	2E-5	2E-4
			--	Bone surf (3E+2)	--	4E-10	--	--
		W, see ^{86}Zr	--	4E+2	2E-7	5E-10	--	--
		Y, see ^{86}Zr	--	3E+2	1E-7	4E-10	--	--
40	Zirconium-97	D, see ^{86}Zr	6E+2	2E+3	8E-7	3E-9	9E-6	9E-5
		W, see ^{86}Zr	--	1E+3	6E-7	2E-9	--	--
		Y, see ^{86}Zr	--	1E+3	5E-7	2E-9	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (μCi)	ALI (μCi)	DAC (μCi/ml)	Air (μCi/ml)	Water (μCi/ml)	Concentration (μCi/ml)
41	Niobium-88[b/]	W, all compounds except those given for Y	5E+4	2E+5	9E-5	3E-7	--	--
			St wall (7E+4)	--	--	--	1E-3	1E-2
		Y, oxides and hydroxides	--	2E+5	9E-5	3E-7	--	--
41	Niobium-89[b/] (66 min)	W, see ^{88}Nb	1E+4	4E+4	2E-5	6E-8	1E-4	1E-3
		Y, see ^{88}Nb	--	4E+4	2E-5	5E-8	--	--
41	Niobium-89 (122 min)	W, see ^{88}Nb	5E+3	2E+4	8E-6	3E-8	7E-5	7E-4
		Y, see ^{88}Nb	--	2E+4	6E-6	2E-8	--	--
41	Niobium-90	W, see ^{88}Nb	1E+3	3E+3	1E-6	4E-9	1E-5	1E-4
		Y, see ^{88}Nb	--	2E+3	1E-6	3E-9	--	--
41	Niobium-93m	W, see ^{88}Nb	9E+3	2E+3	8E-7	3E-9	--	--
			LLI wall (1E+4)	--	--	--	2E-4	2E-3
		Y, see ^{88}Nb	--	2E+2	7E-8	2E-10	--	--
41	Niobium-94	W, see ^{88}Nb	9E+2	2E+2	8E-8	3E-10	1E-5	1E-4
		Y, see ^{88}Nb	--	2E+1	6E-9	2E-11	--	--
41	Niobium-95m	W, see ^{88}Nb	2E+3	3E+3	1E-6	4E-9	--	--
			LLI wall (2E+3)	--	--	--	3E-5	3E-4
		Y, see ^{88}Nb	--	2E+3	9E-7	3E-9	--	--
41	Niobium-95	W, see ^{88}Nb	2E+3	1E+3	5E-7	2E-9	3E-5	3E-4
		Y, see ^{88}Nb	--	1E+3	5E-7	2E-9	--	--
41	Niobium-96	W, see ^{88}Nb	1E+3	3E+3	1E-6	4E-9	2E-5	2E-4
		Y, see ^{88}Nb	--	2E+3	1E-6	3E-9	--	--
41	Niobium-97[b/]	W, see ^{88}Nb	2E+4	8E+4	3E-5	1E-7	3E-4	3E-3
		Y, see ^{88}Nb	--	7E+4	3E-5	1E-7	--	--
41	Niobium-98[b/]	W, see ^{88}Nb	1E+4	5E+4	2E-5	8E-8	2E-4	2E-3
		Y, see ^{88}Nb	--	5E+4	2E-5	7E-8	--	--
42	Molybdenum-90	D, all compounds except those given for Y	4E+3	7E+3	3E-6	1E-8	3E-5	3E-4
		Y, oxides, hydroxides, and MoS_2	2E+3	5E+3	2E-6	6E-9	--	--
42	Molybdenum-93m	D, see ^{90}Mo	9E+3	2E+4	7E-6	2E-8	6E-5	6E-4
		Y, see ^{90}Mo	4E+3	1E+4	6E-6	2E-8	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
42	Molybdenum-93	D, see ^{90}Mo	4E+3	5E+3	2E-6	8E-9	5E-5	5E-4
		Y, see ^{90}Mo	2E+4	2E+2	8E-8	2E-10	--	--
42	Molybdenum-99	D, see ^{90}Mo	2E+3	3E+3	1E-6	4E-9	--	--
			LLI wall (1E+3)	--	--	--	2E-5	2E-4
		Y, see ^{90}Mo	1E+3	1E+3	6E-7	2E-9	--	--
42	Molybdenum-101[b/]	D, see ^{90}Mo	4E+4	1E+5	6E-5	2E-7	--	--
			St wall (5E+4)	--	--	--	7E-4	7E-3
		Y, see ^{90}Mo	--	1E+5	6E-5	2E-7	--	--
43	Technetium-93m[b/]	D, all compounds except those given for W	7E+4	2E+5	6E-5	2E-7	1E-3	1E-2
		W, oxides, hydroxides, halides, and nitrates	--	3E+5	1E-4	4E-7	--	--
43	Technetium-93	D, see ^{93m}Tc	3E+4	7E+4	3E-5	1E-7	4E-4	4E-3
		W, see ^{93m}Tc	--	1E+5	4E-5	1E-7	--	--
43	Technetium-94m[b/]	D, see ^{93m}Tc	2E+4	4E+4	2E-5	6E-8	3E-4	3E-3
		W, see ^{93m}Tc	--	6E+4	2E-5	8E-8	--	--
43	Technetium-94	D, see ^{93m}Tc	9E+3	2E+4	8E-6	3E-8	1E-4	1E-3
		W, see ^{93m}Tc	--	2E+4	1E-5	3E-8	--	--
43	Technetium-95m	D, see ^{93m}Tc	4E+3	5E+3	2E-6	8E-9	5E-5	5E-4
		W, see ^{93m}Tc	--	2E+3	8E-7	3E-9	--	--
43	Technetium-95	D, see ^{93m}Tc	1E+4	2E+4	9E-6	3E-8	1E-4	1E-3
		W, see ^{93m}Tc	--	2E+4	8E-6	3E-8	--	--
43	Technetium-96m[b/]	D, see ^{93m}Tc	2E+5	3E+5	1E-4	4E-7	2E-3	2E-2
		W, see ^{93m}Tc	--	2E+5	1E-4	3E-7	--	--
43	Technetium-96	D, see ^{93m}Tc	2E+3	3E+3	1E-6	5E-9	3E-5	3E-4
		W, see ^{93m}Tc	--	2E+3	9E-7	3E-9	--	--
43	Technetium-97m	D, see ^{93m}Tc	5E+3	7E+3	3E-6	--	6E-5	6E-4
			--	St wall (7E+3)	--	1E-8	--	--
		W, see ^{93m}Tc	--	1E+3	5E-7	2E-9	--	--
43	Technetium-97	D, see ^{93m}Tc	4E+4	5E+4	2E-5	7E-8	5E-4	5E-3
		W, see ^{93m}Tc	--	6E+3	2E-6	8E-9	--	--
43	Technetium-98	D, see ^{93m}Tc	1E+3	2E+3	7E-7	2E-9	1E-5	1E-4
		W, see ^{93m}Tc	--	3E+2	1E-7	4E-10	--	--
43	Technetium-99m	D, see ^{93m}Tc	8E+4	2E+5	6E-5	2E-7	1E-3	1E-2
		W, see ^{93m}Tc	--	2E+5	1E-4	3E-7	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
43	Technetium-99	D, see ^{93m}Tc	4E+3	5E+3	2E-6	--	6E-5	6E-4
			--	St wall (6E+3)	--	8E-9	--	--
		W, see ^{93m}Tc	--	7E+2	3E-7	9E-10	--	--
43	Technetium-101[b/]	D, see ^{93m}Tc	9E+4	3E+5	1E-4	5E-7	--	--
			St wall (1E+5)	--	--	--	2E-3	2E-2
		W, see ^{93m}Tc	--	4E+5	2E-4	5E-7	--	--
43	Technetium-104[b/]	D, see ^{93m}Tc	2E+4	7E+4	3E-5	1E-7	--	--
			St wall (3E+4)	--	--	--	4E-4	4E-3
		W, see ^{93m}Tc	--	9E+4	4E-5	1E-7	--	--
44	Ruthenium-94[b/]	D, all compounds except those given for W and Y	2E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, halides	--	6E+4	3E-5	9E-8	--	--
		Y, oxides and hydroxides	--	6E+4	2E-5	8E-8	--	--
44	Ruthenium-97	D, see ^{94}Ru	8E+3	2E+4	8E-6	3E-8	1E-4	1E-3
		W, see ^{94}Ru	--	1E+4	5E-6	2E-8	--	--
		Y, see ^{94}Ru	--	1E+4	5E-6	2E-8	--	--
44	Ruthenium-103	D, see ^{94}Ru	2E+3	2E+3	7E-7	2E-9	3E-5	3E-4
		W, see ^{94}Ru	--	1E+3	4E-7	1E-9	--	--
		Y, see ^{94}Ru	--	6E+2	3E-7	9E-10	--	--
44	Ruthenium-105	D, see ^{94}Ru	5E+3	1E+4	6E-6	2E-8	7E-5	7E-4
		W, see ^{94}Ru	--	1E+4	6E-6	2E-8	--	--
		Y, see ^{94}Ru	--	1E+4	5E-6	2E-8	--	--
44	Ruthenium-106	D, see ^{94}Ru	2E+2	9E+1	4E-8	1E-10	--	--
			LLI wall (2E+2)	--	--	--	3E-6	3E-5
		W, see ^{94}Ru	--	5E+1	2E-8	8E-11	--	--
		Y, see ^{94}Ru	--	1E+1	5E-9	2E-11	--	--
45	Rhodium-99m	D, all compounds except those given for W and Y	2E+4	6E+4	2E-5	8E-8	2E-4	2E-3
		W, halides	--	8E+4	3E-5	1E-7	--	--
		Y, oxides and hydroxides	--	7E+4	3E-5	9E-8	--	--
45	Rhodium-99	D, see ^{99m}Rh	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4
		W, see ^{99m}Rh	--	2E+3	9E-7	3E-9	--	--
		Y, see ^{99m}Rh	--	2E+3	8E-7	3E-9	--	--
45	Rhodium-100	D, see ^{99m}Rh	2E+3	5E+3	2E-6	7E-9	2E-5	2E-4
		W, see ^{99m}Rh	--	4E+3	2E-6	6E-9	--	--
		Y, see ^{99m}Rh	--	4E+3	2E-6	5E-9	--	--

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
45	Rhodium-101m	D, see ^{99m}Rh	6E+3	1E+4	5E-6	2E-8	8E-5	8E-4
		W, see ^{99m}Rh	--	8E+3	4E-6	1E-8	--	--
		Y, see ^{99m}Rh	--	8E+3	3E-6	1E-8	--	--
45	Rhodium-101	D, see ^{99m}Rh	2E+3	5E+2	2E-7	7E-10	3E-5	3E-4
		W, see ^{99m}Rh	--	8E+2	3E-7	1E-9	--	--
		Y, see ^{99m}Rh	--	2E+2	6E-8	2E-10	--	--
45	Rhodium-102m	D, see ^{99m}Rh	1E+3	5E+2	2E-7	7E-10	--	--
			LLI wall (1E+3)	--	--	--	2E-5	2E-4
		W, see ^{99m}Rh	--	4E+2	2E-7	5E-10	--	--
		Y, see ^{99m}Rh	--	1E+2	5E-8	2E-10	--	--
45	Rhodium-102	D, see ^{99m}Rh	6E+2	9E+1	4E-8	1E-10	8E-6	8E-5
		W, see ^{99m}Rh	--	2E+2	7E-8	2E-10	--	--
		Y, see ^{99m}Rh	--	6E+1	2E-8	8E-11	--	--
45	Rhodium-103m[b/]	D, see ^{99m}Rh	4E+5	1E+6	5E-4	2E-6	6E-3	6E-2
		W, see ^{99m}Rh	--	1E+6	5E-4	2E-6	--	--
		Y, see ^{99m}Rh	--	1E+6	5E-4	2E-6	--	--
45	Rhodium-105	D, see ^{99m}Rh	4E+3	1E+4	5E-6	2E-8	--	--
			LLI wall (4E+3)	--	--	--	5E-5	5E-4
		W, see ^{99m}Rh	--	6E+3	3E-6	9E-9	--	--
		Y, see ^{99m}Rh	--	6E+3	2E-6	8E-9	--	--
45	Rhodium-106m	D, see ^{99m}Rh	8E+3	3E+4	1E-5	4E-8	1E-4	1E-3
		W, see ^{99m}Rh	--	4E+4	2E-5	5E-8	--	--
		Y, see ^{99m}Rh	--	4E+4	1E-5	5E-8	--	--
45	Rhodium-107[b/]	D, see ^{99m}Rh	7E+4	2E+5	1E-4	3E-7	--	--
			St wall (9E+4)	--	--	--	1E-3	1E-2
		W, see ^{99m}Rh	--	3E+5	1E-4	4E-7	--	--
		Y, see ^{99m}Rh	--	3E+5	1E-4	3E-7	--	--
46	Palladium-100	D, all compound44s except those given for W and4 Y	1E+3	1E+3	6E-7	2E-9	2E-5	2E-4
		W, nitrates	--	1E+3	5E-7	2E-9	--	--
		Y, oxides and hydroxides	--	1E+3	6E-7	2E-9	--	--
46	Palladium-101	D, see ^{100}Pd	1E+4	3E+4	1E-5	5E-8	2E-4	2E-3
		W, see ^{100}Pd	--	3E+4	1E-5	5E-8	--	--
		Y, see ^{100}Pd	--	3E+4	1E-5	4E-8	--	--

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
46	Palladium-103	D, see ^{100}Pd	6E+3	6E+3	3E-6	9E-9	--	--
			LLI wall (7E+3)	--	--	--	1E-4	1E-3
		W, see ^{100}Pd	--	4E+3	2E-6	6E-9	--	--
		Y, see ^{100}Pd	--	4E+3	1E-6	5E-9	--	--
46	Palladium-107	D, see ^{100}Pd	3E+4	2E+4	9E-6	--	--	--
			LLI wall (4E+4)	Kidneys (2E+4)	--	3E-8	5E-4	5E-3
		W, see ^{100}Pd	--	7E+3	3E-6	1E-8	--	--
		Y, see ^{100}Pd	--	4E+2	2E-7	6E-10	--	--
46	Palladium-109	D, see ^{100}Pd	2E+3	6E+3	3E-6	9E-9	3E-5	3E-4
		W, see ^{100}Pd	--	5E+3	2E-6	8E-9	--	--
		Y, see ^{100}Pd	--	5E+3	2E-6	6E-9	--	--
47	Silver-102[b/]	D, all compounds except those given for W and Y	5E+4	2E+5	8E-5	2E-7	--	--
			St wall (6E+4)	--	--	--	9E-4	9E-3
		W, nitrates and sulfides	--	2E+5	9E-5	3E-7	--	--
		Y, oxides and hydroxides	--	2E+5	8E-5	3E-7	--	--
47	Silver-103[b/]	D, see ^{102}Ag	4E+4	1E+5	4E-5	1E-7	5E-4	5E-3
		W, see ^{102}Ag	--	1E+5	5E-5	2E-7	--	--
		Y, see ^{102}Ag	--	1E+5	5E-5	2E-7	--	--
47	Silver-104m[b/]	D, see ^{102}Ag	3E+4	9E+4	4E-5	1E-7	4E-4	4E-3
		W, see ^{102}Ag	--	1E+5	5E-5	2E-7	--	--
		Y, see ^{102}Ag	--	1E+5	5E-5	2E-7	--	--
47	Silver-104[b/]	D, see ^{102}Ag	2E+4	7E+4	3E-5	1E-7	3E-4	3E-3
		W, see ^{102}Ag	--	1E+5	6E-5	2E-7	--	--
		Y, see ^{102}Ag	--	1E+5	6E-5	2E-7	--	--
47	Silver-105	D, see ^{102}Ag	3E+3	1E+3	4E-7	1E-9	4E-5	4E-4
		W, see ^{102}Ag	--	2E+3	7E-7	2E-9	--	--
		Y, see ^{102}Ag	--	2E+3	7E-7	2E-9	--	--
47	Silver-106m	D, see ^{102}Ag	8E+2	7E+2	3E-7	1E-9	1E-5	1E-4
		W, see ^{102}Ag	--	9E+2	4E-7	1E-9	--	--
		Y, see ^{102}Ag	--	9E+2	4E-7	1E-9	--	--
47	Silver-106[b/]	D, see ^{102}Ag	6E+4	2E+5	8E-5	3E-7	--	--
			St wall (6E+4)	--	--	--	9E-4	9E-3
		W, see ^{102}Ag	--	2E+5	9E-5	3E-7	--	--
		Y, see ^{102}Ag	--	2E+5	8E-5	3E-7	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
47	Silver-108m	D, see ^{102}Ag	6E+2	2E+2	8E-8	3E-10	9E-6	9E-5
		W, see ^{102}Ag	--	3E+2	1E-7	4E-10	--	--
		Y, see ^{102}Ag	--	2E+1	1E-8	3E-11	--	--
47	Silver-110m	D, see ^{102}Ag	5E+2	1E+2	5E-8	2E-10	6E-6	6E-5
		W, see ^{102}Ag	--	2E+2	8E-8	3E-10	--	--
		Y, see ^{102}Ag	--	9E+1	4E-8	1E-10	--	--
47	Silver-111	D, see ^{102}Ag	9E+2	2E+3	6E-7	--	--	--
			LLI wall (1E+3)	Liver (2E+3)	--	2E-9	2E-5	2E-4
		W, see ^{102}Ag	--	9E+2	4E-7	1E-9	--	--
		Y, see ^{102}Ag	--	9E+2	4E-7	1E-9	--	--
47	Silver-112	D, see ^{102}Ag	3E+3	8E+3	3E-6	1E-8	4E-5	4E-4
		W, see ^{102}Ag	--	1E+4	4E-6	1E-8	--	--
		Y, see ^{102}Ag	--	9E+3	4E-6	1E-8	--	--
47	Silver-115[b/]	D, see ^{102}Ag	3E+4	9E+4	4E-5	1E-7	--	--
			St wall (3E+4)	--	--	--	4E-4	4E-3
		W, see ^{102}Ag	--	9E+4	4E-5	1E-7	--	--
		Y, see ^{102}Ag	--	8E+4	3E-5	1E-7	--	--
48	Cadmium-104[b/]	D, all compounds except those given for W and Y	2E+4	7E+4	3E-5	9E-8	3E-4	3E-3
		W, sulfides, halides, and nitrates	--	1E+5	5E-5	2E-7	--	--
		Y, oxides and hydroxides	--	1E+5	5E-5	2E-7	--	--
48	Cadmium-107	D, see ^{104}Cd	2E+4	5E+4	2E-5	8E-8	3E-4	3E-3
		W, see ^{104}Cd	--	6E+4	2E-5	8E-8	--	--
		Y, see ^{104}Cd	--	5E+4	2E-5	7E-8	--	--
48	Cadmium-109	D, see ^{104}Cd	3E+2	4E+1	1E-8	--	--	--
			Kidneys (4E+2)	Kidneys (5E+1)	--	7E-11	6E-6	6E-5
		W, see ^{104}Cd	--	1E+2	5E-8	--	--	--
			--	Kidneys (1E+2)	--	2E-10	--	--
		Y, see ^{104}Cd	--	1E+2	5E-8	2E-10	--	--
48	Cadmium-113m	D, see ^{104}Cd	2E+1	2E+0	1E-9	--	--	--
			Kidneys (4E+1)	Kidneys (4E+0)	--	5E-12	5E-7	5E-6
		W, see ^{104}Cd	--	8E+0	4E-9	--	--	--
			--	Kidneys (1E+1)	--	2E-11	--	--
		Y, see ^{104}Cd	--	1E+1	5E-9	2E-11	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
48	Cadmium-113	D, see ^{104}Cd	2E+1 Kidneys (3E+1)	2E+0 Kidneys (3E+0)	9E-10 --	-- 5E-12	-- 4E-7	-- 4E-6
		W, see ^{104}Cd	--	8E+0 Kidneys (1E+1)	3E-9 --	-- 2E-11	-- --	-- --
		Y, see ^{104}Cd	--	1E+1	6E-9	2E-11	--	--
48	Cadmium-115m	D, see ^{104}Cd	3E+2	5E+1 Kidneys (8E+1)	2E-8 --	-- 1E-10	4E-6 --	4E-5 --
		W, see ^{104}Cd	--	1E+2	5E-8	2E-10	--	--
		Y, see ^{104}Cd	--	1E+2	6E-8	2E-10	--	--
48	Cadmium-115	D, see ^{104}Cd	9E+2 LLI wall (1E+3)	1E+3 --	6E-7 --	2E-9 --	-- 1E-5	-- 1E-4
		W, see ^{104}Cd	--	1E+3	5E-7	2E-9	--	--
		Y, see ^{104}Cd	--	1E+3	6E-7	2E-9	--	--
48	Cadmium-117m	D, see ^{104}Cd	5E+3	1E+4	5E-6	2E-8	6E-5	6E-4
		W, see ^{104}Cd	--	2E+4	7E-6	2E-8	--	--
		Y, see ^{104}Cd	--	1E+4	6E-6	2E-8	--	--
48	Cadmium-117	D, see ^{104}Cd	5E+3	1E+4	5E-6	2E-8	6E-5	6E-4
		W, see ^{104}Cd	--	2E+4	7E-6	2E-8	--	--
		Y, see ^{104}Cd	--	1E+4	6E-6	2E-8	--	--
49	Indium-109	D, all compounds except those given for W	2E+4	4E+4	2E-5	6E-8	3E-4	3E-3
		W, oxides, hydroxides, halides, and nitrates	--	6E+4	3E-5	9E-8	--	--
49	Indium-110[b] (69.1 min)	D, see ^{109}In	2E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{109}In	--	6E+4	2E-5	8E-8	--	--
49	Indium-110 (4.9 h)	D, see ^{109}In	5E+3	2E+4	7E-6	2E-8	7E-5	7E-4
		W, see ^{109}In	--	2E+4	8E-6	3E-8	--	--
49	Indium-111	D, see ^{109}In	4E+3	6E+3	3E-6	9E-9	6E-5	6E-4
		W, see ^{109}In	--	6E+3	3E-6	9E-9	--	--
49	Indium-112[b]	D, see ^{109}In	2E+5	6E+5	3E-4	9E-7	2E-3	2E-2
		W, see ^{109}In	--	7E+5	3E-4	1E-6	--	--
49	Indium-113m[b]	D, see ^{109}In	5E+4	1E+5	6E-5	2E-7	7E-4	7E-3
		W, see ^{109}In	--	2E+5	8E-5	3E-7	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
49	Indium-114m	D, see ^{109}In	3E+2	6E+1	3E-8	9E-11	--	--
			LLI wall (4E+2)	--	--	--	5E-6	5E-5
		W, see ^{109}In	--	1E+2	4E-8	1E-10	--	--
49	Indium-115m	D, see ^{109}In	1E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{109}In	--	5E+4	2E-5	7E-8	--	--
49	Indium-115	D, see ^{109}In	4E+1	1E+0	6E-10	2E-12	5E-7	5E-6
		W, see ^{109}In	--	5E+0	2E-9	8E-12	--	--
49	Indium-116m[b]	D, see ^{109}In	2E+4	8E+4	3E-5	1E-7	3E-4	3E-3
		W, see ^{109}In	--	1E+5	5E-5	2E-7	--	--
49	Indium-117m[b]	D, see ^{109}In	1E+4	3E+4	1E-5	5E-8	2E-4	2E-3
		W, see ^{109}In	--	4E+4	2E-5	6E-8	--	--
49	Indium-117[b]	D, see ^{109}In	6E+4	2E+5	7E-5	2E-7	8E-4	8E-3
		W, see ^{109}In	--	2E+5	9E-5	3E-7	--	--
49	Indium-119m[b]	D, see ^{109}In	4E+4	1E+5	5E-5	2E-7	--	--
			St wall (5E+4)	--	--	--	7E-4	7E-3
		W, see ^{109}In	--	1E+5	6E-5	2E-7	--	--
50	Tin-110	D, all compounds except those given for W	4E+3	1E+4	5E-6	2E-8	5E-5	5E-4
		W, sulfides, oxides, hydroxides, halides, nitrates, and stannic phosphate	--	1E+4	5E-6	2E-8	--	--
50	Tin-111[b]	D, see ^{110}Sn	7E+4	2E+5	9E-5	3E-7	1E-3	1E-2
		W, see ^{110}Sn	--	3E+5	1E-4	4E-7	--	--
50	Tin-113	D, see ^{110}Sn	2E+3	1E+3	5E-7	2E-9	--	--
			LLI wall (2E+3)	--	--	--	3E-5	3E-4
		W, see ^{110}Sn	--	5E+2	2E-7	8E-10	--	--
50	Tin-117m	D, see ^{110}Sn	2E+3	1E+3	5E-7	--	--	--
			LLI wall (2E+3)	Bone surf (2E+3)	--	3E-9	3E-5	3E-4
		W, see ^{110}Sn	--	1E+3	6E-7	2E-9	--	--
50	Tin-119m	D, see ^{110}Sn	3E+3	2E+3	1E-6	3E-9	--	--
			LLI wall (4E+3)	--	--	--	6E-5	6E-4
		W, see ^{110}Sn	--	1E+3	4E-7	1E-9	--	--

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
50	Tin-121m	D, see ^{110}Sn	3E+3	9E+2	4E-7	1E-9	--	--
			LLI wall (4E+3)	--	--	--	5E-5	5E-4
		W, see ^{110}Sn	--	5E+2	2E-7	8E-10	--	--
50	Tin-121	D, see ^{110}Sn	6E+3	2E+4	6E-6	2E-8	--	--
			LLI wall (6E+3)	--	--	--	8E-5	8E-4
		W, see ^{110}Sn	--	1E+4	5E-6	2E-8	--	--
50	Tin-123m[b/]	D, see ^{110}Sn	5E+4	1E+5	5E-5	2E-7	7E-4	7E-3
		W, see ^{110}Sn	--	1E+5	6E-5	2E-7	--	--
50	Tin-123	D, see ^{110}Sn	5E+2	6E+2	3E-7	9E-10	--	--
			LLI wall (6E+2)	--	--	--	9E-6	9E-5
		W, see ^{110}Sn	--	2E+2	7E-8	2E-10	--	--
50	Tin-125	D, see ^{110}Sn	4E+2	9E+2	4E-7	1E-9	--	--
			LLI wall (5E+2)	--	--	--	6E-6	6E-5
		W, see ^{110}Sn	--	4E+2	1E-7	5E-10	--	--
50	Tin-126	D, see ^{110}Sn	3E+2	6E+1	2E-8	8E-11	4E-6	4E-5
		W, see ^{110}Sn	--	7E+1	3E-8	9E-11	--	--
50	Tin-127	D, see ^{110}Sn	7E+3	2E+4	8E-6	3E-8	9E-5	9E-4
		W, see ^{110}Sn	--	2E+4	8E-6	3E-8	--	--
50	Tin-128[b/]	D, see ^{110}Sn	9E+3	3E+4	1E-5	4E-8	1E-4	1E-3
		W, see ^{110}Sn	--	4E+4	1E-5	5E-8	--	--
51	Antimony-115[b/]	D, all compounds except those given for W	8E+4	2E+5	1E-4	3E-7	1E-3	1E-2
		W, oxides, hydroxides, halides, sulfides, sulfates, and nitrates	--	3E+5	1E-4	4E-7	--	--
51	Antimony-116m[b/]	D, see ^{115}Sb	2E+4	7E+4	3E-5	1E-7	3E-4	3E-3
		W, see ^{115}Sb	--	1E+5	6E-5	2E-7	--	--
51	Antimony-116[b/]	D, see ^{115}Sb	7E+4	3E+5	1E-4	4E-7	--	--
			St wall (9E+4)	--	--	--	1E-3	1E-2
		W, see ^{115}Sb	--	3E+5	1E-4	5E-7	--	--
51	Antimony-117	D, see ^{115}Sb	7E+4	2E+5	9E-5	3E-7	9E-4	9E-3
		W, see ^{115}Sb	--	3E+5	1E-4	4E-7	--	--
51	Antimony-118m	D, see ^{115}Sb	6E+3	2E+4	8E-6	3E-8	7E-5	7E-4
		W, see ^{115}Sb	5E+3	2E+4	9E-6	3E-8	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
51	Antimony-119	D, see ^{115}Sb	2E+4	5E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{115}Sb	2E+4	3E+4	1E-5	4E-8	--	--
51	Antimony-120[b/] (16 min)	D, see ^{115}Sb	1E+5 St wall (2E+5)	4E+5 --	2E-4 --	6E-7 --	-- 2E-3	-- 2E-2
		W, see ^{115}Sb	--	5E+5	2E-4	7E-7	--	--
51	Antimony-120 (5.76 d)	D, see ^{115}Sb	1E+3	2E+3	9E-7	3E-9	1E-5	1E-4
		W, see ^{115}Sb	9E+2	1E+3	5E-7	2E-9	--	--
51	Antimony-122	D, see ^{115}Sb	8E+2 LLI wall (8E+2)	2E+3 --	1E-6 --	3E-9 --	-- 1E-5	-- 1E-4
		W, see ^{115}Sb	7E+2	1E+3	4E-7	2E-9	--	--
51	Antimony-124m[b/]	D, see ^{115}Sb	3E+5	8E+5	4E-4	1E-6	3E-3	3E-2
		W, see ^{115}Sb	2E+5	6E+5	2E-4	8E-7	--	--
51	Antimony-124	D, see ^{115}Sb	6E+2	9E+2	4E-7	1E-9	7E-6	7E-5
		W, see ^{115}Sb	5E+2	2E+2	1E-7	3E-10	--	--
51	Antimony-125	D, see ^{115}Sb	2E+3	2E+3	1E-6	3E-9	3E-5	3E-4
		W, see ^{115}Sb	--	5E+2	2E-7	7E-10	--	--
51	Antimony-126m[b/]	D, see ^{115}Sb	5E+4 St wall (7E+4)	2E+5 --	8E-5 --	3E-7 --	-- 9E-4	-- 9E-3
		W, see ^{115}Sb	--	2E+5	8E-5	3E-7	--	--
51	Antimony-126	D, see ^{115}Sb	6E+2	1E+3	5E-7	2E-9	7E-6	7E-5
		W, see ^{115}Sb	5E+2	5E+2	2E-7	7E-10	--	--
51	Antimony-127	D, see ^{115}Sb	8E+2 LLI wall (8E+2)	2E+3 --	9E-7 --	3E-9 --	-- 1E-5	-- 1E-4
		W, see ^{115}Sb	7E+2	9E+2	4E-7	1E-9	--	--
51	Antimony-128[b/] (10.4 min)	D, see ^{115}Sb	8E+4 St wall (1E+5)	4E+5 --	2E-4 --	5E-7 --	-- 1E-3	-- 1E-2
		W, see ^{115}Sb	--	4E+5	2E-4	6E-7	--	--
51	Antimony-128 (9.01 h)	D, see ^{115}Sb	1E+3	4E+3	2E-6	6E-9	2E-5	2E-4
		W, see ^{115}Sb	--	3E+3	1E-6	5E-9	--	--
51	Antimony-129	D, see ^{115}Sb	3E+3	9E+3	4E-6	1E-8	4E-5	4E-4
		W, see ^{115}Sb	--	9E+3	4E-6	1E-8	--	--
51	Antimony-130[b/]	D, see ^{115}Sb	2E+4	6E+4	3E-5	9E-8	3E-4	3E-3
		W, see ^{115}Sb	--	8E+4	3E-5	1E-7	--	--

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
51	Antimony-131[b/]	D, see ^{115}Sb	1E+4	2E+4	1E-5	--	--	--
			Thyroid (2E+4)	Thyroid (4E+4)	--	6E-8	2E-4	2E-3
		W, see ^{115}Sb	--	2E+4	1E-5		--	--
			--	Thyroid (4E+4)	--	6E-8	--	--
52	Tellurium-116	D, all compounds except those given for W	8E+3	2E+4	9E-6	3E-8	1E-4	1E-3
		W, oxides, hydroxides, and nitrates	--	3E+4	1E-5	4E-8	--	--
52	Tellurium-121m	D, see ^{116}Te	5E+2	2E+2	8E-8	--	--	--
			Bone surf (7E+2)	Bone surf (4E+2)	--	5E-10	1E-5	1E-4
		W, see ^{116}Te	--	4E+2	2E-7	6E-10	--	--
52	Tellurium-121	D, see ^{116}Te	3E+3	4E+3	2E-6	6E-9	4E-5	4E-4
		W, see ^{116}Te	--	3E+3	1E-6	4E-9	--	--
52	Tellurium-123m	D, see ^{116}Te	6E+2	2E+2	9E-8	--	--	--
			Bone surf (1E+3)	Bone surf (5E+2)	--	8E-10	1E-5	1E-4
		W, see ^{116}Te	--	5E+2	2E-7	8E-10	--	--
52	Tellurium-123	D, see ^{116}Te	5E+2	2E+2	8E-8	--	--	--
			Bone surf (1E+3)	Bone surf (5E+2)	--	7E-10	2E-5	2E-4
		W, see ^{116}Te	--	4E+2	2E-7	--	--	--
			--	Bone surf (1E+3)	--	2E-9	--	--
52	Tellurium-125m	D, see ^{116}Te	1E+3	4E+2	2E-7	--	--	
			Bone surf (1E+3)	Bone surf (1E+3)	--	1E-9	2E-5	2E-4
		W, see ^{116}Te	--	7E+2	3E-7	1E-9	--	--
52	Tellurium-127m	D, see ^{116}Te	6E+2	3E+2	1E-7	--	9E-6	9E-5
			--	Bone surf (4E+2)	--	6E-10	--	--
		W, see ^{116}Te	--	3E+2	1E-7	4E-10	--	--
52	Tellurium-127	D, see ^{116}Te	7E+3	2E+4	9E-6	3E-8	1E-4	1E-3
		W, see ^{116}Te	--	2E+4	7E-6	2E-8	--	--
52	Tellurium-129m	D, see ^{116}Te	5E+2	6E+2	3E-7	9E-10	7E-6	7E-5
		W, see ^{116}Te	--	2E+2	1E-7	3E-10	--	--
52	Tellurium-129[b/]	D, see ^{116}Te	3E+4	6E+4	3E-5	9E-8	4E-4	4E-3
		W, see ^{116}Te	--	7E+4	3E-5	1E-7	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
52	Tellurium-131m	D, see ^{116}Te	3E+2 Thyroid (6E+2)	4E+2 Thyroid (1E+3)	2E-7 --	-- 2E-9	-- 8E-6	-- 8E-5
		W, see ^{116}Te	--	4E+2 Thyroid (9E+2)	2E-7 --	-- 1E-9	-- --	-- --
52	Tellurium-131[b/]	D, see ^{116}Te	3E+3 Thyroid (6E+3)	5E+3 Thyroid (1E+4)	2E-6 --	-- 2E-8	-- 8E-5	-- 8E-4
		W, see ^{116}Te	--	5E+3 Thyroid (1E+4)	2E-6 --	-- 2E-8	-- --	-- --
52	Tellurium-132	D, see ^{116}Te	2E+2 Thyroid (7E+2)	2E+2 Thyroid (8E+2)	9E-8 --	-- 1E-9	-- 9E-6	-- 9E-5
		W, see ^{116}Te	--	2E+2 Thyroid (6E+2)	9E-8 --	-- 9E-10	-- --	-- --
52	Tellurium-133m[b/]	D, see ^{116}Te	3E+3 Thyroid (6E+3)	5E+3 Thyroid (1E+4)	2E-6 --	-- 2E-8	-- 9E-5	-- 9E-4
		W, see ^{116}Te	--	5E+3 Thyroid (1E+4)	2E-6 --	-- 2E-8	-- --	-- --
52	Tellurium-133[b/]	D, see ^{116}Te	1E+4 Thyroid (3E+4)	2E+4 Thyroid (6E+4)	9E-6 --	-- 8E-8	-- 4E-4	-- 4E-3
		W, see ^{116}Te	--	2E+4 Thyroid (6E+4)	9E-6 --	-- 8E-8	-- --	-- --
52	Tellurium-134[b/]	D, see ^{116}Te	2E+4 Thyroid (2E+4)	2E+4 Thyroid (5E+4)	1E-5 --	-- 7E-8	-- 3E-4	-- 3E-3
		W, see ^{116}Te	--	2E+4 Thyroid (5E+4)	1E-5 --	-- 7E-8	-- --	-- --
53	Iodine-120m[b/]	D, all compounds	1E+4 Thyroid (1E+4)	2E+4 --	9E-6 --	3E-8 --	-- 2E-4	-- 2E-3
53	Iodine-120[b/]	D, all compounds	4E+3 Thyroid (8E+3)	9E+3 Thyroid (1E+4)	4E-6 --	-- 2E-8	-- 1E-4	-- 1E-3

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
53	Iodine-121	D, all compounds	1E+4 Thyroid (3E+4)	2E+4 Thyroid (5E+4)	8E-6 --	-- 7E-8	-- 4E-4	-- 4E-3
53	Iodine-123	D, all compounds	3E+3 Thyroid (1E+4)	6E+3 Thyroid (2E+4)	3E-6 --	-- 2E-8	-- 1E-4	-- 1E-3
53	Iodine-124	D, all compounds	5E+1 Thyroid (2E+2)	8E+1 Thyroid (3E+2)	3E-8 --	-- 4E-10	-- 2E-6	-- 2E-5
53	Iodine-125	D, all compounds	4E+1 Thyroid (1E+2)	6E+1 Thyroid (2E+2)	3E-8 --	-- 3E-10	-- 2E-6	-- 2E-5
53	Iodine-126	D, all compounds	2E+1 Thyroid (7E+1)	4E+1 Thyroid (1E+2)	1E-8 --	-- 2E-10	-- 1E-6	-- 1E-5
53	Iodine-128[b/]	D, all compounds	4E+4 St wall (6E+4)	1E+5 --	5E-5 --	2E-7 --	-- 8E-4	-- 8E-3
53	Iodine-129	D, all compounds	5E+0 Thyroid (2E+1)	9E+0 Thyroid (3E+1)	4E-9 --	-- 4E-11	-- 2E-7	-- 2E-6
53	Iodine-130	D, all compounds	4E+2 Thyroid (1E+3)	7E+2 Thyroid (2E+3)	3E-7 --	-- 3E-9	-- 2E-5	-- 2E-4
53	Iodine-131	D, all compounds	3E+1 Thyroid (9E+1)	5E+1 Thyroid (2E+2)	2E-8 --	-- 2E-10	-- 1E-6	-- 1E-5
53	Iodine-132m[b/]	D, all compounds	4E+3 Thyroid (1E+4)	8E+3 Thyroid (2E+4)	4E-6 --	-- 3E-8	-- 1E-4	-- 1E-3
53	Iodine-132	D, all compounds	4E+3 Thyroid (9E+3)	8E+3 Thyroid (1E+4)	3E-6 --	-- 2E-8	-- 1E-4	-- 1E-3
53	Iodine-133	D, all compounds	1E+2 Thyroid (5E+2)	3E+2 Thyroid (9E+2)	1E-7 --	-- 1E-9	-- 7E-6	□ 7E-5
53	Iodine-134[b/]	D, all compounds	2E+4 Thyroid (3E+4)	5E+4 --	2E-5 --	6E-8 --	-- 4E-4	-- 4E-3

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
53	Iodine-135	D, all compounds	8E+2 Thyroid (3E+3)	2E+3 Thyroid (4E+3)	7E-7 --	-- 6E-9	-- 3E-5	-- 3E-4
54	Xenon-120[b/]	Submersion[a/]	--	--	1E-5	4E-8	--	--
54	Xenon-121[b/]	Submersion[a/]	--	--	2E-6	1E-8	--	--
54	Xenon-122	Submersion[a/]	--	--	7E-5	3E-7	--	--
54	Xenon-123	Submersion[a/]	--	--	6E-6	3E-8	--	--
54	Xenon-125	Submersion[a/]	--	--	2E-5	7E-8	--	--
54	Xenon-127	Submersion[a/]	--	--	1E-5	6E-8	--	--
54	Xenon-129m	Submersion[a/]	--	--	2E-4	9E-7	--	--
54	Xenon-131m	Submersion[a/]	--	--	4E-4	2E-6	--	--
54	Xenon-133m	Submersion[a/]	--	--	1E-4	6E-7	--	--
54	Xenon-133	Submersion[a/]	--	--	1E-4	5E-7	--	--
54	Xenon-135m[b/]	Submersion[a/]	--	--	9E-6	4E-8	--	--
54	Xenon-135	Submersion[a/]	--	--	1E-5	7E-8	--	--
54	Xenon-138[b/]	Submersion[a/]	--	--	4E-6	2E-8	--	--
55	Cesium-125[b/]	D, all compounds	5E+4 St wall (9E+4)	1E+5 --	6E-5 --	2E-7 --	-- 1E-3	-- 1E-2
55	Cesium-127	D, all compounds	6E+4	9E+4	4E-5	1E-7	9E-4	9E-3
55	Cesium-129	D, all compounds	2E+4	3E+4	1E-5	5E-8	3E-4	3E-3
55	Cesium-130[b/]	D, all compounds	6E+4 St wall (1E+5)	2E+5 --	8E-5 --	3E-7 --	-- 1E-3	-- 1E-2
55	Cesium-131	D, all compounds	2E+4	3E+4	1E-5	4E-8	3E-4	3E-3
55	Cesium-132	D, all compounds	3E+3	4E+3	2E-6	6E-9	4E-5	4E-4
55	Cesium-134m	D, all compounds	1E+5 St wall (1E+5)	1E+5 --	6E-5 --	2E-7 --	-- 2E-3	-- 2E-2
55	Cesium-134	D, all compounds	7E+1	1E+2	4E-8	2E-10	9E-7	9E-6

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
55	Cesium-135m[b/]	D, all compounds	1E+5	2E+5	8E-5	3E-7	1E-3	1E-2
55	Cesium-135	D, all compounds	7E+2	1E+3	5E-7	2E-9	1E-5	1E-4
55	Cesium-136	D, all compounds	4E+2	7E+2	3E-7	9E-10	6E-6	6E-5
55	Cesium-137	D, all compounds	1E+2	2E+2	6E-8	2E-10	1E-6	1E-5
55	Cesium-138[b/]	D, all compounds	2E+4	6E+4	2E-5	8E-8	--	--
			St wall (3E+4)	--	--	--	4E-4	4E-3
56	Barium-126[b/]	D, all compounds	6E+3	2E+4	6E-6	2E-8	8E-5	8E-4
56	Barium-128	D, all compounds	5E+2	2E+3	7E-7	2E-9	7E-6	7E-5
56	Barium-131m[b/]	D, all compounds	4E+5	1E+6	6E-4	2E-6	--	--
			St wall (5E+5)	--	--	--	7E-3	7E-2
56	Barium-131	D, all compounds	3E+3	8E+3	3E-6	1E-8	4E-5	4E-4
56	Barium-133m	D, all compounds	2E+3	9E+3	4E-6	1E-8	--	--
			LLI wall (3E+3)	--	--	--	4E-5	4E-4
56	Barium-133	D, all compounds	2E+3	7E+2	3E-7	9E-10	2E-5	2E-4
56	Barium-135m	D, all compounds	3E+3	1E+4	5E-6	2E-8	4E-5	4E-4
56	Barium-139[b/]	D, all compounds	1E+4	3E+4	1E-5	4E-8	2E-4	2E-3
56	Barium-140	D, all compounds	5E+2	1E+3	6E-7	2E-9	--	--
			LLI wall (6E+2)	--	--	--	8E-6	8E-5
56	Barium-141[b/]	D, all compounds	2E+4	7E+4	3E-5	1E-7	3E-4	3E-3
56	Barium-142[b/]	D, all compounds	5E+4	1E+5	6E-5	2E-7	7E-4	7E-3
57	Lanthanum-131[b/]	D, all compounds except those given for W	5E+4	1E+5	5E-5	2E-7	6E-4	6E-3
		W, oxides and hydroxides	--	2E+5	7E-5	2E-7	--	--
57	Lanthanum-132	D, see ^{131}La	3E+3	1E+4	4E-6	1E-8	4E-5	4E-4
		W, see ^{131}La	--	1E+4	5E-6	2E-8	--	--
57	Lanthanum-135	D, see ^{131}La	4E+4	1E+5	4E-5	1E-7	5E-4	5E-3
		W, see ^{131}La	--	9E+4	4E-5	1E-7	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
57	Lanthanum-137	D, see ^{131}La	1E+4	6E+1	3E-8	--	2E-4	2E-3
			--	Liver (7E+1)	--	1E-10	--	--
		W, see ^{131}La	--	3E+2	1E-7	--	--	--
			--	Liver (3E+2)	--	4E-10	--	--
57	Lanthanum-138	D, see ^{131}La	9E+2	4E+0	1E-9	5E-12	1E-5	1E-4
		W, see ^{131}La	--	1E+1	6E-9	2E-11	--	--
57	Lanthanum-140	D, see ^{131}La	6E+2	1E+3	6E-7	2E-9	9E-6	9E-5
		W, see ^{131}La	--	1E+3	5E-7	2E-9	--	--
57	Lanthanum-141	D, see ^{131}La	4E+3	9E+3	4E-6	1E-8	5E-5	5E-4
		W, see ^{131}La	--	1E+4	5E-6	2E-8	--	--
57	Lanthanum-142[b]	D, see ^{131}La	8E+3	2E+4	9E-6	3E-8	1E-4	1E-3
		W, see ^{131}La	--	3E+4	1E-5	5E-8	--	--
57	Lanthanum-143[b]	D, see ^{131}La	4E+4	1E+5	4E-5	1E-7	--	--
			St wall (4E+4)	--	--	--	5E-4	5E-3
		W, see ^{131}La	--	9E+4	4E-5	1E-7	--	--
58	Cerium-134	W, all compounds except those given for Y	5E+2	7E+2	3E-7	1E-9	--	--
			LLI wall (6E+2)	--	--	--	8E-6	8E-5
		Y, oxides, hydroxides, and fluorides	--	7E+2	3E-7	9E-10	--	--
58	Cerium-135	W, see ^{134}Ce	2E+3	4E+3	2E-6	5E-9	2E-5	2E-4
		Y, see ^{134}Ce	--	4E+3	1E-6	5E-9	--	--
58	Cerium-137m	W, see ^{134}Ce	2E+3	4E+3	2E-6	6E-9	--	--
			LLI wall (2E+3)	--	--	--	3E-5	3E-4
		Y, see ^{134}Ce	--	4E+3	2E-6	5E-9	--	--
58	Cerium-137	W, see ^{134}Ce	5E+4	1E+5	6E-5	2E-7	7E-4	7E-3
		Y, see ^{134}Ce	--	1E+5	5E-5	2E-7	--	--
58	Cerium-139	W, see ^{134}Ce	5E+3	8E+2	3E-7	1E-9	7E-5	7E-4
		Y, see ^{134}Ce	--	7E+2	3E-7	9E-10	--	--
58	Cerium-141	W, see ^{134}Ce	2E+3	7E+2	3E-7	1E-9	--	--
			LLI wall (2E+3)	--	--	--	3E-5	3E-4
		Y, see ^{134}Ce	--	6E+2	2E-7	8E-10	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
58	Cerium-143	W, see ^{134}Ce	1E+3	2E+3	8E-7	3E-9	--	--
			LLI wall (1E+3)	--	--	--	2E-5	2E-4
		Y, see ^{134}Ce	--	2E+3	7E-7	2E-9	--	--
58	Cerium-144	W, see ^{134}Ce	2E+2	3E+1	1E-8	4E-11	--	--
			LLI wall (3E+2)	--	--	--	3E-6	3E-5
		Y, see ^{134}Ce	--	1E+1	6E-9	2E-11	--	--
59	Praseodymium-136[b/]	W, all compounds except those given for Y	5E+4	2E+5	1E-4	3E-7	--	--
			St wall (7E+4)	--	--	--	1E-3	1E-2
		Y, oxides, hydroxides, carbides, and fluorides	--	2E+5	9E-5	3E-7	--	--
59	Praseodymium-137[b/]	W, see ^{136}Pr	4E+4	2E+5	6E-5	2E-7	5E-4	5E-3
		Y, see ^{136}Pr	--	1E+5	6E-5	2E-7	--	--
59	Praseodymium-138m	W, see ^{136}Pr	1E+4	5E+4	2E-5	8E-8	1E-4	1E-3
		Y, see ^{136}Pr	--	4E+4	2E-5	6E-8	--	--
59	Praseodymium-139	W, see ^{136}Pr	4E+4	1E+5	5E-5	2E-7	6E-4	6E-3
		Y, see ^{136}Pr	--	1E+5	5E-5	2E-7	--	--
59	Praseodymium-142m[b/]	W, see ^{136}Pr	8E+4	2E+5	7E-5	2E-7	1E-3	1E-2
		Y, see ^{136}Pr	--	1E+5	6E-5	2E-7	--	--
59	Praseodymium-142	W, see ^{136}Pr	1E+3	2E+3	9E-7	3E-9	1E-5	1E-4
		Y, see ^{136}Pr	--	2E+3	8E-7	3E-9	--	--
59	Praseodymium-143	W, see ^{136}Pr	9E+2	8E+2	3E-7	1E-9	--	--
			LLI wall (1E+3)	--	--	--	2E-5	2E-4
		Y, see ^{136}Pr	--	7E+2	3E-7	9E-10	--	--
59	Praseodymium-144[b/]	W, see ^{136}Pr	3E+4	1E+5	5E-5	2E-7	--	--
			St wall (4E+4)	--	--	--	6E-4	6E-3
		Y, see ^{136}Pr	--	1E+5	5E-5	2E-7	--	--
59	Praseodymium-145	W, see ^{136}Pr	3E+3	9E+3	4E-6	1E-8	4E-5	4E-4
		Y, see ^{136}Pr	--	8E+3	3E-6	1E-8	--	--
59	Praseodymium-147[b/]	W, see ^{136}Pr	5E+4	2E+5	8E-5	3E-7	--	--
			St wall (8E+4)	--	--	--	1E-3	1E-2
		Y, see ^{136}Pr	--	2E+5	8E-5	3E-7	--	--

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
60	Neodymium-136[b/]	W, all compounds except those given for Y	1E+4	6E+4	2E-5	8E-8	2E-4	2E-3
		Y, oxides, hydroxides, carbides, and fluorides	--	5E+4	2E-5	8E-8	--	--
60	Neodymium-138	W, see ^{136}Nd	2E+3	6E+3	3E-6	9E-9	3E-5	3E-4
		Y, see ^{136}Nd	--	5E+3	2E-6	7E-9	--	--
60	Neodymium-139m	W, see ^{136}Nd	5E+3	2E+4	7E-6	2E-8	7E-5	7E-4
		Y, see ^{136}Nd	--	1E+4	6E-6	2E-8	--	--
60	Neodymium-139[b/]	W, see ^{136}Nd	9E+4	3E+5	1E-4	5E-7	1E-3	1E-2
		Y, see ^{136}Nd	--	3E+5	1E-4	4E-7	--	--
60	Neodymium-141	W, see ^{136}Nd	2E+5	7E+5	3E-4	1E-6	2E-3	2E-2
		Y, see ^{136}Nd	--	6E+5	3E-4	9E-7	--	--
60	Neodymium-147	W, see ^{136}Nd	1E+3	9E+2	4E-7	1E-9	--	--
			LLI wall (1E+3)	--	--	--	2E-5	2E-4
		Y, see ^{136}Nd	--	8E+2	4E-7	1E-9	--	--
60	Neodymium-149[b/]	W, see ^{136}Nd	1E+4	3E+4	1E-5	4E-8	1E-4	1E-3
		Y, see ^{136}Nd	--	2E+4	1E-5	3E-8	--	--
60	Neodymium-151[b/]	W, see ^{136}Nd	7E+4	2E+5	8E-5	3E-7	9E-4	9E-3
		Y, see ^{136}Nd	--	2E+5	8E-5	3E-7	--	--
61	Promethium-141[b/]	W, all compounds except those given for Y	5E+4	2E+5	8E-5	3E-7	--	--
			St wall (6E+4)	--	--	--	8E-4	8E-3
		Y, oxides, hydroxides, carbides, and fluorides	--	2E+5	7E-5	2E-7	--	--
61	Promethium-143	W, see ^{141}Pm	5E+3	6E+2	2E-7	8E-10	7E-5	7E-4
		Y, see ^{141}Pm	--	7E+2	3E-7	1E-9	--	--
61	Promethium-144	W, see ^{141}Pm	1E+3	1E+2	5E-8	2E-10	2E-5	2E-4
		Y, see ^{141}Pm	--	1E+2	5E-8	2E-10	--	--
61	Promethium-145	W, see ^{141}Pm	1E+4	2E+2	7E-8	--	1E-4	1E-3
			--	Bone surf (2E+2)	--	3E-10	--	--
		Y, see ^{141}Pm	--	2E+2	8E-8	3E-10	--	--
61	Promethium-146	W, see ^{141}Pm	2E+3	5E+1	2E-8	7E-11	2E-5	2E-4
		Y, see ^{141}Pm	--	4E+1	2E-8	6E-11	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
61	Promethium-147	W, see ^{141}Pm	4E+3	1E+2	5E-8	--	--	--
			LLI wall (5E+3)	Bone surf (2E+2)	--	3E-10	7E-5	7E-4
		Y, see ^{141}Pm	--	1E+2	6E-8	2E-10	--	--
61	Promethium-148m	W, see ^{141}Pm	7E+2	3E+2	1E-7	4E-10	1E-5	1E-4
		Y, see ^{141}Pm	--	3E+2	1E-7	5E-10	--	--
61	Promethium-148	W, see ^{141}Pm	4E+2	5E+2	2E-7	8E-10	--	--
			LLI wall (5E+2)	--	--	--	7E-6	7E-5
		Y, see ^{141}Pm	--	5E+2	2E-7	7E-10	--	--
61	Promethium-149	W, see ^{141}Pm	1E+3	2E+3	8E-7	3E-9	--	--
			LLI wall (1E+3)	--	--	--	2E-5	2E-4
		Y, see ^{141}Pm	--	2E+3	8E-7	2E-9	--	--
61	Promethium-150	W, see ^{141}Pm	5E+3	2E+4	8E-6	3E-8	7E-5	7E-4
		Y, see ^{141}Pm	--	2E+4	7E-6	2E-8	--	--
61	Promethium-151	W, see ^{141}Pm	2E+3	4E+3	1E-6	5E-9	2E-5	2E-4
		Y, see ^{141}Pm	--	3E+3	1E-6	4E-9	--	--
62	Samarium-141m[b/]	W, all compounds	3E+4	1E+5	4E-5	1E-7	4E-4	4E-3
62	Samarium-141[b/]	W, all compounds	5E+4	2E+5	8E-5	2E-7	--	--
			St wall (6E+4)	--	--	--	8E-4	8E-3
62	Samarium-142[b/]	W, all compounds	8E+3	3E+4	1E-5	4E-8	1E-4	1E-3
62	Samarium-145	W, all compounds	6E+3	5E+2	2E-7	7E-10	8E-5	8E-4
62	Samarium-146	W, all compounds	1E+1	4E-2	1E-11	--	--	--
			Bone surf (3E+1)	Bone surf (6E-2)	--	9E-14	3E-7	3E-6
62	Samarium-147	W, all compounds	2E+1	4E-2	2E-11	--	--	--
			Bone surf (3E+1)	Bone surf (7E-2)	--	1E-13	4E-7	4E-6
62	Samarium-151	W, all compounds	1E+4	1E+2	4E-8	--	--	--
			LLI wall (1E+4)	Bone surf (2E+2)	--	2E-10	2E-4	2E-3
62	Samarium-153	W, all compounds	2E+3	3E+3	1E-6	4E-9	--	--
			LLI wall (2E+3)	--	--	--	3E-5	3E-4

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
62	Samarium-155[b/]	W, all compounds	6E+4	2E+5	9E-5	3E-7	--	--
			St wall (8E+4)	--	--	--	1E-3	1E-2
62	Samarium-156	W, all compounds	5E+3	9E+3	4E-6	1E-8	7E-5	7E-4
63	Europium-145	W, all compounds	2E+3	2E+3	8E-7	3E-9	2E-5	2E-4
63	Europium-146	W, all compounds	1E+3	1E+3	5E-7	2E-9	1E-5	1E-4
63	Europium-147	W, all compounds	3E+3	2E+3	7E-7	2E-9	4E-5	4E-4
63	Europium-148	W, all compounds	1E+3	4E+2	1E-7	5E-10	1E-5	1E-4
63	Europium-149	W, all compounds	1E+4	3E+3	1E-6	4E-9	2E-4	2E-3
63	Europium-150 (12.62 h)	W, all compounds	3E+3	8E+3	4E-6	1E-8	4E-5	4E-4
63	Europium-150 (34.2 y)	W, all compounds	8E+2	2E+1	8E-9	3E-11	1E-5	1E-4
63	Europium-152m	W, all compounds	3E+3	6E+3	3E-6	9E-9	4E-5	4E-4
63	Europium-152	W, all compounds	8E+2	2E+1	1E-8	3E-11	1E-5	1E-4
63	Europium-154	W, all compounds	5E+2	2E+1	8E-9	3E-11	7E-6	7E-5
63	Europium-155	W, all compounds	4E+3	9E+1	4E-8	--	5E-5	5E-4
			--	Bone surf (1E+2)	--	2E-10	--	--
63	Europium-156	W, all compounds	6E+2	5E+2	2E-7	6E-10	8E-6	8E-5
63	Europium-157	W, all compounds	2E+3	5E+3	2E-6	7E-9	3E-5	3E-4
63	Europium-158[b/]	W, all compounds	2E+4	6E+4	2E-5	8E-8	3E-4	3E-3
64	Gadolinium-145[b/]	D, all compounds except those given for W	5E+4	2E+5	6E-5	2E-7	--	--
			St wall (5E+4)	--	--	--	6E-4	6E-3
		W, oxides, hydroxides, and fluorides	--	2E+5	7E-5	2E-7	--	--
64	Gadolinium-146	D, see ^{145}Gd	1E+3	1E+2	5E-8	2E-10	2E-5	2E-4
		W, see ^{145}Gd	--	3E+2	1E-7	4E-10	--	--
64	Gadolinium-147	D, see ^{145}Gd	2E+3	4E+3	2E-6	6E-9	3E-5	3E-4
		W, see ^{145}Gd	--	4E+3	1E-6	5E-9	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
64	Gadolinium-148	D, see ^{145}Gd	1E+1	8E+3	3E-12	--	--	--
			Bone surf (2E+1)	Bone surf (2E-2)	--	2E-14	3E-7	3E-6
		W, see ^{145}Gd	--	3E-2	1E-11	--	--	--
			--	Bone surf (6E-2)	--	8E-14	--	--
64	Gadolinium-149	D, see ^{145}Gd	3E+3	2E+3	9E-7	3E-9	4E-5	4E-4
		W, see ^{145}Gd	--	2E+3	1E-6	3E-9	--	--
64	Gadolinium-151	D, see ^{145}Gd	6E+3	4E+2	2E-7	--	9E-5	9E-4
			--	Bone surf (6E+2)	--	9E-10	--	--
		W, see ^{145}Gd	--	1E+3	5E-7	2E-9	--	--
64	Gadolinium-152	D, see ^{145}Gd	2E+1	1E-2	4E-12	--	--	--
			Bone surf (3E+1)	Bone surf (2E-2)	--	3E-14	4E-7	4E-6
		W, see ^{145}Gd	--	4E-2	2E-11	--	--	--
			--	Bone surf (8E-2)	--	1E-13	--	--
64	Gadolinium-153	D, see ^{145}Gd	5E+3	1E+2	6E-8	--	6E-5	6E-4
			--	Bone surf (2E+2)	--	3E-10	--	--
		W, see ^{145}Gd	--	6E+2	2E-7	8E-10	--	--
64	Gadolinium-159	D, see ^{145}Gd	3E+3	8E+3	3E-6	1E-8	4E-5	4E-4
		W, see ^{145}Gd	--	6E+3	2E-6	8E-9	--	--
65	Terbium-147[b]	W, all compounds	9E+3	3E+4	1E-5	5E-8	1E-4	1E-3
65	Terbium-149	W, all compounds	5E+3	7E+2	3E-7	1E-9	7E-5	7E-4
65	Terbium-150	W, all compounds	5E+3	2E+4	9E-6	3E-8	7E-5	7E-4
65	Terbium-151	W, all compounds	4E+3	9E+3	4E-6	1E-8	5E-5	5E-4
65	Terbium-153	W, all compounds	5E+3	7E+3	3E-6	1E-8	7E-5	7E-4
65	Terbium-154	W, all compounds	2E+3	4E+3	2E-6	6E-9	2E-5	2E-4
65	Terbium-155	W, all compounds	6E+3	8E+3	3E-6	1E-8	8E-5	8E-4
65	Terbium-156m (5.0 h)	W, all compounds	2E+4	3E+4	1E-5	4E-8	2E-4	2E-3
65	Terbium-156m (24.4 h)	W, all compounds	7E+3	8E+3	3E-6	1E-8	1E-4	1E-3
65	Terbium-156	W, all compounds	1E+3	1E+3	6E-7	2E-9	1E-5	1E-4

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
65	Terbium-157	W, all compounds	5E+4	3E+2	1E-7	--	--	--
			LLI wall (5E+4)	Bone surf (6E+2)	--	8E-10	7E-4	7E-3
65	Terbium-158	W, all compounds	1E+3	2E+1	8E-9	3E-11	2E-5	2E-4
65	Terbium-160	W, all compounds	8E+2	2E+2	9E-8	3E-10	1E-5	1E-4
65	Terbium-161	W, all compounds	2E+3	2E+3	7E-7	2E-9	--	--
			LLI wall (2E+3)	--	--	--	3E-5	3E-4
66	Dysprosium-155	W, all compounds	9E+3	3E+4	1E-5	4E-8	1E-4	1E-3
66	Dysprosium-157	W, all compounds	2E+4	6E+4	3E-5	9E-8	3E-4	3E-3
66	Dysprosium-159	W, all compounds	1E+4	2E+3	1E-6	3E-9	2E-4	2E-3
66	Dysprosium-165	W, all compounds	1E+4	5E+4	2E-5	6E-8	2E-4	2E-3
66	Dysprosium-166	W, all compounds	6E+2	7E+2	3E-7	1E-9	--	--
			LLI wall (8E+2)	--	--	--	1E-5	1E-4
67	Holmium-155[b/]	W, all compounds	4E+4	2E+5	6E-5	2E-7	6E-4	6E-3
67	Holmium-157[b/]	W, all compounds	3E+5	1E+6	6E-4	2E-6	4E-3	4E-2
67	Holmium-159[b/]	W, all compounds	2E+5	1E+6	4E-4	1E-6	3E-3	3E-2
67	Holmium-161	W, all compounds	1E+5	4E+5	2E-4	6E-7	1E-3	1E-2
67	Holmium-162m[b/]	W, all compounds	5E+4	3E+5	1E-4	4E-7	7E-4	7E-3
67	Holmium-162[b/]	W, all compounds	5E+5	2E+6	1E-3	3E-6	--	--
			St wall (8E+5)	--	--	--	1E-2	1E-1
67	Holmium-164m[b/]	W, all compounds	1E+5	3E+5	1E-4	4E-7	1E-3	1E-2
67	Holmium-164[b/]	W, all compounds	2E+5	6E+5	3E-4	9E-7	--	--
			St wall (2E+5)	--	--	--	3E-3	3E-2
67	Holmium-166m	W, all compounds	6E+2	7E+0	3E-9	9E-12	9E-6	9E-5
67	Holmium-166	W, all compounds	9E+2	2E+3	7E-7	2E-9	--	--
			LLI wall (9E+2)	--	--	--	1E-5	1E-4
67	Holmium-167	W, all compounds	2E+4	6E+4	2E-5	8E-8	2E-4	2E-3

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
68	Erbium-161	W, all compounds	2E+4	6E+4	3E-5	9E-8	2E-4	2E-3
68	Erbium-165	W, all compounds	6E+4	2E+5	8E-5	3E-7	9E-4	9E-3
68	Erbium-169	W, all compounds	3E+3	3E+3	1E-6	4E-9	--	--
			LLI wall (4E+3)	-	--	--	5E-5	5E-4
68	Erbium-171	W, all compounds	4E+3	1E+4	4E-6	1E-8	5E-5	5E-4
68	Erbium-172	W, all compounds	1E+3	1E+3	6E-7	2E-9	--	--
			LLI wall (1E+3)	-	--	--	2E-5	2E-4
69	Thulium-162[b]	W, all compounds	7E+4	3E+5	1E-4	4E-7	--	--
			St wall (7E+4)	-	--	--	1E-3	1E-2
69	Thulium-166	W, all compounds	4E+3	1E+4	6E-6	2E-8	6E-5	6E-4
69	Thulium-167	W, all compounds	2E+3	2E+3	8E-7	3E-9	--	--
			LLI wall (2E+3)	-	--	--	3E-5	3E-4
69	Thulium-170	W, all compounds	8E+2	2E+2	9E-8	3E-10	--	--
			LLI wall (1E+3)	-	--	--	1E-5	1E-4
69	Thulium-171	W, all compounds	1E+4	3E+2	1E-7	--	--	--
			LLI wall (1E+4)	Bone surf (6E+2)	--	8E-10	2E-4	2E-3
69	Thulium-172	W, all compounds	7E+2	1E+3	5E-7	2E-9	--	--
			LLI wall (8E+2)	-	--	--	1E-5	1E-4
69	Thulium-173	W, all compounds	4E+3	1E+4	5E-6	2E-8	6E-5	6E-4
69	Thulium-175[b]	W, all compounds	7E+4	3E+5	1E-4	4E-7	--	--
			St wall (9E+4)	-	--	--	1E-3	1E-2
70	Ytterbium-162[b]	W, all compounds except those given for Y	7E+4	3E+5	1E-4	4E-7	1E-3	1E-2
		Y, oxides, hydroxides, and fluorides	--	3E+5	1E-4	4E-7	--	--
70	Ytterbium-166	W, see ^{162}Yb	1E+3	2E+3	8E-7	3E-9	2E-5	2E-4
		Y, see ^{162}Yb	--	2E+3	8E-7	3E-9	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
70	Ytterbium-167[b/]	W, see ^{162}Yb	3E+5	8E+5	3E-4	1E-6	4E-3	4E-2
		Y, see ^{162}Yb	--	7E+5	3E-4	1E-6	--	--
70	Ytterbium-169	W, see ^{162}Yb	2E+3	8E+2	4E-7	1E-9	2E-5	2E-4
		Y, see ^{162}Yb	--	7E+2	3E-7	1E-9	--	--
70	Ytterbium-175	W, see ^{162}Yb	3E+3	4E+3	1E-6	5E-9	--	--
			LLI wall (3E+3)	--	--	--	4E-5	4E-4
		Y, see ^{162}Yb	--	3E+3	1E-6	5E-9	--	--
70	Ytterbium-177[b/]	W, see ^{162}Yb	2E+4	5E+4	2E-5	7E-8	2E-4	2E-3
		Y, see ^{162}Yb	--	5E+4	2E-5	6E-8	--	--
70	Ytterbium-178[b/]	W, see ^{162}Yb	1E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		Y, see ^{162}Yb	--	4E+4	2E-5	5E-8	--	--
71	Lutetium-169	W, all compounds except those given for Y	3E+3	4E+3	2E-6	6E-9	3E-5	3E-4
		Y, oxides, hydroxides, and fluorides	--	4E+3	2E-6	6E-9	--	--
71	Lutetium-170	W, see ^{169}Lu	1E+3	2E+3	9E-7	3E-9	2E-5	2E-4
		Y, see ^{169}Lu	--	2E+3	8E-7	3E-9	--	--
71	Lutetium-171	W, see ^{169}Lu	2E+3	2E+3	8E-7	3E-9	3E-5	3E-4
		Y, see ^{169}Lu	--	2E+3	8E-7	3E-9	--	--
71	Lutetium-172	W, see ^{169}Lu	1E+3	1E+3	5E-7	2E-9	1E-5	1E-4
		Y, see ^{169}Lu	--	1E+3	5E-7	2E-9	--	--
71	Lutetium-173	W, see ^{169}Lu	5E+3	3E+2	1E-7	--	7E-5	7E-4
				Bone surf (5E+2)				
			--		--	6E-10	--	--
		Y, see ^{169}Lu	--	3E+2	1E-7	4E-10	--	--
71	Lutetium-174m	W, see ^{169}Lu	2E+3	2E+2	1E-7	--	--	--
			LLI wall (3E+3)	Bone surf (3E+2)	--	5E-10	4E-5	4E-4
		Y, see ^{169}Lu	--	2E+2	9E-8	3E-10	--	--
71	Lutetium-174	W, see ^{169}Lu	5E+3	1E+2	5E-8	--	7E-5	7E-4
				Bone surf (2E+2)				
			--		--	3E-10	--	--
		Y, see ^{169}Lu	--	2E+2	6E-8	2E-10	--	--
71	Lutetium-176m	W, see ^{169}Lu	8E+3	3E+4	1E-5	3E-8	1E-4	1E-3
		Y, see ^{169}Lu	--	2E+4	9E-6	3E-8	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
71	Lutetium-176	W, see ^{169}Lu	7E+2	5E+0	2E-9	--	1E-5	1E-4
			--	Bone surf (1E+1)	--	2E-11	--	--
		Y, see ^{169}Lu	--	8E+0	3E-9	1E-11	--	--
71	Lutetium-177m	W, see ^{169}Lu	7E+2	1E+2	5E-8	--	1E-5	1E-4
			--	Bone surf (1E+2)	--	2E-10	--	--
		Y, see ^{169}Lu	--	8E+1	3E-8	1E-10	--	--
71	Lutetium-177	W, see ^{169}Lu	2E+3	2E+3	9E-7	3E-9	--	--
			LLI wall (3E+3)	--	--	--	4E-5	4E-4
		Y, see ^{169}Lu	--	2E+3	9E-7	3E-9	--	--
71	Lutetium-178m[b/]	W, see ^{169}Lu	5E+4	2E+5	8E-5	3E-7	--	--
			St wall (6E+4)	--	--	--	8E-4	8E-3
		Y, see ^{169}Lu	--	2E+5	7E-5	2E-7	--	--
71	Lutetium-178[b/]	W, see ^{169}Lu	4E+4	1E+5	5E-5	2E-7	--	--
			St wall (4E+4)	--	--	--	6E-4	6E-3
		Y, see ^{169}Lu	--	1E+5	5E-5	2E-7	--	--
71	Lutetium-179	W, see ^{169}Lu	6E+3	2E+4	8E-6	3E-8	9E-5	9E-4
		Y, see ^{169}Lu	--	2E+4	6E-6	3E-8	--	--
72	Hafnium-170	D, all compounds except those given for W	3E+3	6E+3	2E-6	8E-9	4E-5	4E-4
		W, oxides, hydroxides, carbides, and nitrates	--	5E+3	2E-6	6E-9	--	--
72	Hafnium-172	D, see ^{170}Hf	1E+3	9E+0	4E-9	--	2E-5	2E-4
			--	Bone surf (2E+1)	--	3E-11	--	--
		W, see ^{170}Hf	--	4E+1	2E-8	--	--	--
			--	Bone surf (6E+1)	--	8E-11	--	--
72	Hafnium-173	D, see ^{170}Hf	5E+3	1E+4	5E-6	2E-8	7E-5	7E-4
		W, see ^{170}Hf	--	1E+4	5E-6	2E-8	--	--
72	Hafnium-175	D, see ^{170}Hf	3E+3	9E+2	4E-7	--	4E-5	4E-4
			--	Bone surf (1E+3)	--	1E-9	--	--
		W, see ^{170}Hf	--	1E+3	5E-7	2E-9	--	--
72	Hafnium-177m[b/]	D, see ^{170}Hf	2E+4	6E+4	2E-5	8E-8	3E-4	3E-3
		W, see ^{170}Hf	--	9E+4	4E-5	1E-7	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
72	Hafnium-178m	D, see ^{170}Hf	3E+2	1E+0	5E-10	--	3E-6	3E-5
			--	Bone surf (2E+0)	--	3E-12	--	--
		W, see ^{170}Hf	--	5E+0	2E-9	--	--	--
			--	Bone surf (9E+0)	--	1E-11	--	--
72	Hafnium-179m	D, see ^{170}Hf	1E+3	3E+2	1E-7	--	1E-5	1E-4
			--	Bone surf (6E+2)	--	8E-10	--	--
		W, see ^{170}Hf	--	6E+2	3E-7	8E-10	--	--
72	Hafnium-180m	D, see ^{170}Hf	7E+3	2E+4	9E-6	3E-8	1E-4	1E-3
		W, see ^{170}Hf	--	3E+4	1E-5	4E-8	--	--
72	Hafnium-181	D, see ^{170}Hf	1E+3	2E+2	7E-8	--	2E-5	2E-4
			--	Bone surf (4E+2)	--	6E-10	--	--
		W, see ^{170}Hf	--	4E+2	2E-7	6E-10	--	--
72	Hafnium-182m[b/]	D, see ^{170}Hf	4E+4	9E+4	4E-5	1E-7	5E-4	5E-3
		W, see ^{170}Hf	--	1E+5	6E-5	2E-7	--	--
72	Hafnium-182	D, see ^{170}Hf	2E+2	8E-1	3E-10	--	--	--
			Bone surf (4E+2)	Bone surf (2E+0)	--	2E-12	5E-6	5E-5
		W, see ^{170}Hf	--	3E+0	1E-9	--	--	--
			--	Bone surf (7E+0)	--	1E-11	--	--
72	Hafnium-183[b/]	D, see ^{170}Hf	2E+4	5E+4	2E-5	6E-8	3E-4	3E-3
		W, see ^{170}Hf	--	6E+4	2E-5	8E-8	--	--
72	Hafnium-184	D, see ^{170}Hf	2E+3	8E+3	3E-6	1E-8	3E-5	3E-4
		W, see ^{170}Hf	--	6E+3	3E-6	9E-9	--	--
73	Tantalum-172[b/]	W, all compounds except those given for Y	4E+4	1E+5	5E-5	2E-7	5E-4	5E-3
		Y, elemental Ta, oxides, hydroxides, halides, carbides, nitrates, and nitrides	--	1E+5	4E-5	1E-7	--	--
73	Tantalum-173	W, see ^{172}Ta	7E+3	2E+4	8E-6	3E-8	9E-5	9E-4
		Y, see ^{172}Ta	--	2E+4	7E-6	2E-8	--	--
73	Tantalum-174[b/]	W, see ^{172}Ta	3E+4	1E+5	4E-5	1E-7	4E-4	4E-3
		Y, see ^{172}Ta	--	9E+4	4E-5	1E-7	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
73	Tantalum-175	W, see ^{172}Ta	6E+3	2E+4	7E-6	2E-8	8E-5	8E-4
		Y, see ^{172}Ta	--	1E+4	6E-6	2E-8	--	--
73	Tantalum-176	W, see ^{172}Ta	4E+3	1E+4	5E-6	2E-8	5E-5	5E-4
		Y, see ^{172}Ta	--	1E+4	5E-6	2E-8	--	--
73	Tantalum-177	W, see ^{172}Ta	1E+4	2E+4	8E-6	3E-8	2E-4	2E-3
		Y, see ^{172}Ta	--	2E+4	7E-6	2E-8	--	--
73	Tantalum-178	W, see ^{172}Ta	2E+4	9E+4	4E-5	1E-7	2E-4	2E-3
		Y, see ^{172}Ta	--	7E+4	3E-5	1E-7	--	--
73	Tantalum-179	W, see ^{172}Ta	2E+4	5E+3	2E-6	8E-9	3E-4	3E-3
		Y, see ^{172}Ta	--	9E+2	4E-7	1E-9	--	--
73	Tantalum-180m	W, see ^{172}Ta	2E+4	7E+4	3E-5	9E-8	3E-4	3E-3
		Y, see ^{172}Ta	--	6E+4	2E-5	8E-8	--	--
73	Tantalum-180	W, see ^{172}Ta	1E+3	4E+2	2E-7	6E-10	2E-5	2E-4
		Y, see ^{172}Ta	--	2E+1	1E-8	3E-11	--	--
73	Tantalum-182m[b/]	W, see ^{172}Ta	2E+5	5E+5	2E-4	8E-7	--	--
			St wall (2E+5)	--	--	--	3E-3	3E-2
		Y, see ^{172}Ta	--	4E+5	2E-4	6E-7	--	--
73	Tantalum-182	W, see ^{172}Ta	8E+2	3E+2	1E-7	5E-10	1E-5	1E-4
		Y, see ^{172}Ta	--	1E+2	6E-8	2E-10	--	--
73	Tantalum-183	W, see ^{172}Ta	9E+2	1E+3	5E-7	2E-9	--	--
			LLI wall (1E+3)	--	--	--	2E-5	2E-4
		Y, see ^{172}Ta	--	1E+3	4E-7	1E-9	--	--
73	Tantalum-184	W, see ^{172}Ta	2E+3	5E+3	2E-6	8E-9	3E-5	3E-4
		Y, see ^{172}Ta	--	5E+3	2E-6	7E-9	--	--
73	Tantalum-185[b/]	W, see ^{172}Ta	3E+4	7E+4	3E-5	1E-7	4E-4	4E-3
		Y, see ^{172}Ta	--	6E+4	3E-5	9E-8	--	--
73	Tantalum-186[b/]	W, see ^{172}Ta	5E+4	2E+5	1E-4	3E-7	--	--
			St wall (7E+4)	--	--	--	1E-3	1E-2
		Y, see ^{172}Ta	--	2E+5	9E-5	3E-7	--	--
74	Tungsten-176	D, all compounds	1E+4	5E+4	2E-5	7E-8	1E-4	1E-3
74	Tungsten-177	D, all compounds	2E+4	9E+4	4E-5	1E-7	3E-4	3E-3
74	Tungsten-178	D, all compounds	5E+3	2E+4	8E-6	3E-8	7E-5	7E-4

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
74	Tungsten-179[b/]	D, all compounds	5E+5	2E+6	7E-4	2E-6	7E-3	7E-2
74	Tungsten-181	D, all compounds	2E+4	3E+4	1E-5	5E-8	2E-4	2E-3
74	Tungsten-185	D, all compounds	2E+3	7E+3	3E-6	9E-9	--	--
			LLI wall (3E+3)	--	--	--	4E-5	4E-4
74	Tungsten-187	D, all compounds	2E+3	9E+3	4E-6	1E-8	3E-5	3E-4
74	Tungsten-188	D, all compounds	4E+2	1E+3	5E-7	2E-9	--	--
			LLI wall (5E+2)	--	--	--	7E-6	7E-5
75	Rhenium-177[b/]	D, all compounds except those given for W	9E+4	3E+5	1E-4	4E-7	--	--
			St wall (1E+5)	--	--	--	2E-3	2E-2
		W, oxides, hydroxides, and nitrates	--	4E+5	1E-4	5E-7	--	--
75	Rhenium-178[b/]	D, see ^{177}Re	7E+4	3E+5	1E-4	4E-7	--	--
			St wall (1E+5)	--	--	--	1E-3	1E-2
		W, see ^{177}Re	--	3E+5	1E-4	4E-7	--	--
75	Rhenium-181	D, see ^{177}Re	5E+3	9E+3	4E-6	1E-8	7E-5	7E-4
		W, see ^{177}Re	--	9E+3	4E-6	1E-8	--	--
75	Rhenium-182 (12.7 h)	D, see ^{177}Re	7E+3	1E+4	5E-6	2E-8	9E-5	9E-4
		W, see ^{177}Re	--	2E+4	6E-6	2E-8	--	--
75	Rhenium-182 (64.0 h)	D, see ^{177}Re	1E+3	2E+3	1E-6	3E-9	2E-5	2E-4
		W, see ^{177}Re	--	2E+3	9E-7	3E-9	--	--
75	Rhenium-184m	D, see ^{177}Re	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4
		W, see ^{177}Re	--	4E+2	2E-7	6E-10	--	--
75	Rhenium-184	D, see ^{177}Re	2E+3	4E+3	1E-6	5E-9	3E-5	3E-4
		W, see ^{177}Re	--	1E+3	6E-7	2E-9	--	--
75	Rhenium-186m	D, see ^{177}Re	1E+3	2E+3	7E-7	--	--	--
			St wall (2E+3)	St wall (2E+3)	--	3E-9	2E-5	2E-4
		W, see ^{177}Re	--	2E+2	6E-8	2E-10	--	--
75	Rhenium-186	D, see ^{177}Re	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4
		W, see ^{177}Re	--	2E+3	7E-7	2E-9	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
75	Rhenium-187	D, see ^{177}Re	6E+5	8E+5	4E-4	--	8E-3	8E-2
			--	St wall (9E+5)	--	1E-6	--	--
		W, see ^{177}Re	--	1E+5	4E-5	1E-7	--	--
75	Rhenium-188m[b/]	D, see ^{177}Re	8E+4	1E+5	6E-5	2E-7	1E-3	1E-2
		W, see ^{177}Re	--	1E+5	6E-5	2E-7	--	--
75	Rhenium-188	D, see ^{177}Re	2E+3	3E+3	1E-6	4E-9	2E-5	2E-4
		W, see ^{177}Re	--	3E+3	1E-6	4E-9	--	--
75	Rhenium-189	D, see ^{177}Re	3E+3	5E+3	2E-6	7E-9	4E-5	4E-4
		W, see ^{177}Re	--	4E+3	2E-6	6E-9	--	--
76	Osmium-180[b/]	D, all compounds except those given for W and Y	1E+5	4E+5	2E-4	5E-7	1E-3	1E-2
		W, halides and nitrates	--	5E+5	2E-4	7E-7	--	--
		Y, oxides and hydroxides	--	5E+5	2E-4	6E-7	--	--
76	Osmium-181[b/]	D, see ^{180}Os	1E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{180}Os	--	5E+4	2E-5	6E-8	--	--
		Y, see ^{180}Os	--	4E+4	2E-5	6E-8	--	--
76	Osmium-182	D, see ^{180}Os	2E+3	6E+3	2E-6	8E-9	3E-5	3E-4
		W, see ^{180}Os	--	4E+3	2E-6	6E-9	--	--
		Y, see ^{180}Os	--	4E+3	2E-6	6E-9	--	--
76	Osmium-185	D, see ^{180}Os	2E+3	5E+2	2E-7	7E-10	3E-5	3E-4
		W, see ^{180}Os	--	8E+2	3E-7	1E-9	--	--
		Y, see ^{180}Os	--	8E+2	3E-7	1E-9	--	--
76	Osmium-189m	D, see ^{180}Os	8E+4	2E+5	1E-4	3E-7	1E-3	1E-2
		W, see ^{180}Os	--	2E+5	9E-5	3E-7	--	--
		Y, see ^{180}Os	--	2E+5	7E-5	2E-7	--	--
76	Osmium-191m	D, see ^{180}Os	1E+4	3E+4	1E-5	4E-8	2E-4	2E-3
		W, see ^{180}Os	--	2E+4	8E-6	3E-8	--	--
		Y, see ^{180}Os	--	2E+4	7E-6	2E-8	--	--
76	Osmium-191	D, see ^{180}Os	2E+3	2E+3	9E-7	3E-9	--	--
			LLI wall (3E+3)	--	--	--	3E-5	3E-4
		W, see ^{180}Os	--	2E+3	7E-7	2E-9	--	--
		Y, see ^{180}Os	--	1E+3	6E-7	2E-9	--	--
76	Osmium-193	D, see ^{180}Os	2E+3	5E+3	2E-6	6E-9	--	--
			LLI wall (2E+3)	--	--	--	2E-5	2E-4
		W, see ^{180}Os	--	3E+3	1E-6	4E-9	--	--
		Y, see ^{180}Os	--	3E+3	1E-6	4E-9	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
76	Osmium-194	D, see ^{180}Os	4E+2	4E+1	2E-8	6E-11	--	--
			LLI wall (6E+2)	--	--	--	8E-6	8E-5
		W, see ^{180}Os	--	6E+1	2E-8	8E-11	--	--
		Y, see ^{180}Os	--	8E+0	3E-9	1E-11	--	--
77	Iridium-182[b/]	D, all compounds except those given for W and Y	4E+4	1E+5	6E-5	2E-7	--	--
			St wall (4E+4)	--	--	--	6E-4	6E-3
		W, halides, nitrates, and metallic iridium	--	2E+5	6E-5	2E-7	--	--
		Y, oxides and hydroxides	--	1E+5	5E-5	2E-7	--	--
77	Iridium-184	D, see ^{182}Ir	8E+3	2E+4	1E-5	3E-8	1E-4	1E-3
		W, see ^{182}Ir	--	3E+4	1E-5	5E-8	--	--
		Y, see ^{182}Ir	--	3E+4	1E-5	4E-8	--	--
77	Iridium-185	D, see ^{182}Ir	5E+3	1E+4	5E-6	2E-8	7E-5	7E-4
		W, see ^{182}Ir	--	1E+4	5E-6	2E-8	--	--
		Y, see ^{182}Ir	--	1E+4	4E-6	1E-8	--	--
77	Iridium-186	D, see ^{182}Ir	2E+3	8E+3	3E-6	1E-8	3E-5	3E-4
		W, see ^{182}Ir	--	6E+3	3E-6	9E-9	--	--
		Y, see ^{182}Ir	--	6E+3	2E-6	8E-9	--	--
77	Iridium-187	D, see ^{182}Ir	1E+4	3E+4	1E-5	5E-8	1E-4	1E-3
		W, see ^{182}Ir	--	3E+4	1E-5	4E-8	--	--
		Y, see ^{182}Ir	--	3E+4	1E-5	4E-8	--	--
77	Iridium-188	D, see ^{182}Ir	2E+3	5E+3	2E-6	6E-9	3E-5	3E-4
		W, see ^{182}Ir	--	4E+3	1E-6	5E-9	--	--
		Y, see ^{182}Ir	--	3E+3	1E-6	5E-9	--	--
77	Iridium-189	D, see ^{182}Ir	5E+3	5E+3	2E-6	7E-9	--	--
			LLI wall (5E+3)	--	--	--	7E-5	7E-4
		W, see ^{182}Ir	--	4E+3	2E-6	5E-9	--	--
		Y, see ^{182}Ir	--	4E+3	1E-6	5E-9	--	--
77	Iridium-190m[b/]	D, see ^{182}Ir	2E+5	2E+5	8E-5	3E-7	2E-3	2E-2
		W, see ^{182}Ir	--	2E+5	9E-5	3E-7	--	--
		Y, see ^{182}Ir	--	2E+5	8E-5	3E-7	--	--
77	Iridium-190	D, see ^{182}Ir	1E+3	9E+2	4E-7	1E-9	1E-5	1E-4
		W, see ^{182}Ir	--	1E+3	4E-7	1E-9	--	--
		Y, see ^{182}Ir	--	9E+2	4E-7	1E-9	--	--
77	Iridium-192m	D, see ^{182}Ir	3E+3	9E+1	4E-8	1E-10	4E-5	4E-4
		W, see ^{182}Ir	--	2E+2	9E-8	3E-10	--	--
		Y, see ^{182}Ir	--	2E+1	6E-9	2E-11	--	--

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
77	Iridium-192	D, see ^{182}Ir	9E+2	3E+2	1E-7	4E-10	1E-5	1E-4
		W, see ^{182}Ir	--	4E+2	2E-7	6E-10	--	--
		Y, see ^{182}Ir	--	2E+2	9E-8	3E-10	--	--
77	Iridium-194m	D, see ^{182}Ir	6E+2	9E+1	4E-8	1E-10	9E-6	9E-5
		W, see ^{182}Ir	--	2E+2	7E-8	2E-10	--	--
		Y, see ^{182}Ir	--	1E+2	4E-8	1E-10	--	--
77	Iridium-194	D, see ^{182}Ir	1E+3	3E+3	1E-6	4E-9	1E-5	1E-4
		W, see ^{182}Ir	--	2E+3	9E-7	3E-9	--	--
		Y, see ^{182}Ir	--	2E+3	8E-7	3E-9	--	--
77	Iridium-195m	D, see ^{182}Ir	8E+3	2E+4	1E-5	3E-8	1E-4	1E-3
		W, see ^{182}Ir	--	3E+4	1E-5	4E-8	--	--
		Y, see ^{182}Ir	--	2E+4	9E-6	3E-8	--	--
77	Iridium-195	D, see ^{182}Ir	1E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{182}Ir	--	5E+4	2E-5	7E-8	--	--
		Y, see ^{182}Ir	--	4E+4	2E-5	6E-8	--	--
78	Platinum-186	D, all compounds	1E+4	4E+4	2E-5	5E-8	2E-4	2E-3
78	Platinum-188	D, all compounds	2E+3	2E+3	7E-7	2E-9	2E-5	2E-4
78	Platinum-189	D, all compounds	1E+4	3E+4	1E-5	4E-8	1E-4	1E-3
78	Platinum-191	D, all compounds	4E+3	8E+3	4E-6	1E-8	5E-5	5E-4
78	Platinum-193m	D, all compounds	3E+3	6E+3	3E-6	8E-9	--	--
			LLI wall (3E+4)	--	--	--	4E-5	4E-4
78	Platinum-193	D, all compounds	4E+4	2E+4	1E-5	3E-8	--	--
			LLI wall (5E+4)	--	--	--	6E-4	6E-3
78	Platinum-195m	D, all compounds	2E+3	4E+3	2E-6	6E-9	--	--
			LLI wall (2E+3)	--	--	--	3E-5	3E-4
78	Platinum-197m[b/]	D, all compounds	2E+4	4E+4	2E-5	6E-8	2E-4	2E-3
78	Platinum-197	D, all compounds	3E+3	1E+4	4E-6	1E-8	4E-5	4E-4
78	Platinum-199[b/]	D, all compounds	5E+4	1E+5	6E-5	2E-7	7E-4	7E-3
78	Platinum-200	D, all compounds	1E+3	3E+3	1E-6	5E-9	2E-5	2E-4

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
79	Gold-193	D, all compounds except those given for W and Y	9E+3	3E+4	1E-5	4E-8	1E-4	1E-3
		W, halides and nitrates	--	2E+4	9E-6	3E-8	--	--
		Y, oxides and hydroxides	--	2E+4	8E-6	3E-8	--	--
79	Gold-194	D, see ^{193}Au	3E+3	8E+3	3E-6	1E-8	4E-5	4E-4
		W, see ^{193}Au	--	5E+3	2E-6	8E-9	--	--
		Y, see ^{193}Au	--	5E+3	2E-6	7E-9	--	--
79	Gold-195	D, see ^{193}Au	5E+3	1E+4	5E-6	2E-8	7E-5	7E-4
		W, see ^{193}Au	--	1E+3	6E-7	2E-9	--	--
		Y, see ^{193}Au	--	4E+2	2E-7	6E-10	--	--
79	Gold-198m	D, see ^{193}Au	1E+3	3E+3	1E-6	4E-9	1E-5	1E-4
		W, see ^{193}Au	--	1E+3	5E-7	2E-9	--	--
		Y, see ^{193}Au	--	1E+3	5E-7	2E-9	--	--
79	Gold-198	D, see ^{193}Au	1E+3	4E+3	2E-6	5E-9	2E-5	2E-4
		W, see ^{193}Au	--	2E+3	8E-7	3E-9	--	--
		Y, see ^{193}Au	--	2E+3	7E-7	2E-9	--	--
79	Gold-199	D, see ^{193}Au	3E+3	9E+3	4E-6	1E-8	--	--
			LLI wall (3E+3)	--	--	--	4E-5	4E-4
		W, see ^{193}Au	--	4E+3	2E-6	6E-9	--	--
		Y, see ^{193}Au	--	4E+3	2E-6	5E-9	--	--
79	Gold-200m	D, see ^{193}Au	1E+3	4E+3	1E-6	5E-9	2E-5	2E-4
		W, see ^{193}Au	--	3E+3	1E-6	4E-9	--	--
		Y, see ^{193}Au	--	2E+4	1E-6	3E-9	--	--
79	Gold-200[b/]	D, see ^{193}Au	3E+4	6E+4	3E-5	9E-8	4E-4	4E-3
		W, see ^{193}Au	--	8E+4	3E-5	1E-7	--	--
		Y, see ^{193}Au	--	7E+4	3E-5	1E-7	--	--
79	Gold-201[b/]	D, see ^{193}Au	7E+4	2E+5	9E-5	3E-7	--	--
			St wall (9E+4)	--	--	--	1E-3	1E-2
		W, see ^{193}Au	--	2E+5	1E-4	3E-7	--	--
		Y, see ^{193}Au	--	2E+5	9E-5	3E-7	--	--
80	Mercury-193m	Vapor	--	8E+3	4E-6	1E-8	--	--
		Organic D	4E+3	1E+4	5E-6	2E-8	6E-5	6E-4
		D, sulfates	3E+3	9E+3	4E-6	1E-8	4E-5	4E-4
		W, oxides, hydroxides, halides, nitrates, and sulfides	--	8E+3	3E-6	1E-8	--	--

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
80	Mercury-193	Vapor	--	3E+4	1E-5	4E-8	--	--
		Organic D	2E+4	6E+4	3E-5	9E-8	3E-4	3E-3
		D, see ^{193m}Hg	2E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{193m}Hg	--	4E+4	2E-5	6E-8	--	--
80	Mercury-194	Vapor	--	3E+1	1E-8	4E-11	--	--
		Organic D	2E+1	3E+1	1E-8	4E-11	2E-7	2E-6
		D, see ^{193m}Hg	8E+2	4E+1	2E-8	6E-11	1E-5	1E-4
		W, see ^{193m}Hg	--	1E+2	5E-8	2E-10	--	--
80	Mercury-195m	Vapor	--	4E+3	2E-6	6E-9	--	--
		Organic D	3E+3	6E+3	3E-6	8E-9	4E-5	4E-4
		D, see ^{193m}Hg	2E+3	5E+3	2E-6	7E-9	3E-5	3E-4
		W, see ^{193m}Hg	--	4E+3	2E-6	5E-9	--	--
80	Mercury-195	Vapor	--	3E+4	1E-5	4E-8	--	--
		Organic D	2E+4	5E+4	2E-5	6E-8	2E-4	2E-3
		D, see ^{193m}Hg	1E+4	4E+4	1E-5	5E-8	2E-4	2E-3
		W, see ^{193m}Hg	--	3E+4	1E-5	5E-8	--	--
80	Mercury-197m	Vapor	--	5E+3	2E-6	7E-9	--	--
		Organic D	4E+3	9E+3	4E-6	1E-8	5E-5	5E-4
		D, see ^{193m}Hg	3E+3	7E+3	3E-6	1E-8	4E-5	4E-4
		W, see ^{193m}Hg	--	5E+3	2E-6	7E-9	--	--
80	Mercury-197	Vapor	--	8E+3	4E-6	1E-8	--	--
		Organic D	7E+3	1E+4	6E-6	2E-8	9E-5	9E-4
		D, see ^{193m}Hg	6E+3	1E+4	5E-6	2E-8	8E-5	8E-4
		W, see ^{193m}Hg	--	9E+3	4E-6	1E-8	--	--
80	Mercury-199m[b/]	Vapor	--	8E+4	3E-5	1E-7	--	--
		Organic D	6E+4	2E+5	7E-5	2E-7	--	--
			St wall (1E+5)	--	--	--	1E-3	1E-2
		D, see ^{193m}Hg	6E+4	1E+5	6E-5	2E-7	8E-4	8E-3
		W, see ^{193m}Hg	--	2E+5	7E-5	2E-7	--	--
80	Mercury-203	Vapor	--	8E+2	4E-7	1E-9	--	--
		Organic D	5E+2	8E+2	3E-7	1E-9	7E-6	7E-5
		D, see ^{193m}Hg	2E+3	1E+3	5E-7	2E-9	3E-5	3E-4
		W, see ^{193m}Hg	--	1E+3	5E-7	2E-9	--	--
81	Thallium-194m[b/]	D, all compounds	5E+4	2E+5	6E-5	2E-7	--	--
			St wall (7E+4)	--	--	--	1E-3	1E-2
81	Thallium-194[b/]	D, all compounds	3E+5	6E+5	2E-4	8E-7	--	--
			St wall (3E+5)	--	--	--	4E-3	4E-2
81	Thallium-195[b/]	D, all compounds	6E+4	1E+5	5E-5	2E-7	9E-4	9E-3

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
81	Thallium-197	D, all compounds	7E+4	1E+5	5E-5	2E-7	1E-3	1E-2
81	Thallium-198m[b/]	D, all compounds	3E+4	5E+4	2E-5	8E-8	4E-4	4E-3
81	Thallium-198	D, all compounds	2E+4	3E+4	1E-5	5E-8	3E-4	3E-3
81	Thallium-199	D, all compounds	6E+4	8E+4	4E-5	1E-7	9E-4	9E-3
81	Thallium-200	D, all compounds	8E+3	1E+4	5E-6	2E-8	1E-4	1E-3
81	Thallium-201	D, all compounds	2E+4	2E+4	9E-6	3E-8	2E-4	2E-3
81	Thallium-202	D, all compounds	4E+3	5E+3	2E-6	7E-9	5E-5	5E-4
81	Thallium-204	D, all compounds	2E+3	2E+3	9E-7	3E-9	2E-5	2E-4
82	Lead-195m[b/]	D, all compounds	6E+4	2E+5	8E-5	3E-7	8E-4	8E-3
82	Lead-198	D, all compounds	3E+4	6E+4	3E-5	9E-8	4E-4	4E-3
82	Lead-199[b/]	D, all compounds	2E+4	7E+4	3E-5	1E-7	3E-4	3E-3
82	Lead-200	D, all compounds	3E+3	6E+3	3E-6	9E-9	4E-5	4E-4
82	Lead-201	D, all compounds	7E+3	2E+4	8E-6	3E-8	1E-4	1E-3
82	Lead-202m	D, all compounds	9E+3	3E+4	1E-5	4E-8	1E-4	1E-3
82	Lead-202	D, all compounds	1E+2	5E+1	2E-8	7E-11	2E-6	2E-5
82	Lead-203	D, all compounds	5E+3	9E+3	4E-6	1E-8	7E-5	7E-4
82	Lead-205	D, all compounds	4E+3	1E+3	6E-7	2E-9	5E-5	5E-4
82	Lead-209	D, all compounds	2E+4	6E+4	2E-5	8E-8	3E-4	3E-3
82	Lead-210	D, all compounds	6E-1 Bone surf (1E+0)	2E-1 Bone surf (4E-1)	1E-10 --	-- 6E-13	-- 1E-8	-- 1E-7
82	Lead-211[b/]	D, all compounds	1E+4	6E+2	3E-7	9E-10	2E-4	2E-3
82	Lead-212	D, all compounds	8E+1 Bone surf (1E+2)	3E+1 --	1E-8 --	5E-11 --	-- 2E-6	-- 2E-5
82	Lead-214[b/]	D, all compounds	9E+3	8E+2	3E-7	1E-9	1E-4	1E-3
83	Bismuth-200[b/]	D, nitrates	3E+4	8E+4	4E-5	1E-7	4E-4	4E-3
		W, all other compounds	--	1E+5	4E-5	1E-7	--	--

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
83	Bismuth-201[b/]	D, see ^{200}Bi	1E+4	3E+4	1E-5	4E-8	2E-4	2E-3
		W, see ^{200}Bi	--	4E+4	2E-5	5E-8	--	--
83	Bismuth-202[b/]	D, see ^{200}Bi	1E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{200}Bi	--	8E+4	3E-5	1E-7	--	--
83	Bismuth-203	D, see ^{200}Bi	2E+3	7E+3	3E-6	9E-9	3E-5	3E-4
		W, see ^{200}Bi	--	6E+3	3E-6	9E-9	--	--
83	Bismuth-205	D, see ^{200}Bi	1E+3	3E+3	1E-6	3E-9	2E-5	2E-4
		W, see ^{200}Bi	--	1E+3	5E-7	2E-9	--	--
83	Bismuth-206	D, see ^{200}Bi	6E+2	1E+3	6E-7	2E-9	9E-6	9E-5
		W, see ^{200}Bi	--	9E+2	4E-7	1E-9	--	--
83	Bismuth-207	D, see ^{200}Bi	1E+3	2E+3	7E-7	2E-9	1E-5	1E-4
		W, see ^{200}Bi	--	4E+2	1E-7	5E-10	--	--
83	Bismuth-210m	D, see ^{200}Bi	4E+1 Kidneys (6E+1)	5E+0 Kidneys (6E+0)	2E-9 --	-- 9E-12	-- 8E-7	-- 8E-6
		W, see ^{200}Bi	--	7E-1	3E-10	9E-13	--	--
83	Bismuth-210	D, see ^{200}Bi	8E+2 -- --	2E+2 Kidneys (4E+2)	1E-7 --	-- 5E-10	1E-5 --	1E-4 --
		W, see ^{200}Bi	--	3E+1	1E-8	4E-11	--	--
83	Bismuth-212[b/]	D, see ^{200}Bi	5E+3	2E+2	1E-7	3E-10	7E-5	7E-4
		W, see ^{200}Bi	--	3E+2	1E-7	4E-10	--	--
83	Bismuth-213[b/]	D, see ^{200}Bi	7E+3	3E+2	1E-7	4E-10	1E-4	1E-3
		W, see ^{200}Bi	--	4E+2	1E-7	5E-10	--	--
83	Bismuth-214[b/]	D, see ^{200}Bi	2E+4 St wall (2E+4)	8E+2 --	3E-7 --	1E-9 --	-- 3E-4	-- 3E-3
		W, see ^{200}Bi	--	9E-2	4E-7	1E-9	--	--
84	Polonium-203[b/]	D, all compounds except those given for W	3E+4	6E+4	3E-5	9E-8	3E-4	3E-3
		W, oxides, hydroxides, and nitrates	--	9E+4	4E-5	1E-7	--	--
84	Polonium-205[b/]	D, see ^{203}Po	2E+4	4E+4	2E-5	5E-8	3E-4	3E-3
		W, see ^{203}Po	--	7E+4	3E-5	1E-7	--	--
84	Polonium-207	D, see ^{203}Po	8E+3	3E+4	1E-5	3E-8	1E-4	1E-3
		W, see ^{203}Po	--	3E+4	1E-5	4E-8	--	--

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
84	Polonium-210	D, see ^{203}Po	3E+0	6E-1	3E-10	9E-13	4E-8	4E-7
		W, see ^{203}Po	--	6E-1	3E-10	9E-13	--	--
85	Astatine-207[b/]	D, halides	6E+3	3E+3	1E-6	4E-9	8E-5	8E-4
		W	--	2E+3	9E-7	3E-9	--	--
85	Astatine-211	D, halides	1E+2	8E+1	3E-8	1E-10	2E-6	2E-5
		W	--	5E+1	2E-8	8E-11	--	--
86	Radon-220	With daughters removed	--	2E+4	7E-6	2E-8	--	--
		With daughters present	--	2E+1 (or 12 WLM)	9E-9 (or 1.0 WL)	3E-11	--	--
86	Radon-222	With daughters removed	--	1E+4	4E-6	1E-8	--	--
		With daughters present	--	1E+2 (or 4 WLM)	3E-8 (or 0.33 WL)	1E-10	--	--
87	Francium-222[b/]	D, all compounds	2E+3	5E+2	2E-7	6E-10	3E-5	3E-4
87	Francium-223[b/]	D, all compounds	6E+2	8E+2	3E-7	1E-9	8E-6	8E-5
88	Radium-223	W, all compounds	5E+0 Bone surf (9E+0)	7E-1 --	3E-10 --	9E-13 --	-- 1E-7	-- 1E-6
88	Radium-224	W, all compounds	8E+0 Bone surf (2E+1)	2E+0 --	7E-10 --	2E-12 --	-- 2E-7	-- 2E-6
88	Radium-225	W, all compounds	8E+0 Bone surf (2E+1)	7E-1 --	3E-10 --	9E-13 --	-- 2E-7	-- 2E-6
88	Radium-226	W, all compounds	2E+0 Bone surf (5E+0)	6E-1 --	3E-10 --	9E-13 --	-- 6E-8	-- 6E-7
88	Radium-227[b/]	W, all compounds	2E+4 Bone surf (2E+4)	1E+4 Bone surf (2E+4)	6E-6 --	-- 3E-8	-- 3E-4	-- 3E-3
88	Radium-228	W, all compounds	2E+0 Bone surf (4E+0)	1E+0 --	5E-10 --	2E-12 --	-- 6E-8	-- 6E-7

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
89	Actinium-224	D, all compounds except those given for W and Y	2E+3	3E+1	1E-8	--	--	--
			LLI wall (2E+3)	Bone surf (4E+1)	--	5E-11	3E-5	3E-4
		W, halides and nitrates	--	5E+1	2E-8	7E-11	--	--
		Y, oxides and hydroxides	--	5E+1	2E-8	6E-11	--	--
89	Actinium-225	D, see ^{224}Ac	5E+1	3E-1	1E-10	--	--	--
			LLI wall (5E+1)	Bone surf (5E-1)	--	7E-13	7E-7	7E-6
		W, see ^{224}Ac	--	6E-1	3E-10	9E-13	--	--
		Y, see ^{224}Ac	--	6E-1	3E-10	9E-13	--	--
89	Actinium-226	D, see ^{224}Ac	1E+2	3E+0	1E-9	--	--	--
			LLI wall (1E+2)	Bone surf (4E+0)	--	5E-12	2E-6	2E-5
		W, see ^{224}Ac	--	5E+0	2E-9	7E-12	--	--
		Y, see ^{224}Ac	--	5E+0	2E-9	6E-12	--	--
89	Actinium-227	D, see ^{224}Ac	2E-1	4E-4	2E-13	--	--	--
			Bone surf (4E-1)	Bone surf (8E-4)	--	1E-15	5E-9	5E-8
		W, see ^{224}Ac	--	2E-3	7E-13	--	--	--
			--	Bone surf (3E-3)	--	4E-15	--	--
		Y, see ^{224}Ac	--	4E-3	2E-12	6E-15	--	--
89	Actinium-228	D, see ^{224}Ac	2E+3	9E+0	4E-9	--	3E-5	3E-4
			--	Bone surf (2E+1)	--	2E-11	--	--
		W, see ^{224}Ac	--	4E+1	2E-8	--	--	--
			--	Bone surf (6E+1)	--	8E-11	--	--
		Y, see ^{224}Ac	--	4E+1	2E-8	6E-11	--	--
90	Thorium-226[b/]	W, all compounds except those given for Y	5E+3	2E+2	6E-8	2E-10	--	--
			St wall (5E+3)	--	--	--	7E-5	7E-4
		Y, oxides and hydroxides	--	1E+2	6E-8	2E-10	--	--
90	Thorium-227	W, see ^{226}Th	1E+2	3E-1	1E-10	5E-13	2E-6	2E-5
		Y, see ^{226}Th	--	3E-1	1E-10	5E-13	--	--
90	Thorium-228	W, see ^{226}Th	6E+0	1E-2	4E-12	--	--	--
			Bone surf (1E+1)	Bone surf (2E-2)	--	3E-14	2E-7	2E-6
		Y, see ^{226}Th	--	2E-2	7E-12	2E-14	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
90	Thorium-229	W, see ^{226}Th	6E-1	9E-4	4E-13	--	--	--
			Bone surf (1E+0)	Bone surf (2E-3)	--	3E-15	2E-8	2E-7
		Y, see ^{226}Th	--	2E-3	1E-12	--	--	--
			--	Bone surf (3E-3)	--	4E-15	--	--
90	Thorium-230	W, see ^{226}Th	4E+0	6E-3	3E-12	--	--	--
			Bone surf (9E+0)	Bone surf (2E-2)	--	2E-14	1E-7	1E-6
		Y, see ^{226}Th	--	2E-2	6E-12	--	--	--
			--	Bone surf (2E-2)	--	3E-14	--	--
90	Thorium-231	W, see ^{226}Th	4E+3	6E+3	3E-6	9E-9	5E-5	5E-4
		Y, see ^{226}Th	--	6E+3	3E-6	9E-9	--	--
90	Thorium-232	W, see ^{226}Th	7E-1	1E-3	5E-13	--	--	--
			Bone surf (2E+0)	Bone surf (3E-3)	--	4E-15	3E-8	3E-7
		Y, see ^{226}Th	--	3E-3	1E-12	--	--	--
			-	Bone surf (4E-3)	--	6E-15	--	--
90	Thorium-234	W, see ^{226}Th	3E+2	2E+2	8E-8	3E-10	--	□
			LLI wall (4E+2)	--	--	--	5E-6	5E-5
		Y, see ^{226}Th	--	2E+2	6E-8	2E-10	--	--
91	Protactinium-227[b]	W, all compounds except those given for Y	4E+3	1E+2	5E-8	2E-10	5E-5	5E-4
		Y, oxides and hydroxides	--	1E+2	4E-8	1E-10	--	--
91	Protactinium-228	W, see ^{227}Pa	1E+3	1E+1	5E-9	--	2E-5	2E-4
			--	Bone surf (2E+1)	--	3E-11	--	--
		Y, see ^{227}Pa	--	1E+1	5E-9	2E-11	--	--
91	Protactinium-230	W, see ^{227}Pa	6E+2	5E+0	2E-9	7E-12	--	--
			Bone surf (9E+2)	--	--	--	1E-5	1E-4
		Y, see ^{227}Pa	--	4E+0	1E-9	5E-12	--	--
91	Protactinium-231	W, see ^{227}Pa	2E-1	2E-3	6E-13	--	--	--
			Bone surf (5E-1)	Bone surf (4E-3)	--	6E-15	6E-9	6E-8
		Y, see ^{227}Pa	--	4E-3	2E-12	--	--	--
			--	Bone surf (6E-3)	--	8E-15	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
91	Protactinium-232	W, see ^{227}Pa	1E+3	2E+1 Bone surf (6E+1)	9E-9	--	2E-5	2E-4
		Y, see ^{227}Pa	--	6E+1 Bone surf (7E+1)	2E-8	8E-11	--	--
91	Protactinium-233	W, see ^{227}Pa	1E+3 LLI wall (2E+3)	7E+2 --	3E-7 --	1E-9 --	-- 2E-5	-- 2E-4
		Y, see ^{227}Pa	--	6E+2	2E-7	8E-10	--	--
91	Protactinium-234	W, see ^{227}Pa	2E+3	8E+3	3E-6	1E-8	3E-5	3E-4
		Y, see ^{227}Pa	--	7E+3	3E-6	9E-9	--	--
92	Uranium-230	D, UF_6, UO_2F_2, $UO_2(NO_3)_2$	4E+0 Bone surf (6E+0)	4E-1 Bone surf (6E-1)	2E-10 --	-- 8E-13	-- 8E-8	-- 8E-7
		W, UO_3, UF_4, UCl_4	--	4E-1	1E-10	5E-13	--	--
		Y, UO_2, U_3O_8	--	3E-1	1E-10	4E-13	--	--
92	Uranium-231	D, see ^{230}U	5E+3 LLI wall (4E+3)	8E+3 --	3E-6 --	1E-8 --	-- 6E-5	-- 6E-4
		W, see ^{230}U	--	6E+3	2E-6	8E-9	--	--
		Y, see ^{230}U	--	5E+3	2E-6	6E-9	--	--
92	Uranium-232	D, see ^{230}U	2E+0 Bone surf (4E+0)	2E-1 Bone surf (4E-1)	9E-11 --	-- 6E-13	-- 6E-8	-- 6E-7
		W, see ^{230}U	--	4E-1	2E-10	5E-13	--	--
		Y, see ^{230}U	--	8E-3	3E-12	1E-14	--	--
92	Uranium-233	D, see ^{230}U	1E+1 Bone surf (2E+1)	1E+0 Bone surf (2E+0)	5E-10 --	-- 3E-12	-- 3E-7	-- 3E-6
		W, see ^{230}U	--	7E-1	3E-10	1E-12	--	--
		Y, see ^{230}U	--	4E-2	2E-11	5E-14	--	--
92	Uranium-234[e/]	D, see ^{230}U	1E+1 Bone surf (2E+1)	1E+0 Bone surf (2E+0)	5E-10 --	-- 3E-12	-- 3E-7	-- 3E-6
		W, see ^{230}U	--	7E-1	3E-10	1E-12	--	--
		Y, see ^{230}U	--	4E-2	2E-11	5E-14	--	--

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
92	Uranium-235[c/]	D, see ^{230}U	1E+1	1E+0	6E-10	--	--	--
			Bone surf (2E+1)	Bone surf (2E+0)	--	3E-12	3E-7	3E-6
		W, see ^{230}U	--	8E-1	3E-10	1E-12	--	--
		Y, see ^{230}U	--	4E-2	2E-11	6E-14	--	--
92	Uranium-236	D, see ^{230}U	1E+1	1E+0	5E-10	--	--	--
			Bone surf (2E+1)	Bone surf (2E+0)	--	3E-12	3E-7	3E-6
		W, see ^{230}U	--	8E-1	3E-10	1E-12	--	--
		Y, see ^{230}U	--	4E-2	2E-11	6E-14	--	--
92	Uranium-237	D, see ^{230}U	2E+3	3E+3	1E-6	4E-9	--	--
			LLI wall (2E+3)	--	--	--	3E-5	3E-4
		W, see ^{230}U	--	2E+3	7E-7	2E-9	--	--
		Y, see ^{230}U	--	2E+3	6E-7	2E-9	--	--
92	Uranium-238[c/]	D, see ^{230}U	1E+1	1E+0	6E-10	--	--	--
			Bone surf (2E+1)	Bone surf (2E+0)	--	3E-12	3E-7	3E-6
		W, see ^{230}U	--	8E-1	3E-10	1E-12	--	--
		Y, see ^{230}U	--	4E-2	2E-11	6E-14	--	--
92	Uranium-239[b/]	D, see ^{230}U	7E+4	2E+5	8E-5	3E-7	9E-4	9E-3
		W, see ^{230}U	--	2E+5	7E-5	2E-7	--	--
		Y, see ^{230}U	--	2E+5	6E-5	2E-7	--	--
92	Uranium-240	D, see ^{230}U	1E+3	4E+3	2E-6	5E-9	2E-5	2E-4
		W, see ^{230}U	--	3E+3	1E-6	4E-9	--	--
		Y, see ^{230}U	--	2E+3	1E-6	3E-9	--	--
92	Uranium-natural[c/]	D, see ^{230}U	1E+1	1E+0	5E-10	--	--	--
			Bone surf (2E+1)	Bone surf (2E+0)	--	3E-12	3E-7	3E-6
		W, see ^{230}U	--	8E-1	3E-10	9E-13	--	--
		Y, see ^{230}U	--	5E-2	2E-11	9E-14	--	--
93	Neptunium-232[b/]	W, all compounds	1E+5	2E+3	7E-7	--	2E-3	2E-2
			-	Bone surf (5E+2)	--	6E-9	-	--
93	Neptunium-233[b/]	W, all compounds	8E+5	3E+6	1E-3	4E-6	1E-2	1E-1
93	Neptunium-234	W, all compounds	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4
93	Neptunium-235	W, all compounds	2E+4	8E+2	3E-7	--	--	--
			LLI wall (2E+4)	Bone surf (1E+3)	--	2E-9	3E-4	3E-3

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
93	Neptunium-236 (1.15E+5 y)	W, all compounds	3E+0 Bone surf (6E+0)	2E-2 Bone surf (5E-2)	9E-12 --	-- 8E-14	-- 9E-8	-- 9E-7
93	Neptunium-236 (22.5 h)	W, all compounds	3E+3 Bone surf (4E+3)	3E+1 Bone surf (7E+1)	1E-8 --	-- 1E-10	-- 5E-5	-- 5E-4
93	Neptunium-237	W, all compounds	5E-1 Bone surf (1E+0)	4E-3 Bone surf (1E-2)	2E-12 --	-- 1E-14	-- 2E-8	-- 2E-7
93	Neptunium-238	W, all compounds	1E+3 -	6E+1 Bone surf (2E+2)	3E-8 --	-- 2E-10	2E-5 -	2E-4 --
93	Neptunium-239	W, all compounds	2E+3 LLI wall (2E+3)	2E+3 --	9E-7 --	3E-9 --	-- 2E-5	-- 2E-4
93	Neptunium-240[b/]	W, all compounds	2E+4	8E+4	3E-5	1E-7	3E-4	3E-3
94	Plutonium-234	W, all compounds except PuO_2	8E+3	2E+2	9E-8	3E-10	1E-4	1E-3
		Y, PuO_2	--	2E+2	8E-8	3E-10	--	--
94	Plutonium-235[b/]	W, see ^{234}Pu	9E+5	3E+6	1E-3	4E-6	1E-2	1E-1
		Y, see ^{234}Pu	--	3E+6	1E-3	3E-6	--	--
94	Plutonium-236	W, see ^{234}Pu	2E+0 Bone surf (4E+0)	2E-2 Bone surf (4E-2)	8E-12 --	-- 5E-14	-- 6E-8	-- 6E-7
		Y, see ^{234}Pu	--	4E-2	2E-11	6E-14	--	--
94	Plutonium-237	W, see ^{234}Pu	1E+4	3E+3	1E-6	5E-9	2E-4	2E-3
		Y, see ^{234}Pu	--	3E+3	1E-6	4E-9	--	--
94	Plutonium-238	W, see ^{234}Pu	9E-1 Bone surf (2E+0)	7E-3 Bone surf (1E-2)	3E-12 --	-- 2E-14	-- 2E-8	-- 2E-7
		Y, see ^{234}Pu	--	2E-2	8E-12	2E-14	--	--
94	Plutonium-239	W, see ^{234}Pu	8E-1 Bone surf (1E+0)	6E-3 Bone surf (1E-2)	3E-12 --	-- 2E-14	-- 2E-8	-- 2E-7
		Y, see ^{234}Pu	-- --	2E-2 Bone surf (2E-2)	7E-12 --	-- 2E-14	-- --	-- --

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
94	Plutonium-240	W, see ^{234}Pu	8E-1	6E-3	3E-12	--	--	--
			Bone surf (1E+0)	Bone surf (1E-2)	--	2E-14	2E-8	2E-7
		Y, see ^{234}Pu	--	2E-2	7E-12	--	--	--
				Bone surf				
			--	(2E-2)	--	2E-14	--	--
94	Plutonium-241	W, see ^{234}Pu	4E+1	3E-1	1E-10	--	--	--
			Bone surf (7E+1)	Bone surf (6E-1)	--	8E-13	1E-6	1E-5
		Y, see ^{234}Pu	--	8E-1	3E-10	--	--	--
				Bone surf				
			--	(1E+0)	--	1E-12	--	--
94	Plutonium-242	W, see ^{234}Pu	8E-1	7E-3	3E-12	--	--	--
			Bone surf (1E+0)	Bone surf (1E-2)	--	2E-14	2E-8	2E-7
		Y, see ^{234}Pu	--	2E-2	7E-12	--	--	--
				Bone surf				
			--	(2E-2)	--	2E-14	--	--
94	Plutonium-243	W, see ^{234}Pu	2E+4	4E+4	2E-5	5E-8	2E-4	2E-3
		Y, see ^{234}Pu	--	4E+4	2E-5	5E-8	--	--
94	Plutonium-244	W, see ^{234}Pu	8E-1	7E-3	3E-12	--	--	--
			Bone surf (2E+0)	Bone surf (1E-2)	--	2E-14	2E-8	2E-7
		Y, see ^{234}Pu	--	2E-2	7E-12	--	--	--
				Bone surf				
			--	(2E-2)	--	2E-14	--	--
94	Plutonium-245	W, see ^{234}Pu	2E+3	5E+3	2E-6	6E-9	3E-5	3E-4
		Y, see ^{234}Pu	--	4E+3	2E-6	6E-9	--	--
94	Plutonium-246	W, see ^{234}Pu	4E+2	3E+2	1E-7	4E-10	--	--
			LLI wall (4E+2)	--	--	--	6E-6	6E-5
		Y, see ^{234}Pu	--	3E+2	1E-7	4E-10	--	--
95	Americium-237[b/]	W, all compounds	8E+4	3E+5	1E-4	4E-7	1E-3	1E-2
95	Americium-238[b/]	W, all compounds	4E+4	3E+3	1E-6	--	5E-4	5E-3
				Bone surf				
			--	(6E+3)	--	9E-9	--	--
95	Americium-239	W, all compounds	5E+3	1E+4	5E-6	2E-8	7E-5	7E-4
95	Americium-240	W, all compounds	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4

Appendix G

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
95	Americium-241	W, all compounds	8E-1	6E-3	3E-12	--	--	--
			Bone surf (1E+0)	Bone surf (1E-2)	--	2E-14	2E-8	2E-7
95	Americium-242m	W, all compounds	8E-1	6E-3	3E-12	--	--	--
			Bone surf (1E+0)	Bone surf (1E-2)	--	2E-14	2E-8	2E-7
95	Americium-242	W, all compounds	4E+3	8E+1	4E-8	--	5E-5	5E-4
			--	Bone surf (9E+1)	--	1E-10	--	--
95	Americium-243	W, all compounds	8E-1	6E-3	3E-12	--	--	--
			Bone surf (1E+0)	Bone surf (1E-2)	--	2E-14	2E-8	2E-7
95	Americium-244m[b/]	W, all compounds	6E+4	4E+3	2E-6	--	--	--
			St wall (8E+4)	Bone surf (7E+3)	--	1E-8	1E-3	1E-2
95	Americium-244	W, all compounds	3E+3	2E+2	8E-8	--	4E-5	4E-4
			--	Bone surf (3E+2)	--	4E-10	--	--
95	Americium-245	W, all compounds	3E+4	8E+4	3E-5	1E-7	4E-4	4E-3
95	Americium-246m[b/]	W, all compounds	5E+4	2E+5	8E-5	3E-7	--	--
			St wall (6E+4)	--	--	--	8E-4	8E-3
95	Americium-246[b/]	W, all compounds	3E+4	1E+5	4E-5	1E-7	4E-4	4E-3
96	Curium-238	W, all compounds	2E+4	1E+3	5E-7	2E-9	2E-4	2E-3
96	Curium-240	W, all compounds	6E+1	6E-1	2E-10	--	--	--
			Bone surf (8E+1)	Bone surf (6E-1)	--	9E-13	1E-6	1E-5
96	Curium-241	W, all compounds	1E+3	3E+1	1E-8	--	2E-5	2E-4
			--	Bone surf (4E+1)	--	5E-11	--	--
96	Curium-242	W, all compounds	3E+1	3E-1	1E-10	--	--	--
			Bone surf (5E+1)	Bone surf (3E-1)	□	4E-13	7E-7	7E-6
96	Curium-243	W, all compounds	1E+0	9E-3	4E-12	--	--	--
			Bone surf (2E+0)	Bone surf (2E-2)	--	2E-14	3E-8	3E-7

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
96	Curium-244	W, all compounds	1E+0 Bone surf (3E+0)	1E-2 Bone surf (2E-2)	5E-12 --	-- 3E-14	-- 3E-8	-- 3E-7
96	Curium-245	W, all compounds	7E-1 Bone surf (1E+0)	6E-3 Bone surf (1E-2)	3E-12 --	-- 2E-14	-- 2E-8	-- 2E-7
96	Curium-246	W, all compounds	7E-1 Bone surf (1E+0)	6E-3 Bone surf (1E-2)	3E-12 --	-- 2E-14	-- 2E-8	-- 2E-7
96	Curium-247	W, all compounds	8E-1 Bone surf (1E+0)	6E-3 Bone surf (1E-2)	3E-12 --	-- 2E-14	-- 2E-8	-- 2E-7
96	Curium-248	W, all compounds	2E-1 Bone surf (4E-1)	2E-3 Bone surf (3E-3)	7E-13 --	-- 4E-15	-- 5E-9	-- 5E-8
96	Curium-249[b/]	W, all compounds	5E+4 --	2E+4 Bone surf (3E+4)	7E-6 --	-- 4E-8	7E-4 --	7E-3 --
96	Curium-250	W, all compounds	4E-2 Bone surf (6E-2)	3E-4 Bone surf (5E-4)	1E-13 --	-- 8E-16	-- 9E-10	-- 9E-9
97	Berkelium-245	W, all compounds	2E+3	1E+3	5E-7	2E-9	3E-5	3E-4
97	Berkelium-246	W, all compounds	3E+3	3E+3	1E-6	4E-9	4E-5	4E-4
97	Berkelium-247	W, all compounds	5E-1 Bone surf (1E+0)	4E-3 Bone surf (9E-3)	2E-12 --	-- 1E-14	-- 2E-8	-- 2E-7
97	Berkelium-249	W, all compounds	2E+2 Bone surf (5E+2)	2E+0 Bone surf (4E+0)	7E-10 --	-- 5E-12	-- 6E-6	-- 6E-5
97	Berkelium-250	W, all compounds	9E+3 --	3E+2 Bone surf (7E+2)	1E-7 --	-- 1E-9	1E-4 --	1E-3 --
98	Californium-244[b/]	W, all compounds except those given for Y	3E+4 St wall (3E+4)	6E+2 --	2E-7 --	8E-10 --	-- 4E-4	-- 4E-3
		Y, oxides and hydroxides	--	6E+2	2E-7	8E-10	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
98	Californium-246	W, see ^{244}Cf	4E+2	9E+0	4E-9	1E-11	5E-6	5E-5
		Y, see ^{244}Cf	--	9E+0	4E-9	1E-11	--	--
98	Californium-248	W, see ^{244}Cf	8E+0 Bone surf (2E+1)	6E-2 Bone surf (1E-1)	3E-11 --	-- 2E-13	-- 2E-7	-- 2E-6
		Y, see ^{244}Cf	--	1E-1	4E-11	1E-13	--	--
98	Californium-249	W, see ^{244}Cf	5E-1 Bone surf (1E+0)	4E-3 Bone surf (9E-3)	2E-12 --	-- 1E-14	-- 2E-8	-- 2E-7
		Y, see ^{244}Cf	--	1E-2 Bone surf (1E-2)	4E-12 --	-- 2E-14	-- --	-- --
98	Californium-250	W, see ^{244}Cf	1E+0 Bone surf (2E+0)	9E-3 Bone surf (2E-2)	4E-12 --	-- 3E-14	-- 3E-8	-- 3E-7
		Y, see ^{244}Cf	--	3E-2	1E-11	4E-14	--	--
98	Californium-251	W, see ^{244}Cf	5E-1 Bone surf (1E+0)	4E-3 Bone surf (9E-3)	2E-12 --	-- 1E-14	-- 2E-8	-- 2E-7
		Y, see ^{244}Cf	--	1E-2 Bone surf (1E-2)	4E-12 --	-- 2E-14	-- --	-- --
98	Californium-252	W, see ^{244}Cf	2E+0 Bone surf (5E+0)	2E-2 Bone surf (4E-2)	8E-12 --	-- 5E-14	-- 7E-8	-- 7E-7
		Y, see ^{244}Cf	--	3E-2	1E-11	5E-14	--	--
98	Californium-253	W, see ^{244}Cf	2E+2 Bone surf (4E+2)	2E+0 --	8E-10 --	3E-12 --	-- 5E-6	-- 5E-5
		Y, see ^{244}Cf	--	2E+0	7E-10	2E-12	--	--
98	Californium-254	W, see ^{244}Cf	2E+0	2E-2	9E-12	3E-14	3E-8	3E-7
		Y, see ^{244}Cf	--	2E-2	7E-12	2E-14	--	--
99	Einsteinium-250	W, all compounds	4E+4 Bone surf (1E+3)	5E+2 --	2E-7 --	-- 2E-9	6E-4 --	6E-3 --
99	Einsteinium-251	W, all compounds	7E+3 Bone surf (1E+3)	9E+2 --	4E-7 --	-- 2E-9	1E-4 --	1E-3 --
99	Einsteinium-253	W, all compounds	2E+2	1E+0	6E-10	2E-12	2E-6	2E-5

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
99	Einsteinium-254m	W, all compounds	3E+2	1E+1	4E-9	1E-11	--	--
			LLI wall (3E+2)	--	--	--	4E-6	4E-5
99	Einsteinium-254	W, all compounds	8E+0 Bone surf (2E+1)	7E-2 Bone surf (1E-1)	3E-11 --	-- 2E-13	-- 2E-7	-- 2E-6
100	Fermium-252	W, all compounds	5E+2	1E+1	5E-9	2E-11	6E-6	6E-5
100	Fermium-253	W, all compounds	1E+3	1E+1	4E-9	1E-11	1E-5	1E-4
100	Fermium-254	W, all compounds	3E+3	9E+1	4E-8	1E-10	4E-5	4E-4
100	Fermium-255	W, all compounds	5E+2	2E+1	9E-9	3E-11	7E-6	7E-5
100	Fermium-257	W, all compounds	2E+1 Bone surf (4E+1)	2E-1 Bone surf (2E-1)	7E-11 --	-- 3E-13	-- 5E-7	-- 5E-6
101	Mendelevium-257	W, all compounds	7E+3 --	8E+1 Bone surf (9E+1)	4E-8 --	-- 1E-10	1E-4 --	1E-3 --
101	Mendelevium-258	W, all compounds	3E+1 Bone surf (5E+1)	2E-1 Bone surf (3E-1)	1E-10 --	-- 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[a]	--	2E+2	1E-7	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		. . . .	--	2E-1	1E-10	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		. . . .	--	4E-4	2E-13	1E-15	2E-9	2E-8

Footnotes:

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

[b] *These radionuclides have radiological half-lives of less than 2 hours. The total effective equivalent dose (H) received during operations with these radionuclides might include a significant contribution from external exposure. The DAC values for all radionuclides, other than those designated Class "Submersion," are based upon the committed effective equivalent dose (H) due to the intake of the radionuclide into the body and do NOT include potentially significant contributions to equivalent dose (H) from external exposures. The licensee may substitute 1E-7 µCi/ml for the listed DAC to account for the submersion dose prospectively, but should use individual monitoring devices or other radiation measuring instruments that measure external exposure to demonstrate compliance with the limits. (See D.203.)*

~~[c] For soluble mixtures of U-238, U-234, and U-235 in air, chemical toxicity may be the limiting factor (see D.201e.). If the percent by weight (enrichment) of U-235 is not greater than 5, the concentration value for a 40-hour workweek is 0.2 milligrams uranium per cubic meter of air average. For any enrichment, the product of the average concentration and time of exposure during a 40-hour workweek shall not exceed 8E-3 (SA) µCi-hr/ml, where SA is the specific activity of the uranium inhaled. The specific activity for natural uranium is 6.77E-7 curies per gram U. The specific activity for other mixtures of U-238, U-235, and U-234, if not known, shall be:~~

~~$SA = 3.6E\text{-}7 \text{ curies/gram U}$ U-depleted~~

~~$SA = [0.4 + 0.38 (\text{enrichment}) + 0.0034 (\text{enrichment})^2] E\text{-}6$, enrichment ≥ 0.72~~

~~where enrichment is the percentage by weight of U-235, expressed as percent.~~

~~Note:~~

~~1. If the identity of each radionuclide in a mixture is known but the concentration of one or more of the radionuclides in the mixture is not known, the DAC for the mixture shall be the most restrictive DAC of any radionuclide in the mixture.~~

~~2. If the identity of each radionuclide in the mixture is not known, but it is known that certain radionuclides specified in this appendix are not present in the mixture, the inhalation ALI, DAC, and effluent and sewage concentrations for the mixture are the lowest values specified in this appendix for any radionuclide that is not known to be absent from the mixture; or~~

~~Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage *(Continued)*~~

			Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
Atomic No.	Radionuclide	Class	ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
~~If it is known that Ac-227-D and Cm-250-W are not present~~			--	7E-4	3E-13	--	--	--
~~If, in addition, it is known that Ac-227-W,Y, Th-229-W,Y, Th-230-W, Th-232-W,Y, Pa-231-W,Y, Np-237-W, Pu-239-W, Pu-240-W, Pu-242-W, Am-241-W, Am-242m-W, Am-243-W, Cm-245-W, Cm-246-W, Cm-247-W, Cm-248-W, Bk-247-W, Cf-249-W, and Cf-251-W are not present~~			--	7E-3	3E-12	--	--	--
~~If, in addition, it is known that Sm-146-W, Sm-147-W, Gd-148-D,W, Gd-152-D,W, Th-228-W,Y, Th-230-Y, U-232-Y, U-233-Y, U-234-Y, U-235-Y, U-236-Y, U-238-Y, Np-236-W, Pu-236-W,Y, Pu-238-W,Y, Pu-239-Y, Pu-240-Y, Pu-242-Y, Pu-244-W,Y, Cm-243-W, Cm-244-W, Cf-248-W, Cf-249-Y, Cf-250-W,Y, Cf-251-Y, Cf-252-W,Y, and Cf-254-W,Y are not present~~			--	7E-2	3E-11	--	--	--

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
If, in addition, it is known that 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, Pu-241-W, Cm-240-W, Cm-242-W, Cf-248-Y, Es-254-W, Fm-257-W, and Md-258-W are not present			--	7E-1	3E-10	--	--	--
If, in addition, it is known that Si-32-Y, Ti-44-Y, Fe-60-D, Sr-90-Y, Zr-93-D, Cd-113m-D, Cd-113-D, In-115-D,W, La-138-D, Lu-176-W, Hf-178m-D,W, Hf-182-D,W, Bi-210m-D, Ra-224-W, Ra-228-W, Ac-226-D,W,Y, Pa-230-W,Y, U-233-D,W, U-234-D,W, U-235-D,W, U-236-D,W, U-238-D,W, Pu-241-Y, Bk-249-W, Cf-253-W,Y, and Es-253-W are not present			--	7E+0	3E-9	--	--	--
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

3. If a mixture of radionuclides consists of uranium and its daughters in ore dust (10 µm AMAD particle distribution assumed) prior to chemical separation of the uranium from the ore, the following values may be used for the DAC of the mixture: 6E-11 µCi of gross alpha activity from uranium-238, uranium-234, thorium-230, and radium-226 per milliliter of air; 3E-11 µCi of natural uranium per milliliter of air; or 45 micrograms of natural uranium per cubic meter of air.

4. 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 B 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 DACs are DAC_A, DAC_B, and DAC_C, respectively, then the concentrations shall be limited so that the following relationship exists:

$$\frac{C_A}{DAC_A} + \frac{C_B}{DAC} SUBB + \frac{C_C}{DAC_C} \leq 1$$

PART D

APPENDIX C

QUANTITIES[a] OF LICENSED OR REGISTERED MATERIAL REQUIRING LABELING
(In Atomic Number Order)

Radionuclide	Quantity (µCi)[b]	Radionuclide	Quantity (µCi)[b]
Hydrogen-3	1,000	Scandium-47	100
Beryllium-7	1,000	Scandium-48	100
Beryllium-10	1	Scandium-49	1,000
Carbon-11	1,000	Titanium-44	1
Carbon-14	1,000	Titanium-45	1,000
Fluorine-18	1,000	Vanadium-47	1,000
Sodium-22	10	Vanadium-48	100
Sodium-24	100	Vanadium-49	1,000
Magnesium-28	100	Chromium-48	1,000
Aluminum-26	10	Chromium-49	1,000
Silicon-31	1,000	Chromium-51	1,000
Silicon-32	1	Manganese-51	1,000
Phosphorus-32	10	Manganese-52m	1,000
Phosphorus-33	100	Manganese-52	100
Sulfur-35	100	Manganese-53	1,000
Chlorine-36	10	Manganese-54	100
Chlorine-38	1,000	Manganese-56	1,000
Chlorine-39	1,000	Iron-52	100
Argon-39	1,000	Iron-55	100
Argon-41	1,000	Iron-59	10
Potassium-40	100	Iron-60	1
Potassium-42	1,000	Cobalt-55	100
Potassium-43	1,000	Cobalt-56	10
Potassium-44	1,000	Cobalt-57	100
Potassium-45	1,000	Cobalt-58m	1,000
Calcium-41	100	Cobalt-58	100
Calcium-45	100	Cobalt-60m	1,000
Calcium-47	100	Cobalt-60	1
Scandium-43	1,000	Cobalt-61	1,000
Scandium-44m	100	Cobalt-62m	1,000
Scandium-44	100	Nickel-56	100
Scandium-46	10	Nickel-57	100

a See explanation at the end of this listing.
b To convert µCi to kBq, multiply the µCi value by 37.

QUANTITIES[a] OF LICENSED OR REGISTERED MATERIAL REQUIRING LABELING
(In Atomic Number Order)

(Continued)

Radionuclide	Quantity (µCi)[b]	Radionuclide	Quantity (µCi)[b]
Nickel-59	100	Arsenic-74	100
Nickel-63	100	Arsenic-76	100
Nickel-65	1,000	Arsenic-77	100
Nickel-66	10	Arsenic-78	1,000
Copper-60	1,000	Selenium-70	1,000
Copper-61	1,000	Selenium-73m	1,000
Copper-64	1,000	Selenium-73	100
Copper-67	1,000	Selenium-75	100
Zinc-62	100	Selenium-79	100
Zinc-63	1,000	Selenium-81m	1,000
Zinc-65	10	Selenium-81	1,000
Zinc-69m	100	Selenium-83	1,000
Zinc-69	1,000	Bromine-74m	1,000
Zinc-71m	1,000	Bromine-74	1,000
Zinc-72	100	Bromine-75	1,000
Gallium-65	1,000	Bromine-76	100
Gallium-66	100	Bromine-77	1,000
Gallium-67	1,000	Bromine-80m	1,000
Gallium-68	1,000	Bromine-80	1,000
Gallium-70	1,000	Bromine-82	100
Gallium-72	100	Bromine-83	1,000
Gallium-73	1,000	Bromine-84	1,000
Germanium-66	1,000	Krypton-74	1,000
Germanium-67	1,000	Krypton-76	1,000
Germanium-68	10	Krypton-77	1,000
Germanium-69	1,000	Krypton-79	1,000
Germanium-71	1,000	Krypton-81	1,000
Germanium-75	1,000	Krypton-83m	1,000
Germanium-77	1,000	Krypton-85m	1,000
Germanium-78	1,000	Krypton-85	1,000
Arsenic-69	1,000	Krypton-87	1,000
Arsenic-70	1,000	Krypton-88	1,000
Arsenic-71	100	Rubidium-79	1,000
Arsenic-72	100	Rubidium-81m	1,000
Arsenic-73	100	Rubidium-81	1,000

a See explanation at the end of this listing.
b To convert µCi to kBq, multiply the µCi value by 37.

QUANTITIES[a] OF LICENSED OR REGISTERED MATERIAL REQUIRING LABELING

(In Atomic Number Order)

(Continued)

Radionuclide	Quantity (µCi)[b]	Radionuclide	Quantity (µCi)[b]
Rubidium-82m	1,000	Niobium-88	1,000
Rubidium-83	100	Niobium-89m (66 min)	1,000
Rubidium-84	100	Niobium-89 (122 min)	1,000
Rubidium-86	100	Niobium-90	100
Rubidium-87	100	Niobium-93m	10
Rubidium-88	1,000	Niobium-94	1
Rubidium-89	1,000	Niobium-95m	100
Strontium-80	100	Niobium-95	100
Strontium-81	1,000	Niobium-96	100
Strontium-83	100	Niobium-97	1,000
Strontium-85m	1,000	Niobium-98	1,000
Strontium-85	100	Molybdenum-90	100
Strontium-87m	1,000	Molybdenum-93m	100
Strontium-89	10	Molybdenum-93	10
Strontium-90	0.1	Molybdenum-99	100
Strontium-91	100	Molybdenum-101	1,000
Strontium-92	100	Technetium-93m	1,000
Yttrium-86m	1,000	Technetium-93	1,000
Yttrium-86	100	Technetium-94m	1,000
Yttrium-87	100	Technetium-94	1,000
Yttrium-88	10	Technetium-96m	1,000
Yttrium-90m	1,000	Technetium-96	100
Yttrium-90	10	Technetium-97m	100
Yttrium-91m	1,000	Technetium-97	1,000
Yttrium-91	10	Technetium-98	10
Yttrium-92	100	Technetium-99m	1,000
Yttrium-93	100	Technetium-99	100
Yttrium-94	1,000	Technetium-101	1,000
Yttrium-95	1,000	Technetium-104	1,000
Zirconium-86	100	Ruthenium-94	1,000
Zirconium-88	10	Ruthenium-97	1,000
Zirconium-89	100	Ruthenium-103	100
Zirconium-93	1	Ruthenium-105	1,000
Zirconium-95	10	Ruthenium-106	1
Zirconium-97	100	Rhodium-99m	1,000

a See explanation at the end of this listing.
b To convert µCi to kBq, multiply the µCi value by 37.

QUANTITIES[a] OF LICENSED OR REGISTERED MATERIAL REQUIRING LABELING
(In Atomic Number Order)
(Continued)

Radionuclide	Quantity (µCi)[b]	Radionuclide	Quantity (µCi)[b]
Rhodium-99	100	Cadmium-117	1,000
Rhodium-100	100	Indium-109	1,000
Rhodium-101m	1,000	Indium-110 (69.1 min)	1,000
Rhodium-101	10	Indium-11O (4.9 h)	1,000
Rhodium-102m	10	Indium-111	100
Rhodium-102	10	Indium-112	1,000
Rhodium-103m	1,000	Indium-113m	1,000
Rhodium-105	100	Indium-114m	10
Rhodium-106m	1,000	Indium-115m	1,000
Rhodium-107	1,000	Indium-115	100
Palladium-100	100	Indium-116m	1,000
Palladium-101	1,000	Indium-117m	1,000
Palladium-103	100	Indium-117	1,000
Palladium-107	10	Indium-119m	1,000
Palladium-109	100	Tin-110	100
Silver-102	1,000	Tin-111	1,000
Silver-103	1,000	Tin-113	100
Silver-104m	1,000	Tin-117m	100
Silver-104	1,000	Tin-119m	100
Silver-105	100	Tin-121m	100
Silver-106m	100	Tin-121	1,000
Silver-106	1,000	Tin-123m	1,000
Silver-108m	1	Tin-123	10
Silver-11Om	10	Tin-125	10
Silver-111	100	Tin-126	10
Silver-112	100	Tin-127	1,000
Silver-115	1,000	Tin-128	1,000
Cadmium-104	1,000	Antimony-115	1,000
Cadmium-107	1,000	Antimony-116m	1,000
Cadmium-109	1	Antimony-116	1,000
Cadmium-113m	0.1	Antimony-117	1,000
Cadmium-113	100	Antimony-118m	1,000
Cadmium-115m	10	Antimony-119	1,000
Cadmium-115	100	Antimony-120 (16 min)	1,000
Cadmium-117m	1,000	Antimony-120 (5.76 d)	100

a See explanation at the end of this listing.
b To convert µCi to kBq, multiply the µCi value by 37.

QUANTITIES[a] OF LICENSED OR REGISTERED MATERIAL REQUIRING LABELING

(In Atomic Number Order)

(Continued)

Radionuclide	Quantity (µCi)[b]	Radionuclide	Quantity (µCi)[b]
Antimony-122	100	Iodine-128	1,000
Antimony-124m	1,000	Iodine-129	1
Antimony-124	10	Iodine-130	10
Antimony-125	100	Iodine-131	1
Antimony-126m	1,000	Iodine-132m	100
Antimony-126	100	Iodine-132	100
Antimony-127	100	Iodine-133	10
Antimony-128 (10.4 min)	1,000	Iodine-134	1,000
Antimony-128 (9.O1 h)	100	Iodine-135	100
Antimony-129	100	Xenon-120	1,000
Antimony-130	1,000	Xenon-121	1,000
Antimony-131	1,000	Xenon-122	1,000
Tellurium-116	1,000	Xenon-123	1,000
Tellurium-121m	10	Xenon-125	1,000
Tellurium-121	100	Xenon-127	1,000
Tellurium-123m	10	Xenon-129m	1,000
Tellurium-123	100	Xenon-131m	1,000
Tellurium-125m	10	Xenon-133m	1,000
Tellurium-127m	10	Xenon-133	1,000
Tellurium-127	1,000	Xenon-135m	1,000
Tellurium-129m	10	Xenon-135	1,000
Tellurium-129	1,000	Xenon-138	1,000
Tellurium-131m	10	Cesium-125	1,000
Tellurium-131	100	Cesium-127	1,000
Tellurium-132	10	Cesium-129	1,000
Tellurium-133m	100	Cesium-130	1,000
Tellurium-133	1,000	Cesium-131	1,000
Tellurium-134	1,000	Cesium-132	100
Iodine-120m	1,000	Cesium-134m	1,000
Iodine-120	100	Cesium-134	10
Iodine-121	1,000	Cesium-135m	1,000
Iodine-123	100	Cesium-135	100
Iodine-124	10	Cesium-136	10
Iodine-125	1	Cesium-137	10
Iodine-126	1	Cesium-138	1,000

a See explanation at the end of this listing.
b To convert µCi to kBq, multiply the µCi value by 37.

QUANTITIES[a] OF LICENSED OR REGISTERED MATERIAL REQUIRING LABELING

(In Atomic Number Order)

(Continued)

Radionuclide	Quantity (µCi)[b]	Radionuclide	Quantity (µCi)[b]
Barium-126	1,000	Praseodymium-144	1,000
Barium-128	100	Praseodymium-145	100
Barium-131m	1,000	Praseodymium-147	1,000
Barium-131	100	Neodymium-136	1,000
Barium-133m	100	Neodymium-138	100
Barium-133	100	Neodymium-139m	1,000
Barium-135m	100	Neodymium-139	1,000
Barium-139	1,000	Neodymium-141	1,000
Barium-140	100	Neodymium-147	100
Barium-141	1,000	Neodymium-149	1,000
Barium-142	1,000	Neodymium-151	1,000
Lanthanum-131	1,000	Promethium-141	1,000
Lanthanum-132	100	Promethium-143	100
Lanthanum-135	1,000	Promethium-144	10
Lanthanum-137	10	Promethium-145	10
Lanthanum-138	100	Promethium-146	1
Lanthanum-140	100	Promethium-147	10
Lanthanum-141	100	Promethium-148m	10
Lanthanum-142	1,000	Promethium-148	10
Lanthanum-143	1,000	Promethium-149	100
Cerium-134	100	Promethium-150	1,000
Cerium-135	100	Promethium-151	100
Cerium-137m	100	Samarium-141m	1,000
Cerium-137	1,000	Samarium-141	1,000
Cerium-139	100	Samarium-142	1,000
Cerium-141	100	Samarium-145	100
Cerium-143	100	Samarium-146	1
Cerium-144	1	Samarium-147	100
Praseodymium-136	1,000	Samarium-151	10
Praseodymium-137	1,000	Samarium-153	100
Praseodymium-138m	1,000	Samarium-155	1,000
Praseodymium-139	1,000	Samarium-156	1,000
Praseodymium-142m	1,000	Europium-145	100
Praseodymium-142	100	Europium-146	100
Praseodymium-143	100	Europium-147	100

a See explanation at the end of this listing.

b To convert µCi to kBq, multiply the µCi value by 37.

QUANTITIES[a] OF LICENSED OR REGISTERED MATERIAL REQUIRING LABELING

(In Atomic Number Order)

(Continued)

Radionuclide	Quantity (µCi)[b]	Radionuclide	Quantity (µCi)[b]
Europium-148	10	Dysprosium-157	1,000
Europium-149	100	Dysprosium-159	100
Europium-150 (12.62 h)	100	Dysprosium-165	1,000
Europium-150 (34.2 y)	1	Dysprosium-166	100
Europium-152m	100	Holmium-155	1,000
Europium-152	1	Holmium-157	1,000
Europium-154	1	Holmium-159	1,000
Europium-155	10	Holmium-161	1,000
Europium-156	100	Holmium-162m	1,000
Europium-157	100	Holmium-162	1,000
Europium-158	1,000	Holmium-164m	1,000
Gadolinium-145	1,000	Holmium-164	1,000
Gadolinium-146	10	Holmium-166m	1
Gadolinium-147	100	Holmium-166	100
Gadolinium-148	0.001	Holmium-167	1,000
Gadolinium-149	100	Erbium-161	1,000
Gadolinium-151	10	Erbium-165	1,000
Gadolinium-152	100	Erbium-169	100
Gadolinium-153	10	Erbium-171	100
Gadolinium-159	100	Erbium-172	100
Terbium-147	1,000	Thulium-162	1,000
Terbium-149	100	Thulium-166	100
Terbium-150	1,000	Thulium-167	100
Terbium-151	100	Thulium-170	10
Terbium-153	1,000	Thulium-171	10
Terbium-154	100	Thulium-172	100
Terbium-155	1,000	Thulium-173	100
Terbium-156m (5.O h)	1,000	Thulium-175	1,000
Terbium-156m (24.4 h)	1,000	Ytterbium-162	1,000
Terbium-156	100	Ytterbium-166	100
Terbium-157	10	Ytterbium-167	1,000
Terbium-158	1	Ytterbium-169	100
Terbium-160	10	Ytterbium-175	100
Terbium-161	100	Ytterbium-177	1,000
Dysprosium-155	1,000	Ytterbium-178	1,000

a See explanation at the end of this listing.

b To convert µCi to kBq, multiply the µCi value by 37.

QUANTITIES[a] OF LICENSED OR REGISTERED MATERIAL REQUIRING LABELING

(In Atomic Number Order)

(Continued)

Radionuclide	Quantity (µCi)[b]	Radionuclide	Quantity (µCi)[b]
Lutetium-169	100	Tantalum-180m	1,000
Lutetium-170	100	Tantalum-180	100
Lutetium-171	100	Tantalum-182m	1,000
Lutetium-172	100	Tantalum-182	10
Lutetium-173	10	Tantalum-183	100
Lutetium-174m	10	Tantalum-184	100
Lutetium-174	10	Tantalum-185	1,000
Lutetium-176m	1,000	Tantalum-186	1,000
Lutetium-176	100	Tungsten-176	1,000
Lutetium-177m	10	Tungsten-177	1,000
Lutetium-177	100	Tungsten-178	1,000
Lutetium-178m	1,000	Tungsten-179	1,000
Lutetium-178	1,000	Tungsten-181	1,000
Lutetium-179	1,000	Tungsten-185	100
Hafnium-170	100	Tungsten-187	100
Hafnium-172	1	Tungsten-188	10
Hafnium-173	1,000	Rhenium-177	1,000
Hafnium-175	100	Rhenium-178	1,000
Hafnium-177m	1,000	Rhenium-181	1,000
Hafnium-178m	0.1	Rhenium-182 (12.7 h)	1,000
Hafnium-179m	10	Rhenium-182 (64.O h)	100
Hafnium-180m	1,000	Rhenium-184m	10
Hafnium-181	10	Rhenium-184	100
Hafnium-182m	1,000	Rhenium-186m	10
Hafnium-182	0.1	Rhenium-186	100
Hafnium-183	1,000	Rhenium-187	1,000
Hafnium-184	100	Rhenium-188m	1,000
Tantalum-172	1,000	Rhenium-188	100
Tantalum-173	1,000	Rhenium-189	100
Tantalum-174	1,000	Osmium-180	1,000
Tantalum-175	1,000	Osmium-181	1,000
Tantalum-176	100	Osmium-182	100
Tantalum-177	1,000	Osmium-185	100
Tantalum-178	1,000	Osmium-189m	1,000
Tantalum-179	100	Osmium-191m	1,000

a See explanation at the end of this listing.

b To convert µCi to kBq, multiply the µCi value by 37.

QUANTITIES[a] OF LICENSED OR REGISTERED MATERIAL REQUIRING LABELING

(In Atomic Number Order)

(Continued)

Radionuclide	Quantity (µCi)[b]	Radionuclide	Quantity (µCi)[b]
Osmium-191	100	Gold-200m	100
Osmium-193	100	Gold-200	1,000
Osmium-194	1	Gold-201	1,000
Iridium-182	1,000	Mercury-193m	100
Iridium-184	1,000	Mercury-193	1,000
Iridium-185	1,000	Mercury-194	1
Iridium-186	100	Mercury-195m	100
Iridium-187	1,000	Mercury-195	1,000
Iridium-188	100	Mercury-197m	100
Iridium-189	100	Mercury-197	1,000
Iridium-190m	1,000	Mercury-199m	1,000
Iridium-190	100	Mercury-203	100
Iridium-192m (1.4 min)	10	Thallium-194m	1,000
Iridium-192 (73.8 d)	1	Thallium-194	1,000
Iridium-194m	10	Thallium-195	1,000
Iridium-194	100	Thallium-197	1,000
Iridium-195m	1,000	Thallium-198m	1,000
Iridium-195	1,000	Thallium-198	1,000
Platinum-186	1,000	Thallium-199	1,000
Platinum-188	100	Thallium-201	1,000
Platinum-189	1,000	Thallium-200	1,000
Platinum-191	100	Thallium-202	100
Platinum-193m	100	Thallium-204	100
Platinum-193	1,000	Lead-195m	1,000
Platinum-195m	100	Lead-198	1,000
Platinum-197m	1,000	Lead-199	1,000
Platinum-197	100	Lead-200	100
Platinum-199	1,000	Lead-201	1,000
Platinum-200	100	Lead-202m	1,000
Gold-193	1,000	Lead-202	10
Gold-194	100	Lead-203	1,000
Gold-195	10	Lead-205	100
Gold-198m	100	Lead-209	1,000
Gold-198	100	Lead-210	0.01
Gold-199	100	Lead-211	100

a See explanation at the end of this listing.

b To convert µCi to kBq, multiply the µCi value by 37.

QUANTITIES[a] OF LICENSED OR REGISTERED MATERIAL REQUIRING LABELING

(In Atomic Number Order)

(Continued)

Radionuclide	Quantity (µCi)[b]	Radionuclide	Quantity (µCi)[b]
Lead-212	1	Thorium-226	10
Lead-214	100	Thorium-227	0.01
Bismuth-200	1,000	Thorium-228	0.001
Bismuth-201	1,000	Thorium-229	0.001
Bismuth-202	1,000	Thorium-230	0.001
Bismuth-203	100	Thorium-231	100
Bismuth-205	100	Thorium-232	100
Bismuth-206	100	Thorium-234	10
Bismuth-207	10	Thorium-natural	100
Bismuth-210m	0.1	Protactinium-227	10
Bismuth-210	1	Protactinium-228	1
Bismuth-212	10	Protactinium-230	0.1
Bismuth-213	10	Protactinium-231	0.001
Bismuth-214	100	Protactinium-232	1
Polonium-203	1,000	Protactinium-233	100
Polonium-205	1,000	Protactinium-234	100
Polonium-207	1,000	Uranium-230	0.01
Polonium-210	0.1	Uranium-231	100
Astatine-207	100	Uranium-232	0.001
Astatine-211	10	Uranium-233	0.001
Radon-220	1	Uranium-234	0.001
Radon-222	1	Uranium-235	0.001
Francium-222	100	Uranium-236	0.001
Francium-223	100	Uranium-237	100
Radium-223	0.1	Uranium-238	100
Radium-224	0.1	Uranium-239	1,000
Radium-225	0.1	Uranium-240	100
Radium-226	0.1	Uranium-natural	100
Radium-227	1,000	Neptunium-232	100
Radium-228	0.1	Neptunium-233	1,000
Actinium-224	1	Neptunium-234	100
Actinium-225	0.01	Neptunium-235	100
Actinium-226	0.1	Neptunium-236 (1.15E+5 y)	0.001
Actinium-227	0.001	Neptunium-236 (22.5 h)	1
Actinium-228	1	Neptunium-237	0.001

a See explanation at the end of this listing.
b To convert µCi to kBq, multiply the µCi value by 37.

QUANTITIES[a] OF LICENSED OR REGISTERED MATERIAL REQUIRING LABELING

(In Atomic Number Order)

(Continued)

Radionuclide	Quantity (µCi)[b]	Radionuclide	Quantity (µCi)[b]
Neptunium-238	10	Curium-246	0.001
Neptunium-239	100	Curium-247	0.001
Neptunium-240	1,000	Curium-248	0.001
Plutonium-234	10	Curium-249	1,000
Plutonium-235	1,000	Berkelium-245	100
Plutonium-236	0.001	Berkelium-246	100
Plutonium-237	100	Berkelium-247	0.001
Plutonium-238	0.001	Berkelium-249	0.1
Plutonium-239	0.001	Berkelium-250	10
Plutonium-240	0.001	Californium-244	100
Plutonium-241	0.01	Californium-246	1
Plutonium-242	0.001	Californium-248	0.01
Plutonium-243	1,000	Californium-249	0.001
Plutonium-244	0.001	Californium-250	0.001
Plutonium-245	100	Californium-251	0.001
Americium-237	1,000	Californium-252	0.001
Americium-238	100	Californium-253	0.1
Americium-239	1,000	Californium-254	0.001
Americium-240	100	Einsteinium-250	100
Americium-241	0.001	Einsteinium-251	100
Americium-242m	0.001	Einsteinium-253	0.1
Americium-242	10	Einsteinium-254m	1
Americium-243	0.001	Einsteinium-254	0.01
Americium-244m	100	Fermium-252	1
Americium-244	10	Fermium-253	1
Americium-245	1,000	Fermium-254	10
Americium-246m	1,000	Fermium-255	1
Americium-246	1,000	Fermium-257	0.01
Curium-238	100	Mendelevium-257	10
Curium-240	0.1	Mendelevium-258	0.01
Curium-241	1		
Curium-242	0.01		
Curium-243	0.001		
Curium-244	0.001		
Curium-245	0.001		

a See explanation at the end of this listing.
b To convert µCi to kBq, multiply the µCi value by 37.

QUANTITIES[a] OF LICENSED OR REGISTERED MATERIAL REQUIRING LABELING

(In Atomic Number Order)

(Continued)

Radionuclide	Quantity (µCi)[b]	Radionuclide	Quantity (µCi)[b]
Any alpha-emitting radionuclide not listed above or mixtures of alpha emitters of unknown composition	0.001	Any radionuclide other than alpha-emitting radionuclides not listed above, or mixtures of beta emitters of unknown composition	0.01

NOTE: For purposes of D.902e., D.905a., and D.1201a. where there is involved a combination of radionuclides in known amounts, the limit for the combination shall be derived as follows: determine, for each radionuclide in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific radionuclide when not in combination. The sum of such ratios for all radionuclides in the combination may not exceed "1" -- that is, unity.

[a/] *The quantities listed above were derived by taking 1/10th of the most restrictive ALI listed in Table I, Columns 1 and 2, of Appendix B to Part D, rounding to the nearest factor of 10, and constraining the values listed between 37 Bq and 37 MBq (0.001 and 1,000 µCi). Values of 3.7 MBq (100 µCi) have been assigned for radionuclides having a radioactive half-life in excess of E+9 years, except rhenium, 37 MBq (1,000 µCi), to take into account their low specific activity.*

[b/] *To convert µCi to kBq, multiply the µCi value by 37.*

PART D

APPENDIX D

REQUIREMENTS FOR TRANSFER OF LOW-LEVEL RADIOACTIVE WASTE FOR DISPOSAL AT LAND DISPOSAL FACILITIES AND MANIFESTS

Section I. – Manifest.

The shipment manifest shall contain the name, address, and telephone number of the person generating the waste. The manifest shall also include the name, address, and telephone number or the name and the Environmental Protection Agency hazardous waste identification number of the person transporting the waste to the land disposal facility. The manifest shall also indicate: a physical description of the waste, the volume, radionuclide identity and quantity, the total radioactivity, and the principal chemical form. The solidification agent shall be specified. Waste containing more than 0.1 percent chelating agents by weight shall be identified and the weight percentage of the chelating agent estimated. Wastes classified as Class A, Class B, or Class C in Section I of Appendix E shall be clearly identified as such in the manifest. The total quantity of the radionuclides hydrogen-3, carbon-14, technetium-99, and iodine-129 shall be shown. The manifest required by this paragraph may be shipping papers used to meet the Department of Transportation or the Environmental Protection Agency regulations or requirements of the receiver, provided all the required information is included. Copies of manifests required by this section may be legible carbon copies or legible photocopies.

Section II. – Certification.

The waste generator shall include in the shipment manifest a certification that the transported materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation and the Agency. An authorized representative of the waste generator shall sign and date the manifest.

Section III. – Control and Tracking.

(a) Any radioactive waste generator who transfers radioactive waste to a land disposal facility or a licensed waste collector shall comply with the requirements in (a)(1) through (8). Any radioactive waste generator who transfers waste to a licensed waste processor who treats or repackages waste shall comply with the requirements of (a)(4) through (8). A licensee shall:

(1) Prepare all wastes so that the waste is classified according to Section I of Appendix E and meets the waste characteristics requirements in Section II of Appendix E;

(2) Label each package of waste to identify whether it is Class A waste, Class B waste, or Class C waste, in accordance with Section I of Appendix E;

(3) Conduct a quality control program to ensure compliance with Section I and II of Appendix E; the program shall include management evaluation of audits;

(4) Prepare shipping manifests to meet the requirements of Section I and II;

(5) Forward a copy of the manifest to the intended recipient, at the time of shipment, or deliver to a collector at the time the waste is collected, obtaining acknowledgment of receipt in the form of a signed copy of the manifest or equivalent documentation from the collector;

(6) Include one copy of the manifest with the shipment;

(7) Retain a copy of the manifest and documentation of acknowledgment of receipt as the record of transfer of licensed material as required by C.40 of the regulations; and

(8) For any shipments or any portion of a shipment for which acknowledgment of receipt has not been received within the times set forth in this section, conduct an investigation in accordance with Section III.(e).

(b) Any waste collector licensee who handles only prepackaged waste shall:

(1) Acknowledge receipt of the waste from the generator within 1 week of receipt by returning a signed copy of the manifest or equivalent documentation;

(2) Prepare a new manifest to reflect consolidated shipments; the new manifest shall serve as a listing or index for the detailed generator manifests. Copies of the generator manifests shall be a part of the new manifest. The waste collector may prepare a new manifest without attaching the generator manifests, provided the new manifest contains for each package the information specified in Section I. The collector licensee shall certify that nothing has been done to the waste that would invalidate the generator's certification;

(3) Forward a copy of the new manifest to the land disposal facility operator at the time of shipment;

(4) Include the new manifest with the shipment to the disposal site;

(5) Retain a copy of the manifest and documentation of acknowledgement of receipt as the record of transfer of licensed material as required by C.40 of the regulations, and retain information from generator manifest until the license is terminated and disposition is authorized by the Agency; and

(6) For any shipments or any portion of a shipment for which acknowledgement of receipt is not received within the times set forth in this section, conduct an investigation in accordance with Section III.(e).

(c) Any licensed waste processor who treats or repackages wastes shall:

(1) Acknowledge receipt of the waste from the generator within 1 week of receipt by returning a signed copy of the manifest or equivalent documentation;

(2) Prepare a new manifest that meets the requirements of Section I and II. Preparation of the new manifest reflects that the processor is responsible for the waste;

(3) Prepare all wastes so that the waste is classified according to Section I of Appendix E and meets the waste characteristics requirements in Section II of Appendix E;

(4) Label each package of waste to identify whether it is Class A waste, Class B waste, or Class C waste, in accordance with Section I and III of Appendix E;

(5) Conduct a quality control program to ensure compliance with Section I and II of Appendix E. The program shall include management evaluation of audits;

(6) Forward a copy of the new manifest to the disposal site operator or waste collector at the time of shipment, or deliver to a collector at the time the waste is collected, obtaining acknowledgement of receipt in the form of a signed copy of the manifest or equivalent documentation by the collector;

(7) Include the new manifest with the shipment;

(8) Retain copies of original manifests and new manifests and documentation of acknowledgement of receipt as the record of transfer of licensed material required by C.40 of the regulations; and

(9) For any shipment or portion of a shipment for which acknowledgement is not received within the times set forth in this section, conduct an investigation in accordance with Section III.(e).

(d) The land disposal facility operator shall:

(1) Acknowledge receipt of the waste within 1 week of receipt by returning a signed copy of the manifest or equivalent documentation to the shipper. The shipper to be notified is the licensee who last possessed the waste and transferred the waste to the operator. The returned copy of the manifest or equivalent documentation shall indicate any discrepancies between materials listed on the manifest and materials received;

(2) Maintain copies of all completed manifests or equivalent documentation until the Agency authorizes their disposition; and

(3) Notify the shipper, that is, the generator, the collector, or processor, and the Agency when any shipment or portion of a shipment has not arrived within 60 days after the advance manifest was received.

(e) Any shipment or portion of a shipment for which acknowledgement is not received within the times set forth in this section shall:

(1) Be investigated by the shipper if the shipper has not received notification or receipt within 20 days after transfer; and

(2) Be traced and reported to whom. The investigation shall include tracing the shipment and filing a report with the Agency. Each licensee who conducts a trace investigation shall file a written report with the Agency within 2 weeks of completion of the investigation.

PART D

APPENDIX E

CLASSIFICATION AND CHARACTERISTICS OF LOW-LEVEL RADIOACTIVE WASTE

Section I. – Classification of Radioactive Waste for Land Disposal.

(a) Considerations. Determination of the classification of radioactive waste involves two considerations. First, consideration must be given to the concentration of long-lived radionuclides (and their shorter-lived precursors) whose potential hazard will persist long after such precautions as institutional controls, improved waste form, and deeper disposal have ceased to be effective. These precautions delay the time when long-lived radionuclides could cause exposures. In addition, the magnitude of the potential dose is limited by the concentration and availability of the radionuclide at the time of exposure. Second, consideration must be given to the concentration of shorter-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are effective.

(b) Classes of waste.

(1) Class A waste is waste that is usually segregated from other waste classes at the disposal site. The physical form and characteristics of Class A waste must meet the minimum requirements set forth in Section II.(a). If Class A waste also meets the stability requirements set forth in Section II.(b), it is not necessary to segregate the waste for disposal.

(2) Class B waste is waste that must meet more rigorous requirements on waste form to ensure stability after disposal. The physical form and characteristics of Class B waste must meet both the minimum and stability requirements set forth in Section II.

(3) Class C waste is waste that not only must meet more rigorous requirements on waste form to ensure stability but also requires additional measures at the disposal facility to protect against inadvertent intrusion. The physical form and characteristics of Class C waste must meet both the minimum and stability requirements set forth in Section II.

(c) Classification determined by long-lived radionuclides. If the radioactive waste contains only radionuclides listed in Table IV, classification shall be determined as follows:

(1) If the concentration does not exceed 0.1 times the value in Table IV, the waste is Class A.

(2) If the concentration exceeds 0.1 times the value in Table IV, but does not exceed the value in Table IV, the waste is Class C.

(3) If the concentration exceeds the value in Table IV, the waste is not generally acceptable for land disposal.

(4) For wastes containing mixtures of radionuclides listed in Table IV, the total concentration shall be determined by the sum of fractions rule described in Section I.(g).

TABLE IV

Radionuclide	Concentration Curie/Cubic Meter[a]	Concentration Nanocurie/Gram[b]
C-14	8	
C-14 in activated metal	80	
Ni-59 in activated metal	220	
Nb-94 in activated metal	0.2	
Tc-99	3	
I-129	0.08	
Alpha emitting transuranic radionuclides with half-life greater than five years		100
Pu-241		3,500
Cm-242		20,000
Ra-226		100

[a/] *To convert the Ci/m^3 values to gigabecquerel (GBq) per cubic meter, multiply the Ci/m^3 value by 37.*

[b/] *To convert the nCi/g values to becquerel (Bq) per gram, multiply the nCi/g value by 37.*

d) Classification determined by short-lived radionuclides. If the waste does not contain any of the radionuclides listed in Table IV, classification shall be determined based on the concentrations shown in Table V. However, as specified in Section I.(f), if radioactive waste does not contain any nuclides listed in either Table IV or V, it is Class A.

1) If the concentration does not exceed the value in Column 1, the waste is Class A.

2) If the concentration exceeds the value in Column 1 but does not exceed the value in Column 2, the waste is Class B.

3) If the concentration exceeds the value in Column 2 but does not exceed the value in Column 3, the waste is Class C.

4) If the concentration exceeds the value in Column 3, the waste is not generally acceptable for near-surface disposal.

5) For wastes containing mixtures of the radionuclides listed in Table V, the total concentration shall be determined by the sum of fractions rule described in Section I.(g).

TABLE V

Radionuclide	Concentration Curie/Cubic Meter[a/]		
	Column 1	Column 2	Column 3
Total of all radio-nuclides with less-than 5-year half-life	700	*	*
H-3	40	*	*
Co-60	700	*	*
Ni-63	3.5	70	700
Ni-63 in activated metal	35	700	7000
Sr-90	0.04	150	7000
Cs-137	1	44	4600

[a/] *AGENCY NOTE: To convert the Ci/m^3 value to gigabecquerel (GBq) per cubic meter, multiply the Ci/m^3 value by 37. There are no limits established for these radionuclides in Class B or C wastes. Practical considerations such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes shall be Class B unless the concentrations of other radionuclides in Table V determine the waste to be Class C independent of these radionuclides.*

(e) Classification determined by both long- and short-lived radionuclides. If the radioactive waste contains a mixture of radionuclides, some of which are listed in Table IV and some of which are listed in Table V, classification shall be determined as follows:

(1) If the concentration of a radionuclide listed in Table IV is less than 0.1 times the value listed in Table IV, the class shall be that determined by the concentration of radionuclides listed in Table V.

(2) If the concentration of a radionuclide listed in Table IV exceeds 0.1 times the value listed in Table IV, but does not exceed the value in Table IV, the waste shall be Class C, provided the concentration of radionuclides listed in Table V does not exceed the value shown in Column 3 of Table V.

(f) Classification of wastes with radionuclides other than those listed in Tables IV and V. If the waste does not contain any radionuclides listed in either Table IV or V, it is Class A.

(g) The sum of the fractions rule for mixtures of radionuclides. For determining classification for waste that contains a mixture of radionuclides, it is necessary to determine the sum of fractions by dividing each radionuclide's concentration by the appropriate limit and adding the resulting values. The appropriate limits must all be taken from the same column of the same table. The sum of the fractions for the column must be less than 1.0 if the waste class is to be determined by that column. Example: A waste contains Sr-90 in a concentration of 1.85 TBq/m^3 (50 Ci/m^3) and Cs-137 in a concentration of 814 GBq/m^3 (22 Ci/m^3). Since the concentrations both exceed the values in Column 1, Table V, they must be compared to Column 2 values. For Sr-90

fraction, 50/150 = 0.33., for Cs-137 fraction, 22/44 = 0.5; the sum of the fractions = 0.83. Since the sum is less than 1.0, the waste is Class B.

(h) Determination of concentrations in wastes. The concentration of a radionuclide may be determined by indirect methods such as use of scaling factors which relate the inferred concentration of one radionuclide to another that is measured, or radionuclide material accountability, if there is reasonable assurance that the indirect methods can be correlated with actual measurements. The concentration of a radionuclide may be averaged over the volume of the waste, or weight of the waste if the units are expressed as becquerel (nanocurie) per gram.

Section II. – Radioactive Waste Characteristics.

(a) The following are minimum requirements for all classes of waste and are intended to facilitate handling and provide protection of health and safety of personnel at the disposal site.

(1) Wastes shall be packaged in conformance with the conditions of the license issued to the site operator to which the waste will be shipped. Where the conditions of the site license are more restrictive than the provisions of Part D, the site license conditions shall govern.

(2) Wastes shall not be packaged for disposal in cardboard or fiberboard boxes.

(3) Liquid waste shall be packaged in sufficient absorbent material to absorb twice the volume of the liquid.

(4) Solid waste containing liquid shall contain as little free-standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1 percent of the volume.

(5) Waste shall not be readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures, or of explosive reaction with water.

(6) Waste shall not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste. This does not apply to radioactive gaseous waste packaged in accordance with Section II.(a)(8).

(7) Waste must not be pyrophoric. Pyrophoric materials contained in wastes shall be treated, prepared, and packaged to be nonflammable.[1]

8) Wastes in a gaseous form shall be packaged at an absolute pressure that does not exceed 1.5 atmospheres at 20°C. Total activity shall not exceed 3.7 TBq (100 Ci) per container.

9) Wastes containing hazardous, biological, pathogenic, or infectious material shall be treated to reduce to the maximum extent practicable the potential hazard from the non-radiological materials.

b) The following requirements are intended to provide stability of the waste. Stability is intended to ensure that the waste does not degrade and affect overall stability of the site through slumping,

1 See A.4 of the regulations for definition of pyrophoric material.

collapse, or other failure of the disposal unit and thereby lead to water infiltration. Stability is also a factor in limiting exposure to an inadvertent intruder, since it provides a recognizable and nondispersible waste.

1) Waste shall have structural stability. A structurally stable waste form will generally maintain its physical dimensions and its form, under the expected disposal conditions such as weight of overburden and compaction equipment, the presence of moisture, and microbial activity, and internal factors such as radiation effects and chemical changes. Structural stability can be provided by the waste form itself, processing the waste to a stable form, or placing the waste in a disposal container or structure that provides stability after disposal.

2) Notwithstanding the provisions in Section II.(a)(3) and (4), liquid wastes, or wastes containing liquid, shall be converted into a form that contains as little free-standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1 percent of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5 percent of the volume of the waste for waste processed to a stable form.

3) Void spaces within the waste and between the waste and its package shall be reduced to the extent practicable.

Section III. – Labeling.

Each package of waste shall be clearly labeled to identify whether it is Class A, Class B, or Class C waste, in accordance with Section I.

PART D

APPENDIX F

QUANTITIES FOR USE WITH DECOMMISSIONING[a]/

Material	Microcurie[b]/
Americium-241	0.01
Antimony-122	100
Antimony-124	10
Antimony-125	10
Arsenic-73	100
Arsenic-74	10
Arsenic-76	10
Arsenic-77	100
Barium-131	10
Barium-133	10
Barium-140	10
Bismuth-210	1
Bromine-82	10
Cadmium-109	10
Cadmium-115m	10
Cadmium-115	100
Calcium-45	10
Calcium-47	10
Carbon-14	100
Cerium-141	100
Cerium-143	100
Cerium-144	1
Cesium-131	1,000
Cesium-134m	100
Cesium-134	1
Cesium-135	10
Cesium-136	10
Cesium-137	10
Chlorine-36	10
Chlorine-38	10
Chromium-51	1,000
Cobalt-58m	10
Cobalt-58	10

a/ *This Appendix is retained for use by those Agreement States that need to adopt decommissioning regulations compatible with the Nuclear Regulatory Commission.*

b/ *To convert µCi to kBq, multiply the µCi value by 37.*

QUANTITIES FOR USE WITH DECOMMISSIONING[a] / *(Continued)*

Material	Microcurie[b] /
Cobalt-60	1
Copper-64	100
Dysprosium-165	10
Dysprosium-166	100
Erbium-169	100
Erbium-171	100
Europium-152 (9.2 h)	100
Europium-152 (13 yr)	1
Europium-154	1
Europium-155	10
Florine-18	1,000
Gadolinium-153	10
Gadolinium-159	100
Gallium-72	10
Germanium-71	0
Hafnium-181	10
Holmium-166	100
Hydrogen-3	1,000
Indium-113m	100
Indium-114m	10
Indium-115m	100
Indium-115	10
Iodine-125	1
Iodine-126	1
Iodine-129	0.1
Iodine-131	1
Iodine-132	10
Iodine-133	1
Iodine-134	10
Iodine-135	10
Iridium-192	10
Iridium-194	100
Iron-55	100
Iron-59	10
Krypton-85	100
Krypton-87	10
Lanthanum-140	10

a/ *This Appendix is retained for use by those Agreement States that need to adopt decommissioning regulations compatible with the Nuclear Regulatory Commission.*

b/ *To convert µCi to kBq, multiply the µCi value by 37.*

QUANTITIES FOR USE WITH DECOMMISSIONING[a] *(Continued)*

Material	Microcurie[b]
Lutetium-177	100
Manganese-52	10
Manganese-54	10
Manganese-56	10
Mercury-197m	100
Mercury-197	100
Mercury-203	10
Molybdenum-99	100
Neodymium-147	100
Neodymium-149	100
Nickel-59	100
Nickel-63	10
Nickel-65	100
Niobium-93m	10
Niobium-95	10
Niobium-97	10
Osmium-185	10
Osmium-191m	100
Osmium-191	100
Osmium-193	100
Palladium-103	100
Palladium-109	100
Phosphorus-32	10
Platinum-191	100
Platinum-193m	100
Platinum-193	100
Platinum-197m	100
Platinum-197	100
Plutonium-239	0.01
Polonium-210	0.1
Potassium-42	10
Praseodymium-142	100
Praseodymium-143	100
Promethium-147	10
Promethium-149	10
Radium-226	0.01
Rhenium-186	100

[a] *This Appendix is retained for use by those Agreement States that need to adopt decommissioning regulations compatible with the Nuclear Regulatory Commission.*

[b] *To convert µCi to kBq, multiply the µCi value by 37.*

QUANTITIES FOR USE WITH DECOMMISSIONING[a] *(Continued)*

Material	Microcurie[b]
Rhenium-188	100
Rhodium-103m	100
Rhodium-105	100
Rubidium-86	10
Rubidium-87	10
Ruthenium-97	100
Ruthenium-103	10
Ruthenium-105	10
Ruthenium-106	1
Samarium-151	10
Samarium-153	100
Scandium-46	10
Scandium-47	100
Scandium-48	10
Selenium-75	10
Silicon-31	100
Silver-105	10
Silver-11Om	1
Silver-111	100
Sodium-22	1
Sodium-24	10
Strontium-85	10
Strontium-89	1
Strontium-90	0.1
Strontium-91	10
Strontium-92	10
Sulfur -35	100
Tantalum-182	10
Technetium-96	10
Technetium-97m	100
Technetium-97	100
Technetium-99m	100
Technetium-99	10
Tellurium-125m	10
Tellurium-127m	10
Tellurium-127	100
Tellurium-129m	10

a/ *This Appendix is retained for use by those Agreement States that need to adopt decommissioning regulations compatible with the Nuclear Regulatory Commission.*

b/ *To convert µCi to kBq, multiply the µCi value by 37.*

QUANTITIES FOR USE WITH DECOMMISSIONING[a] *(Continued)*

Material	Microcurie[b]
Tellurium-129	100
Tellurium-131m	10
Tellurium-132	10
Terbium-160	10
Thallium-200	100
Thallium-201	100
Thallium-202	100
Thallium-204	10
Thorium (natural)[c]	100
Thulium-170	10
Thulium-171	10
Tin-113	10
Tin-125	10
Tungsten-181	10
Tungsten-185	10
Tungsten-187	100
Uranium (natural)[d]	100
Uranium-233	0.01
Uranium-234	0.01
Uranium-235	0.01
Vanadium-48	10
Xenon-131m	1,000
Xenon-133	100
Xenon-135	100
Ytterbium-175	100
Yttrium-90	10
Yttrium-91	10
Yttrium-92	100
Yttrium-93	100
Zinc-65	10
Zinc-69m	100
Zinc-69	1,000
Zirconium-93	10
Zirconium-95	10
Zirconium-97	10

a/ *This Appendix is retained for use by those Agreement States that need to adopt decommissioning regulations compatible with the Nuclear Regulatory Commission.*

b/ *To convert µCi to kBq, multiply the µCi value by 37.*

c/ *Based on alpha disintegration rate of Th-232, Th-230 and their daughter products.*

d/ *Based on alpha disintegration rate of U-238, U-234, and U-235.*

QUANTITIES FOR USE WITH DECOMMISSIONING[a] / *(Continued)*

Material	Microcurie[b] /
Any alpha emitting radionuclide not listed above or mixtures of alpha emitters of unknown composition	0.01
Any radionuclide other than alpha emitting radionuclides, not listed above or mixtures of beta emitters of unknown composition	0.1

NOTE: Where there is involved a combination of isotopes in known amounts, the limit for the combination should be derived as follows: Determine, for each isotope in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific isotope when not in combination. The sum of such ratios for all the isotopes in the combination may not exceed "1" -- that is, unity.

a/ *This Appendix is retained for use by those Agreement States that need to adopt decommissioning regulations compatible with the Nuclear Regulatory Commission.*

b/ *To convert µCi to kBq, multiply the µCi value by 37.*

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PART D

APPENDIX A

ASSIGNED PROTECTION FACTORS (APF) FOR RESPIRATORS[a]

	Operating Mode	Assigned Protection Factors	
I. Air purifying respirators (Particulate[b] only)[c]			
Filtering faceplate disposable[d] ----------	Negative Pressure----------	([d])	
Facepiece, half[e]----------	Negative Pressure----------	10	
Facepiece, full----------	Negative Pressure----------	100	
Facepiece, half----------	Powered air-purifying respirators-	50	
Facepiece, full----------	Powered air-purifying respirators-	1000	
Helmet/hood----------	Powered air-purifying respirators-	1000	
Facepiece, loosefitting----------	Powered air-purifying respirators-	25	
II. Atmosphere supplying respirators (Particulate, gases, and vapors[f])			
1: Air-line respirator:			
Facepiece, half----------	Demand----------	10	
Facepiece, half[e]----------	Continuous Flow----------	50	
Facepiece, half----------	Pressure Demand----------	50	
Facepiece, full----------	Demand----------	100	
Facepiece, full----------	Continuous Flow----------	1000	
Facepiece, full----------	Pressure Demand----------	1000	
Helmet/hood----------	Continuous Flow----------	1000	
Facepiece, loosefitting----------	Continuous Flow----------	25	
Suit----------	Continuous Flow----------	([g])	
2: Self-contained breathing apparatus (SCBA):			
Facepiece, full----------	Demand----------	[h]100	
Facepiece, full----------	Pressure Demand----------	[i]10,000	
Facepiece, full----------	Demand, recirculating----------	[h]100	
Facepiece, full----------	Positive Pressure Recirculating---	[i]10,000	
III. Combination respirators: Any combination of air-purifying and atmosphere-supplying respirators	Assigned protection factor for type and mode of operations as listed above		

See the following pages for footnotes.

FOOTNOTES

a. These assigned protection factors apply only in respiratory protection program that meets the requirements of this Part. They are applicable only to airborne radiological hazards and may not be appropriate to circumstances when chemical or other respiratory hazards exist instead of, or in addition to, radioactive hazards. Selection and use of respirators for such circumstances must also comply with Department of Labor regulations. Radioactive contaminants for which the concentration values in Table 1, column 3 of Appendix B to Part D are based on internal dose due to inhalation may, in addition, present external exposure hazards at higher concentrations. Under these circumstances, limitations on occupancy may have to be governed by external dose limits.

b. Air purifying respirators with APF <100 must be equipped with particulate filters that are at least 95 percent efficient. Air purifying respirators with APF=100 must be equipped with particulate filters that are at least 99 percent efficient. Air purifying respirators with APF >100 must be equipped with particulate filters that area t least 99.97 percent efficient.

c. The licensee may apply to the Agency for the use of an APF greater than 1 for sorbent cartridges as protection against airborne radioactive gases and vapors (e.g., radioiodine).

d. Licensees may permit individuals to use this type of respirator who have not been medically screened or fit tested on the device provided that no credit be taken for their use in estimating intake or dose. It is also recognized that it is difficult to perform an effective positive or negative pressure pre-use user seal check on this type of device. All other respiratory protection program requirements listed in D.24 apply. An assigned protection factor has not been assigned for these devices. However, an APF equal to 10 may be used if the licensee can demonstrate a fit factor of at least 100 by use of a validated or evaluated, qualitative or quantitative fit test.

e. Under-chin type only. No distinction is made in this Appendix between elastomeric half-masks with replaceable cartridges and those designed with the filter medium as an integral part of the facepiece (e.g., disposable or reusable disposable). Both types are acceptable so long as the seal area of the latter contains some substantial type of seal enhancing material such as rubber or plastic, the two or more suspension straps are adjustable, the filter medium is at least 95 percent efficient and all other requirements of this Part are met.

f. The assigned protection factors for gases and vapors are not applicable to radioactive contaminants that present an absorption or submersion hazard. For tritium oxide vapor, approximately one-third of the intake occurs by absorption through the skin so that an overall protection factor of 3 is appropriate when atmosphere-supplying respirators are used to protect against tritium oxide. Exposure to radioactive noble gases is not considered a significant respiratory hazard, and protective actions for these contaminants should be based on external (submersion) dose considerations.

g. No NIOSH approval schedule is currently available for atmospheric supplying units. This

equipment may be used in an acceptable respiratory protection program as long as all the other minimum program requirements, with the exception of fit testing, are met (i.e., D.24).

h. The licensee should implement institutional controls to assure that these devices are not used in areas immediately dangerous to life or health (IDLH).

i. This type of respirator may be used as an emergency device in unknown concentrations for protection against inhalation hazards. External radiation hazards and other limitations to permitted exposure such as skin absorption shall be taken into account in these circumstances. This device may not be used by any individual who experiences perceptible outward leakage of breathing gas while wearing the device.

PART D

APPENDIX B

ANNUAL LIMITS ON INTAKE (ALI) AND DERIVED AIR CONCENTRATIONS (DAC) OF RADIONUCLIDES FOR OCCUPATIONAL EXPOSURE; EFFLUENT CONCENTRATIONS; CONCENTRATIONS FOR RELEASE TO SANITARY SEWERAGE

Introduction

For each radionuclide, Table I indicates the chemical form which is to be used for selecting the appropriate ALI or DAC value. The ALIs and DACs for inhalation are given for an aerosol with an activity median aerodynamic diameter (AMAD) of 1 μm (micron), and for three classes (D,W,Y) of radioactive material, which refer to their retention (approximately days, weeks or years) in the pulmonary region of the lung. This classification applies to a range of clearance half-times for D if less than 10 days, for W from 10 to 100 days, and for Y greater than 100 days. The class (D, W, or Y) given in the column headed "Class" applies only to the inhalation ALIs and DACs given in Table I, column 2 and 3. Table II provides concentration limits for airborne and liquid effluents released to the general environment. Table III provides concentration limits for discharges to sanitary sewerage.

Note: The values in Tables I, II, and III are presented in the computer "E" notation. In this notation a value of 6E-02 represents a value of 6×10^{-2} or 0.06, 6E+2 represents 6×10^{2} or 600, and 6E+0 represents 6×10^{0} or 6.

Table I "Occupational Values"

Note that the columns in Table I of this appendix captioned "Oral Ingestion ALI," "Inhalation ALI," and "DAC," are applicable to occupational exposure to radioactive material.

The ALIs in this appendix are the annual intakes of given radionuclide by "reference man" which would result in either (1) a committed effective dose equivalent of 0.05 sievert (5 rem), stochastic ALI, or (2) a committed dose equivalent of 0.5 sievert (50 rem) to an organ or tissue, non-stochastic ALI. The stochastic ALIs were derived to result in a risk, due to irradiation of organs and tissues, comparable to the risk associated with deep dose equivalent to the whole body of 0.05 sievert (5 rem). The derivation includes multiplying the committed dose equivalent to an organ or tissue by a weighting factor, w_T. This weighting factor is the proportion of the risk of stochastic effects resulting from irradiation of the organ or tissue, T, to the total risk of stochastic effects when the whole body is irradiated uniformly. The values of w_T are listed under the definition of weighting factor in D.3. The non-stochastic ALIs were derived to avoid non-stochastic effects, such as prompt damage to tissue or reduction in organ function.

A value of $w_T = 0.06$ is applicable to each of the 5 organs or tissues in the "remainder" category receiving the highest dose equivalents, and the dose equivalents of all other remaining tissues may be disregarded. The following portions of the GI tract – stomach, small intestine, upper large intestine, and lower large intestine – are to be treated as 4 separate organs.

Note that the dose equivalents for an extremity, skin and lens of the eye are not considered in computing the committed effective dose equivalent, but are subject to limits that must be met separately.

When an ALI is defined by the stochastic dose limit, this value alone is given. When an ALI is determined by the non-stochastic dose limit to an organ, the organ or tissue to which the limit applies is shown, and the ALI for the stochastic limit is shown in parentheses. Abbreviated organ or tissue designations are used:

LLI wall = lower large intestine wall;
St wall = stomach wall;
Blad wall = bladder wall; and
Bone surf = bone surface.

The use of the ALIs listed first, the more limiting of the stochastic and non-stochastic ALIs, will ensure that non-stochastic effects are avoided and that the risk of stochastic effects is limited to an acceptably low value. If, in a particular situation involving a radionuclide for which the non-stochastic ALI is limiting, use of that non-stochastic ALI is considered unduly conservative, the licensee may use the stochastic ALI to determine the committed effective dose equivalent. However, the licensee shall also ensure that the 0.5 sievert (50 rem) dose equivalent limit for any organ or tissue is not exceeded by the sum of the external deep dose equivalent plus the internal committed dose equivalent to that organ, not the effective dose. For the case where there is no external dose contribution, this would be demonstrated if the sum of the fractions of the nonstochastic ALIs (ALI_{ns}) that contribute to the committed dose equivalent to the organ receiving the highest dose does not exceed unity, that is, ? (intake (in µCi) of each radionuclide/ALI_{ns}) <1.0. If there is an external deep dose equivalent contribution of H_d, then this sum must be less than 1 - (H_d/50), instead of < 1.0.

Note that the dose equivalents for an extremity, skin, and lens of the eye are not considered in computing the committed effective dose equivalent, but are subject to limits that must be met separately.

The derived air concentration (DAC) values are derived limits intended to control chronic occupational exposures. The relationship between the DAC and the ALI is given by:

$$DAC = ALI(\text{in } \mu Ci)/(2000 \text{ hours per working year} \times 60 \text{ minutes/hour} \times 2 \times 10^4 \text{ ml per minute}) = [ALI/2.4 \times 10^9] \ \mu Ci/ml,$$

where 2×10^4 ml is the volume of air breathed per minute at work by reference man under working conditions of light work.

The DAC values relate to 1 of 2 modes of exposure: either external submersion or the internal committed dose equivalents resulting from inhalation of radioactive materials. DACs based upon submersion are for immersion in a semi-infinite cloud of uniform concentration and apply to each radionuclide separately.

The ALI and DAC values include contributions to exposure by the single radionuclide named and any in-growth of daughter radionuclides produced in the body by decay of the parent. However, intakes that include both the parent and daughter radionuclides should be treated by the general method appropriate for mixtures.

The values of ALI and DAC do not apply directly when the individual both ingests and inhales a radionuclide, when the individual is exposed to a mixture of radionuclides by either inhalation or ingestion or both, or when the individual is exposed to both internal and external irradiation. See D.1202. When an individual is exposed to radioactive materials which fall under several of the translocation classifications of the same radionuclide, such as, Class D, Class W, or Class Y, the exposure may be evaluated as if it were a mixture of different radionuclides.

It should be noted that the classification of a compound as Class D, W, or Y is based on the chemical form of the compound and does not take into account the radiological half-life of different radionuclides. For this reason, values are given for Class D, W, and Y compounds, even for very short-lived radionuclides.

Table II "Effluent Concentrations"

The columns in Table II of this appendix captioned "Effluents," "Air" and "Water" are applicable to the assessment and control of dose to the public, particularly in the implementation of the provisions of D.1302. The concentration values given in Columns 1 and 2 of Table II are equivalent to the radionuclide concentrations which, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent of 0.5 millisievert (0.05 rem).

Consideration of non-stochastic limits has not been included in deriving the air and water effluent concentration limits because non-stochastic effects are presumed not to occur at or below the dose levels established for individual members of the public. For radionuclides, where the non-stochastic limit was governing in deriving the occupational DAC, the stochastic ALI was used in deriving the corresponding airborne effluent limit in Table II. For this reason, the DAC and airborne effluent limits are not always proportional as was the case in Appendix A of Part D of the eighth edition of Volume I of the *Suggested State Regulations for Control of Radiation.*

The air concentration values listed in Table II, Column 1 were derived by one of two methods. For those radionuclides for which the stochastic limit is governing, the occupational stochastic inhalation ALI was divided by 2.4×10^9 (ml), relating the inhalation ALI to the DAC, as explained above, and then divided by a factor of 300. The factor of 300 includes the following components: a factor of 50 to relate the 0.05 sievert (5 rem) annual occupational dose limit to the 1 millisievert (0.1 rem) limit for members of the public, a factor of 3 to adjust for the difference in exposure time and the inhalation rate for a worker and that for members of the public; and a factor of 2 to adjust the occupational values, derived for adults, so that they are applicable to other age groups.

For those radionuclides for which submersion, that is external dose, is limiting, the occupational DAC in Table I, Column 3 was divided by 219. The factor of 219 is composed of a factor of 50, as described above, and a factor of 4.38 relating occupational exposure for 2,000 hours per year to full-time exposure (8,760 hours per year). Note that an additional factor of 2 for age considerations is not warranted in the submersion case.

The water concentrations were derived by taking the most restrictive occupational stochastic oral ingestion ALI and dividing by 7.3 x 10^7. The factor of 7.3 x 10^7 ml includes the following components: the factors of 50 and 2 described above and a factor of 7.3 x 10^5 ml which is the annual water intake of reference man.

Note 2 of this appendix provides groupings of radionuclides which are applicable to unknown mixtures of radionuclides. These groupings, including occupational inhalation ALIs and DACs, air and water effluent concentrations and releases to sewer, require demonstrating that the most limiting radionuclides in successive classes are absent. The limit for the unknown mixture is defined when the presence of one of the listed radionuclides cannot be definitely excluded as being present either from knowledge of the radionuclide composition of the source or from actual measurements.

Table III "Releases to Sewers"

The monthly average concentrations for release to sanitary sewerage are applicable to the provisions in D.2003. The concentration values were derived by taking the most restrictive occupational stochastic oral ingestion ALI and dividing by 7.3 x 10^6 ml. The factor of 7.3 x 10^6 ml is composed of a factor of 7.3 x 10^5 ml, the annual water intake by reference man, and a factor of 10, such that the concentrations, if the sewage released by the licensee were the only source of water ingested by a reference man during a year, would result in a committed effective dose equivalent of 5 millisievert (0.5 rem).

List of Elements

Name	Symbol	Atomic Number	Name	Symbol	Atomic Number
Actinium	Ac	89	Chromium	Cr	24
Aluminum	Al	13	Cobalt	Co	27
Americium	Am	95	Copper	Cu	29
Antimony	Sb	51	Curium	Cm	96
Argon	Ar	18	Dysprosium	Dy	66
Arsenic	As	33	Einsteinium	Es	99
Astatine	At	85	Erbium	Er	68
Barium	Ba	56	Europium	Eu	63
Berkelium	Bk	97	Fermium	Fm	100
Beryllium	Be	4	Fluorine	F	9
Bismuth	Bi	83	Francium	Fr	87
Bromine	Br	35	Gadolinium	Gd	64
Cadmium	Cd	48	Gallium	Ga	31
Calcium	Ca	20	Germanium	Ge	32
Californium	Cf	98	Gold	Au	79
Carbon	C	6	Hafnium	Hf	72
Cerium	Ce	58	Holmium	Ho	67
Cesium	Cs	55	Hydrogen	H	1
Chlorine	Cl	17	Indium	In	49

List of Elements *(Continued)*

Name	Symbol	Atomic Number	Name	Symbol	Atomic Number
Iodine	I	53	Technetium	Tc	43
Iridium	Ir	77	Tellurium	Te	52
Iron	Fe	26	Terbium	Tb	65
Krypton	Kr	36	Thallium	Tl	81
Lanthanum	La	57	Thorium	Th	90
Lead	Pb	82	Thulium	Tm	69
Lutetium	Lu	71	Tin	Sn	50
Magnesium	Mg	12	Titanium	Ti	22
Manganese	Mn	25	Tungsten	W	74
Mendelevium	Md	101	Uranium	U	92
Mercury	Hg	80	Vanadium	V	23
Molybdenum	Mo	42	Xenon	Xe	54
Neodymium	Nd	60	Ytterbium	Yb	70
Neptunium	Np	93	Yttrium	Y	39
Nickel	Ni	28	Zinc	Zn	30
Niobium	Nb	41	Zirconium	Zr	40
Osmium	Os	76			
Palladium	Pd	46			
Phosphorus	P	15			
Platinum	Pt	78			
Plutonium	Pu	94			
Polonium	Po	84			
Potassium	K	19			
Praseodymium	Pr	59			
Promethium	Pm	61			
Protactinium	Pa	91			
Radium	Ra	88			
Radon	Rn	86			
Rhenium	Re	75			
Rhodium	Rh	45			
Rubidium	Rb	37			
Ruthenium	Ru	44			
Samarium	Sm	62			
Scandium	Sc	21			
Selenium	Se	34			
Silicon	Si	14			
Silver	Ag	47			
Sodium	Na	11			
Strontium	Sr	38			
Sulfur	S	16			
Tantalum	Ta	73			

Appendix B

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
1	Hydrogen-3	Water, DAC includes skin absorption	8E+4	8E+4	2E-5	1E-7	1E-3	1E-2
		Gas (HT or T_2) Submersion[a/]: Use above values as HT and T_2 oxidize in air and in the body to HTO.						
4	Beryllium-7	W, all compounds except those given for Y	4E+4	2E+4	9E-6	3E-8	6E-4	6E-3
		Y, oxides, halides, and nitrates	-	2E+4	8E-6	3E-8	-	-
4	Beryllium-10	W, see ^{7}Be	1E+3	2E+2	6E-8	2E-10	-	-
			LLI wall (1E+3)	-	-	-	2E-5	2E-4
		Y, see ^{7}Be	-	1E+1	6E-9	2E-11	-	-
6	Carbon-11[b/]	Monoxide	-	1E+6	5E-4	2E-6	-	-
		Dioxide	-	6E+5	3E-4	9E-7	-	-
		Compounds	4E+5	4E+5	2E-4	6E-7	6E-3	6E-2
6	Carbon-14	Monoxide	-	2E+6	7E-4	2E-6	-	-
		Dioxide	-	2E+5	9E-5	3E-7	-	-
		Compounds	2E+3	2E+3	1E-6	3E-9	3E-5	3E-4
9	Fluorine-18[b/]	D, fluorides of H, Li, Na, K, Rb, Cs, and Fr	5E+4	7E+4	3E-5	1E-7	-	-
			St wall (5E+4)	-	-	-	7E-4	7E-3
		W, fluorides of Be, Mg, Ca, Sr, Ba, Ra, Al, Ga, In, Tl, As, Sb, Bi, Fe, Ru, Os, Co, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, Sc, Y, Ti, Zr, V, Nb, Ta, Mn, Tc, and Re	-	9E+4	4E-5	1E-7	-	-
		Y, lanthanum fluoride	-	8E+4	3E-5	1E-7	-	-
11	Sodium-22	D, all compounds	4E+2	6E+2	3E-7	9E-10	6E-6	6E-5
11	Sodium-24	D, all compounds	4E+3	5E+3	2E-6	7E-9	5E-5	5E-4
12	Magnesium-28	D, all compounds except those given for W	7E+2	2E+3	7E-7	2E-9	9E-6	9E-5
		W, oxides, hydroxides, carbides, halides, and nitrates	-	1E+3	5E-7	2E-9	-	-

Footnotes appear at the end of these three tables.

Appendix B

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage (*Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
13	Aluminum-26	D, all compounds except those given for W	4E+2	6E+1	3E-8	9E-11	6E-6	6E-5
		W, oxides, hydroxides, carbides, halides, and nitrates	-	9E+1	4E-8	1E-10	-	-
14	Silicon-31	D, all compounds except those given for W and Y	9E+3	3E+4	1E-5	4E-8	1E-4	1E-3
		W, oxides, hydroxides, carbides, and nitrates	-	3E+4	1E-5	5E-8	-	-
		Y, aluminosilicate glass	-	3E+4	1E-5	4E-8	-	-
14	Silicon-32	D, see ^{31}Si	2E+3	2E+2	1E-7	3E-10	-	-
			LLI wall (3E+3)	-	-	-	4E-5	4E-4
		W, see ^{31}Si	-	1E+2	5E-8	2E-10	-	-
		Y, see ^{31}Si	-	5E+0	2E-9	7E-12	-	-
15	Phosphorus-32	D, all compounds except phosphates given for W	6E+2	9E+2	4E-7	1E-9	9E-6	9E-5
		W, phosphates of Zn^{2+}, S^{3+}, Mg^{2+}, Fe^{3+}, Bi^{3+}, and lanthanides	-	4E+2	2E-7	5E-10	-	-
15	Phosphorus-33	D, see ^{32}P	6E+3	8E+3	4E-6	1E-8	8E-5	8E-4
		W, see ^{32}P	-	3E+3	1E-6	4E-9	-	-
16	Sulfur-35	Vapor	-	1E+4	6E-6	2E-8	-	-
		D, sulfides and sulfates except those given for W	1E+4	2E+4	7E-6	2E-8	-	-
			LLI wall (8E+3)	-	-	-	1E-4	1E-3
		W, elemental sulfur, sulfides of Sr, Ba, Ge, Sn, Pb, As, Sb, Bi, Cu, Ag, Au, Zn, Cd, Hg, W, and Mo. Sulfates of Ca, Sr, Ba, Ra, As, Sb, and Bi	6E+3 -	2E+3	9E-7	3E-9	-	-
17	Chlorine-36	D, chlorides of H, Li, Na, K, Rb, Cs, and Fr	2E+3	2E+3	1E-6	3E-9	2E-5	2E-4
		W, chlorides of lantha-nides, Be, Mg, Ca, Sr, Ba, Ra, Al, Ga, In, Tl, Ge, Sn, Pb, As, Sb, Bi, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, Sc, Y, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Mn, Tc, and Re	-	2E+2	1E-7	3E-10	-	-

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage (*Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2 Inhalation	Col. 3	Col. 1	Col. 2	
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
17	Chlorine-38[b/]	D, see ^{36}Cl	2E+4	4E+4	2E-5	6E-8	-	-
			St wall (3E+4)	-	-	-	3E-4	3E-3
		W, see ^{36}Cl	-	5E+4	2E-5	6E-8	-	-
17	Chlorine-39[b/]	D, see ^{36}Cl	2E+4	5E+4	2E-5	7E-8	-	-
			St wall (4E+4)	-	-	-	5E-4	5E-3
		W, see ^{36}Cl	-	6E+4	2E-5	8E-8	-	-
18	Argon-37	Submersion[a/]	-	-	1E+0	6E-3	-	-
18	Argon-39	Submersion[a/]	-	-	2E-4	8E-7	-	-
18	Argon-41	Submersion[a/]	-	-	3E-6	1E-8	-	-
19	Potassium-40	D, all compounds	3E+2	4E+2	2E-7	6E-10	4E-6	4E-5
19	Potassium-42	D, all compounds	5E+3	5E+3	2E-6	7E-9	6E-5	6E-4
19	Potassium-43	D, all compounds	6E+3	9E+3	4E-6	1E-8	9E-5	9E-4
19	Potassium-44[b/]	D, all compounds	2E+4	7E+4	3E-5	9E-8	-	-
			St wall (4E+4)	-	-	-	5E-4	5E-3
19	Potassium-45[b/]	D, all compounds	3E+4	1E+5	5E-5	2E-7	-	-
			St wall (5E+4)	-	-	-	7E-4	7E-3
20	Calcium-41	W, all compounds	3E+3	4E+3	2E-6	-	-	-
			Bone surf (4E+3)	Bone surf (4E+3)	-	5E-9	6E-5	6E-4
20	Calcium-45	W, all compounds	2E+3	8E+2	4E-7	1E-9	2E-5	2E-4
20	Calcium-47	W, all compounds	8E+2	9E+2	4E-7	1E-9	1E-5	1E-4
21	Scandium-43	Y, all compounds	7E+3	2E+4	9E-6	3E-8	1E-4	1E-3
21	Scandium-44m	Y, all compounds	5E+2	7E+2	3E-7	1E-9	7E-6	7E-5
21	Scandium-44	Y, all compounds	4E+3	1E+4	5E-6	2E-8	5E-5	5E-4
21	Scandium-46	Y, all compounds	9E+2	2E+2	1E-7	3E-10	1E-5	1E-4
21	Scandium-47	Y, all compounds	2E+3	3E+3	1E-6	4E-9	-	-
			LLI wall (3E+3)	-	-	-	4E-5	4E-4
21	Scandium-48	Y, all compounds	8E+2	1E+3	6E-7	2E-9	1E-5	1E-4

Footnotes appear at the end of these three tables.

Appendix B

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage (*Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
21	Scandium-49[b/]	Y, all compounds	2E+4	5E+4	2E-5	8E-8	3E-4	3E-3
22	Titanium-44	D, all compounds except those given for W and Y	3E+2	1E+1	5E-9	2E-11	4E-6	4E-5
		W, oxides, hydroxides, carbides, halides, and nitrates	-	3E+1	1E-8	4E-11	-	-
		Y, SrTi0	-	6E+0	2E-9	8E-12	-	-
22	Titanium-45	D, see ^{44}Ti	9E+3	3E+4	1E-5	3E-8	1E-4	1E-3
		W, see ^{44}Ti	-	4E+4	1E-5	5E-8	-	-
		Y, see ^{44}Ti	-	3E+4	1E-5	4E-8	-	-
23	Vanadium-47[b/]	D, all compounds except those given for W	3E+4	8E+4	3E-5	1E-7	-	-
			St wall (3E+4)	-	-	-	4E-4	4E-3
		W, oxides, hydroxides, carbides, and halides	-	1E+5	4E-5	1E-7	-	-
23	Vanadium-48	D, see ^{47}V	6E+2	1E+3	5E-7	2E-9	9E-6	9E-5
		W, see ^{47}V	-	6E+2	3E-7	9E-10	-	-
23	Vanadium-49	D, see ^{47}V	7E+4	3E+4	1E-5	-	-	-
			LLI wall (9E+4)	Bone surf (3E+4)	-	5E-8	1E-3	1E-2
		W, see ^{47}V	-	2E+4	8E-6	2E-8	-	-
24	Chromium-48	D, all compounds except those given for W and Y	6E+3	1E+4	5E-6	2E-8	8E-5	8E-4
		W, halides and nitrates	-	7E+3	3E-6	1E-8	-	-
		Y, oxides and hydroxides	-	7E+3	3E-6	1E-8	-	-
24	Chromium-49[b/]	D, see ^{48}Cr	3E+4	8E+4	4E-5	1E-7	4E-4	4E-3
		W, see ^{48}Cr	-	1E+5	4E-5	1E-7	-	-
		Y, see ^{48}Cr	-	9E+4	4E-5	1E-7	-	-
24	Chromium-51	D, see ^{48}Cr	4E+4	5E+4	2E-5	6E-8	5E-4	5E-3
		W, see ^{48}Cr	-	2E+4	1E-5	3E-8	-	-
		Y, see ^{48}Cr	-	2E+4	8E-6	3E-8	-	-
25	Manganese-51[b/]	D, all compounds except those given for W	2E+4	5E+4	2E-5	7E-8	3E-4	3E-3
		W, oxides, hydroxides, halides, and nitrates	-	6E+4	3E-5	8E-8	-	-
25	Manganese-52m[b/]	D, see ^{51}Mn	3E+4	9E+4	4E-5	1E-7	-	-
			St wall (4E+4)	-	-	-	5E-4	5E-3
		W, see ^{51}Mn	-	1E+5	4E-5	1E-7	-	-

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage (*Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
25	Manganese-52	D, see ^{51}Mn	7E+2	1E+3	5E-7	2E-9	1E-5	1E-4
		W, see ^{51}Mn	-	9E+2	4E-7	1E-9	-	-
25	Manganese-53	D, see ^{51}Mn	5E+4	1E+4	5E-6	-	7E-4	7E-3
			-	Bone surf (2E+4)	-	3E-8	-	-
		W, see ^{51}Mn	-	1E+4	5E-6	2E-8	-	-
25	Manganese-54	D, see ^{51}Mn	2E+3	9E+2	4E-7	1E-9	3E-5	3E-4
		W, see ^{51}Mn	-	8E+2	3E-7	1E-9	-	-
25	Manganese-56	D, see ^{51}Mn	5E+3	2E+4	6E-6	2E-8	7E-5	7E-4
		W, see ^{51}Mn	-	2E+4	9E-6	3E-8	-	-
26	Iron-52	D, all compounds except those given for W	9E+2	3E+3	1E-6	4E-9	1E-5	1E-4
		W, oxides, hydroxides, and halides	-	2E+3	1E-6	3E-9	-	-
26	Iron-55	D, see ^{52}Fe	9E+3	2E+3	8E-7	3E-9	1E-4	1E-3
		W, see ^{52}Fe	-	4E+3	2E-6	6E-9	-	-
26	Iron-59	D, see ^{52}Fe	8E+2	3E+2	1E-7	5E-10	1E-5	1E-4
		W, see ^{52}Fe	-	2E-7	7E-10	-	-	-
26	Iron-60	D, see ^{52}Fe	3E+1	6E+0	3E-9	9E-12	4E-7	4E-6
		W, see ^{52}Fe	-1	8E-9	3E-11	-	-	-
27	Cobalt-55	W, all compounds except those given for Y	1E+3	3E+3	1E-6	4E-9	2E-5	2E-4
		Y, oxides, hydroxides, halides, and nitrates	-	E+3	1E-6	4E-9	-	-
27	Cobalt-56	W, see ^{55}Co	5E+2	3E+2	1E-7	4E-10	6E-6	6E-5
		Y, see ^{55}Co	4E+2	2E+2	8E-8	3E-10	-	-
27	Cobalt-57	W, see ^{55}Co	8E+3	3E+3	1E-6	4E-9	6E-5	6E-4
		Y, see ^{55}Co	4E+3	7E+2	3E-7	9E-10	-	-
27	Cobalt-58m	W, see ^{55}Co	6E+4	9E+4	4E-5	1E-7	8E-4	8E-3
		Y, see ^{55}Co	-	6E+4	3E-5	9E-8	-	-
27	Cobalt-58	W, see ^{55}Co	2E+3	1E+3	5E-7	2E-9	2E-5	2E-4
		Y, see ^{55}Co	1E+3	7E+2	3E-7	1E-9	-	-
27	Cobalt-60m[b/]	W, see ^{55}Co	1E+6	4E+6	2E-3	6E-6	-	-
			St wall (1E+6)	-	-	-	2E-2	2E-1
		Y, see ^{55}Co	-	3E+6	1E-3	4E-6	-	-

Footnotes appear at the end of these three tables.

Appendix B

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage (*Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
27	Cobalt-60	W, see ^{55}Co	5E+2	2E+2	7E-8	2E-10	3E-6	3E-5
		Y, see ^{55}Co	2E+2	3E+1	1E-8	5E-11	-	-
27	Cobalt-61[b/]	W, see ^{55}Co	2E+4	6E+4	3E-5	9E-8	3E-4	3E-3
		Y, see ^{55}Co	2E+4	6E+4	2E-5	8E-8	-	-
27	Cobalt-62m[b/]	W, see ^{55}Co	4E+4	2E+5	7E-5	2E-7	-	-
			St wall (5E+4)	-	-	-	7E-4	7E-3
		Y, see ^{55}Co	-	2E+5	6E-5	2E-7	-	-
28	Nickel-56	D, all compounds except those given for W	1E+3	2E+3	8E-7	3E-9	2E-5	2E-4
		W, oxides, hydroxides, and carbides	-	1E+3	5E-7	2E-9	-	-
		Vapor	-	1E+3	5E-7	2E-9	-	-
28	Nickel-57	D, see ^{56}Ni	2E+3	5E+3	2E-6	7E-9	2E-5	2E-4
		W, see ^{56}Ni	-	3E+3	1E-6	4E-9	-	-
		Vapor	-	6E+3	3E-6	9E-9	-	-
28	Nickel-59	D, see ^{56}Ni	2E+4	4E+3	2E-6	5E-9	3E-4	3E-3
		W, see ^{56}Ni	-	7E+3	3E-6	1E-8	-	-
		Vapor	-	2E+3	8E-7	3E-9	-	-
28	Nickel-63	D, see ^{56}Ni	9E+3	2E+3	7E-7	2E-9	1E-4	1E-3
		W, see ^{56}Ni	-	3E+3	1E-6	4E-9	-	-
		Vapor	-	8E+2	3E-7	1E-9	-	-
28	Nickel-65	D, see ^{56}Ni	8E+3	2E+4	1E-5	3E-8	1E-4	1E-3
		W, see ^{56}Ni	-	3E+4	1E-5	4E-8	-	-
		Vapor	-	2E+4	7E-6	2E-8	-	-
28	Nickel-66	D, see ^{56}Ni	4E+2	2E+3	7E-7	2E-9	-	-
			LLI wall (5E+2)	-	-	-	6E-6	6E-5
		W, see ^{56}Ni	-	6E+2	3E-7	9E-10	-	-
		Vapor	-	3E+3	1E-6	4E-9	-	-
29	Copper-60[b/]	D, all compounds except those given for W and Y	3E+4	9E+4	4E-5	1E-7	-	-
			St wall (3E+4)	-	-	-	4E-4	4E-3
		W, sulfides, halides, and nitrates	-	1E+5	5E-5	2E-7	-	-
		Y, oxides and hydroxides	-	1E+5	4E-5	1E-7	-	-
29	Copper-61	D, see ^{60}Cu	1E+4	3E+4	1E-5	4E-8	2E-4	2E-3
		W, see ^{60}Cu	-	4E+4	2E-5	6E-8	-	-
		Y, see ^{60}Cu	-	4E+4	1E-5	5E-8	-	-

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage (*Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
29	Copper-64	D, see ^{60}Cu	1E+4	3E+4	1E-5	4E-8	2E-4	2E-3
		W, see ^{60}Cu	-	2E+4	1E-5	3E-8	-	-
		Y, see ^{60}Cu	-	2E+4	9E-6	3E-8	-	-
29	Copper-67	D, see ^{60}Cu	5E+3	8E+3	3E-6	1E-8	6E-5	6E-4
		W, see ^{60}Cu	-	5E+3	2E-6	7E-9	-	-
		Y, see ^{60}Cu	-	5E+3	2E-6	6E-9	-	-
30	Zinc-62	Y, all compounds	1E+3	3E+3	1E-6	4E-9	2E-5	2E-4
30	Zinc-63[b/]	Y, all compounds	2E+4	7E+4	3E-5	9E-8	-	-
			St wall (3E+4)	-	-	-	3E-4	3E-3
30	Zinc-65	Y, all compounds	4E+2	3E+2	1E-7	4E-10	5E-6	5E-5
30	Zinc-69m	Y, all compounds	4E+3	7E+3	3E-6	1E-8	6E-5	6E-4
30	Zinc-69[b/]	Y, all compounds	6E+4	1E+5	6E-5	2E-7	8E-4	8E-3
30	Zinc-71m	Y, all compounds	6E+3	2E+4	7E-6	2E-8	8E-5	8E-4
30	Zinc-72	Y, all compounds	1E+3	1E+3	5E-7	2E-9	1E-5	1E-4
31	Gallium-65[b/]	D, all compounds except those given for W	5E+4	2E+5	7E-5	2E-7	-	-
			St wall (6E+4)	-	-	-	9E-4	9E-3
		W, oxides, hydroxides, carbides, halides, and nitrates	-	2E+5	8E-5	3E-7	-	-
31	Gallium-66	D, see ^{65}Ga	1E+3	4E+3	1E-6	5E-9	1E-5	1E-4
		W, see ^{65}Ga	-	3E+3	1E-6	4E-9	-	-
31	Gallium-67	D, see ^{65}Ga	7E+3	1E+4	6E-6	2E-8	1E-4	1E-3
		W, see ^{65}Ga	-	1E+4	4E-6	1E-8	-	-
31	Gallium-68[b/]	D, see ^{65}Ga	2E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{65}Ga	-	5E+4	2E-5	7E-8	-	-
31	Gallium-70[b/]	D, see ^{65}Ga	5E+4	2E+5	7E-5	2E-7	-	-
			St wall (7E+4)	-	-	-	1E-3	1E-2
		W, see ^{65}Ga	-	2E+5	8E-5	3E-7	-	-
31	Gallium-72	D, see ^{65}Ga	1E+3	4E+3	1E-6	5E-9	2E-5	2E-4
		W, see ^{65}Ga	-	3E+3	1E-6	4E-9	-	-
31	Gallium-73	D, see ^{65}Ga	5E+3	2E+4	6E-6	2E-8	7E-5	7E-4
		W, see ^{65}Ga	-	2E+4	6E-6	2E-8	-	-

Footnotes appear at the end of these three tables.

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
32	Germanium-66	D, all compounds except those given for W	2E+4	3E+4	1E-5	4E-8	3E-4	3E-3
		W, oxides, sulfides, and halides	-	2E+4	8E-6	3E-8	-	-
32	Germanium-67[b/]	D, see ^{66}Ge	3E+4	9E+4	4E-5	1E-7	-	-
			St wall (4E+4)	-	-	-	6E-4	6E-3
		W, see ^{66}Ge	-	1E+5	4E-5	1E-7	-	-
32	Germanium-68	D, see ^{66}Ge	5E+3	4E+3	2E-6	5E-9	6E-5	6E-4
		W, see ^{66}Ge	-	1E+2	4E-8	1E-10	-	-
32	Germanium-69	D, see ^{66}Ge	1E+4	2E+4	6E-6	2E-8	2E-4	2E-3
		W, see ^{66}Ge	-	8E+3	3E-6	1E-8	-	-
32	Germanium-71	D, see ^{66}Ge	5E+5	4E+5	2E-4	6E-7	7E-3	7E-2
		W, see ^{66}Ge	-	4E+4	2E-5	6E-8	-	-
32	Germanium-75[b/]	D, see ^{66}Ge	4E+4	8E+4	3E-5	1E-7	-	-
			St wall (7E+4)	-	-	-	9E-4	9E-3
		W, see ^{66}Ge	-	8E+4	4E-5	1E-7	-	-
32	Germanium-77	D, see ^{66}Ge	9E+3	1E+4	4E-6	1E-8	1E-4	1E-3
		W, see ^{66}Ge	-	6E+3	2E-6	8E-9	-	-
32	Germanium-78[b/]	D, see ^{66}Ge	2E+4	2E+4	9E-6	3E-8	-	-
			St wall (2E+4)	-	-	-	3E-4	3E-3
		W, see ^{66}Ge	-	2E+4	9E-6	3E-8	-	-
33	Arsenic-69[b/]	W, all compounds	3E+4	1E+5	5E-5	2E-7	-	-
			St wall (4E+4)	-	-	-	6E-4	6E-3
33	Arsenic-70[b/]	W, all compounds	1E+4	5E+4	2E-5	7E-8	2E-4	2E-3
33	Arsenic-71	W, all compounds	4E+3	5E+3	2E-6	6E-9	5E-5	5E-4
33	Arsenic-72	W, all compounds	9E+2	1E+3	6E-7	2E-9	1E-5	1E-4
33	Arsenic-73	W, all compounds	8E+3	2E+3	7E-7	2E-9	1E-4	1E-3
33	Arsenic-74	W, all compounds	1E+3	8E+2	3E-7	1E-9	2E-5	2E-4
33	Arsenic-76	W, all compounds	1E+3	1E+3	6E-7	2E-9	1E-5	1E-4

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage (*Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1 Oral Ingestion ALI (µCi)	Col. 2 Inhalation ALI (µCi)	Col. 3 Inhalation DAC (µCi/ml)	Col. 1 Air (µCi/ml)	Col. 2 Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
33	Arsenic-77	W, all compounds	4E+3	5E+3	2E-6	7E-9	-	-
			LLI wall (5E+3)	-	-	-	6E-5	6E-4
33	Arsenic-78[b/]	W, all compounds	8E+3	2E+4	9E-6	3E-8	1E-4	1E-3
34	Selenium-70[b/]	D, all compounds except those given for W	2E+4	4E+4	2E-5	5E-8	1E-4	1E-3
		W, oxides, hydroxides, carbides, and elemental Se	1E+4	4E+4	2E-5	6E-8	-	-
34	Selenium-73m[b/]	D, see ^{70}Se	6E+4	2E+5	6E-5	2E-7	4E-4	4E-3
		W, see ^{70}Se	3E+4	1E+5	6E-5	2E-7	-	-
34	Selenium-73	D, see ^{70}Se	3E+3	1E+4	5E-6	2E-8	4E-5	4E-4
		W, see ^{70}Se	-	2E+4	7E-6	2E-8	-	-
34	Selenium-75	D, see ^{70}Se	5E+2	7E+2	3E-7	1E-9	7E-6	7E-5
		W, see ^{70}Se	-	6E+2	3E-7	8E-10	-	-
34	Selenium-79	D, see ^{70}Se	6E+2	8E+2	3E-7	1E-9	8E-6	8E-5
		W, see ^{70}Se	-	6E+2	2E-7	8E-10	-	-
34	Selenium-81m[b/]	D, see ^{70}Se	4E+4	7E+4	3E-5	9E-8	3E-4	3E-3
		W, see ^{70}Se	2E+4	7E+4	3E-5	1E-7	-	-
34	Selenium-81[b/]	D, see ^{70}Se	6E+4	2E+5	9E-5	3E-7	-	-
			St wall (8E+4)	-	-	-	1E-3	1E-2
		W, see ^{70}Se	-	2E+5	1E-4	3E-7	-	-
34	Selenium-83[b/]	D, see ^{70}Se	4E+4	1E+5	5E-5	2E-7	4E-4	4E-3
		W, see ^{70}Se	3E+4	1E+5	5E-5	2E-7	-	-
35	Bromine-74m[b/]	D, bromides of H, Li, Na, K, Rb, Cs, and Fr	1E+4	4E+4	2E-5	5E-8	-	-
			St wall (2E+4)	-	-	-	3E-4	3E-3
		W, bromides of lanthanides, Be, Mg, Ca, Sr, Ba, Ra, Al, Ga, In, Tl, Ge, Sn, Pb, As, Sb, Bi, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, Sc, Y, Ti, Zr, Hf, V, Nb, Ta, Mn, Tc, and Re	-	4E+4	2E-5	6E-8	-	-

Footnotes appear at the end of these three tables.

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
35	Bromine-74[b/]	D, see ^{74m}Br	2E+4	7E+4	3E-5	1E-7	-	-
			St wall (4E+4)	-	-	-	5E-4	5E-3
		W, see ^{74m}Br	–	8E+4	4E-5	1E-7	-	-
35	Bromine-75[b/]	D, see ^{74m}Br	3E+4	5E+4	2E-5	7E-8	–	–
			St wall (4E+4)	–	–	–	5E-4	5E-3
		W, see ^{74m}Br	–	5E+4	2E-5	7E-8	–	–
35	Bromine-76	D, see ^{74m}Br	4E+3	5E+3	2E-6	7E-9	5E-5	5E-4
		W, see ^{74m}Br	–	4E+3	2E-6	6E-9	–	–
35	Bromine-77	D, see ^{74m}Br	2E+4	2E+4	1E-5	3E-8	2E-4	2E-3
		W, see ^{74m}Br	–	2E+4	8E-6	3E-8	–	–
35	Bromine-80m	D, see ^{74m}Br	2E+4	2E+4	7E-6	2E-8	3E-4	3E-3
		W, see ^{74m}Br	–	1E+4	6E-6	2E-8	–	–
35	Bromine-80[b/]	D, see ^{74m}Br	5E+4	2E+5	8E-5	3E-7	–	–
			St wall (9E+4)	–	–	–	1E-3	1E-2
		W, see ^{74m}Br	–	2E+5	9E-5	3E-7	–	–
35	Bromine-82	D, see ^{74m}Br	3E+3	4E+3	2E-6	6E-9	4E-5	4E-4
		W, see ^{74m}Br	–	4E+3	2E-6	5E-9	–	–
35	Bromine-83	D, see ^{74m}Br	5E+4	6E+4	3E-5	9E-8	–	–
			St wall (7E+4)	–	–	–	9E-4	9E-3
		W, see ^{74m}Br	–	6E+4	3E-5	9E-8	–	–
35	Bromine-84[b/]	D, see ^{74m}Br	2E+4	6E+4	2E-5	8E-8	–	–
			St wall (3E+4)	–	–	–	4E-4	4E-3
		W, see ^{74m}Br	–	6E+4	3E-5	9E-8	–	–
36	Krypton-74[b/]	Submersion[a/]	–	–	3E-6	1E-8	–	–
36	Krypton-76	Submersion[a/]	–	–	9E-6	4E-8	–	–
36	Krypton-77[b/]	Submersion[a/]	–	–	4E-6	2E-8	–	–
36	Krypton-79	Submersion[a/]	–	–	2E-5	7E-8	–	–
36	Krypton-81	Submersion[a/]	–	–	7E-4	3E-6	–	–
36	Krypton-83m[b/]	Submersion[a/]	–	–	1E-2	5E-5	–	–
36	Krypton-85m	Submersion[a/]	–	–	2E-5	1E-7	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
36	Krypton-85	Submersion[a/]	–	–	1E-4	7E-7	–	–
36	Krypton-87[b/]	Submersion[a/]	–	–	5E-6	2E-8	–	–
36	Krypton-88	Submersion[a/]	–	–	2E-6	9E-9	–	–
37	Rubidium-79[b/]	D, all compounds	4E+4	1E+5	5E-5	2E-7	–	–
			St wall (6E+4)	–	–	–	8E-4	8E-3
37	Rubidium-81m[b/]	D, all compounds	2E+5	3E+5	1E-4	5E-7	–	–
			St wall (3E+5)	–	–	–	4E-3	4E-2
37	Rubidium-81	D, all compounds	4E+4	5E+4	2E-5	7E-8	5E-4	5E-3
37	Rubidium-82m	D, all compounds	1E+4	2E+4	7E-6	2E-8	2E-4	2E-3
37	Rubidium-83	D, all compounds	6E+2	1E+3	4E-7	1E-9	9E-6	9E-5
37	Rubidium-84	D, all compounds	5E+2	8E+2	3E-7	1E-9	7E-6	7E-5
37	Rubidium-86	D, all compounds	5E+2	8E+2	3E-7	1E-9	7E-6	7E-5
37	Rubidium-87	D, all compounds	1E+3	2E+3	6E-7	2E-9	1E-5	1E-4
37	Rubidium-88[b/]	D, all compounds	2E+4	6E+4	3E-5	9E-8	–	–
			St wall (3E+4)	–	–	–	4E-4	4E-3
37	Rubidium-89[b/]	D, all compounds	4E+4	1E+5	6E-5	2E-7	–	–
			St wall (6E+4)	–	–	–	9E-4	9E-3
38	Strontium-80[b/]	D, all soluble compounds except $SrTiO_3$	4E+3	1E+4	5E-6	2E-8	6E-5	6E-4
		Y, all insoluble compounds and $SrTi0_3$	–	1E+4	5E-6	2E-8	–	–
38	Strontium-81[b/]	D, see ^{80}Sr	3E+4	8E+4	3E-5	1E-7	3E-4	3E-3
		Y, see ^{80}Sr	2E+4	8E+4	3E-5	1E-7	–	–
38	Strontium-82	D, see ^{80}Sr	3E+2	4E+2	2E-7	6E-10	–	–
			LLI wall (2E+2)	–	–	–	3E-6	3E-5
		Y, see ^{80}Sr	2E+2	9E+1	4E-8	1E-10	–	–
38	Strontium-83	D, see ^{80}Sr	3E+3	7E+3	3E-6	1E-8	3E-5	3E-4
		Y, see ^{80}Sr	2E+3	4E+3	1E-6	5E-9	–	–
38	Strontium-85m[b/]	D, see ^{80}Sr	2E+5	6E+5	3E-4	9E-7	3E-3	3E-2
		Y, see ^{80}Sr	–	8E+5	4E-4	1E-6	–	–

Footnotes appear at the end of these three tables.

Appendix B

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
38	Strontium-85	D, see ^{80}Sr	3E+3	3E+3	1E-6	4E-9	4E-5	4E-4
		Y, see ^{80}Sr	–	2E+3	6E-7	2E-9	–	–
38	Strontium-87m	D, see ^{80}Sr	5E+4	1E+5	5E-5	2E-7	6E-4	6E-3
		Y, see ^{80}Sr	4E+4	2E+5	6E-5	2E-7	–	–
38	Strontium-89	D, see ^{80}Sr	6E+2	8E+2	4E-7	1E-9	–	–
			LLI wall (6E+2)	–	–	–	8E-6	8E-5
		Y, see ^{80}Sr	5E+2	1E+2	6E-8	2E-10	–	–
38	Strontium-90	D, see ^{80}Sr	3E+1	2E+1	8E-9	–	–	–
			Bone surf (4E+1)	Bone surf (2E+1)	–	3E-11	5E-7	5E-6
		Y, see ^{80}Sr	–	4E+0	2E-9	6E-12	–	–
38	Strontium-91	D, see ^{80}Sr	2E+3	6E+3	2E-6	8E-9	2E-5	2E-4
		Y, see ^{80}Sr	–	4E+3	1E-6	5E-9	–	–
38	Strontium-92	D, see ^{80}Sr	3E+3	9E+3	4E-6	1E-8	4E-5	4E-4
		Y, see ^{80}Sr	–	7E+3	3E-6	9E-9	–	–
39	Yttrium-86m[b/]	W, all compounds except those given for Y	2E+4	6E+4	2E-5	8E-8	3E-4	3E-3
		Y, oxides and hydroxides	–	5E+4	2E-5	8E-8	–	–
39	Yttrium-86	W, see ^{86m}Y	1E+3	3E+3	1E-6	5E-9	2E-5	2E-4
		Y, see ^{86m}Y	–	3E+3	1E-6	5E-9	–	–
39	Yttrium-87	W, see ^{86m}Y	2E+3	3E+3	1E-6	5E-9	3E-5	3E-4
		Y, see ^{86m}Y	–	3E+3	1E-6	5E-9	–	–
39	Yttrium-88	W, see ^{86m}Y	1E+3	3E+2	1E-7	3E-10	1E-5	1E-4
		Y, see ^{86m}Y	–	2E+2	1E-7	3E-10	–	–
39	Yttrium-90m	W, see ^{86m}Y	8E+3	1E+4	5E-6	2E-8	1E-4	1E-3
		Y, see ^{86m}Y	–	1E+4	5E-6	2E-8	–	–
39	Yttrium-90	W, see ^{86m}Y	4E+2	7E+2	3E-7	9E-10	–	–
			LLI wall (5E+2)	–	–	–	7E-6	7E-5
		Y, see ^{86m}Y	–	6E+2	3E-7	9E-10	–	–
39	Yttrium-91m[b/]	W, see ^{86m}Y	1E+5	2E+5	1E-4	3E-7	2E-3	2E-2
		Y, see ^{86m}Y	–	2E+5	7E-5	2E-7	–	–
39	Yttrium-91	W, see ^{86m}Y	5E+2	2E+2	7E-8	2E-10	–	–
			LLI wall (6E+2)	–	–	–	8E-6	8E-5
		Y, see ^{86m}Y	–	1E+2	5E-8	2E-10	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
39	Yttrium-92	W, see ^{86m}Y	3E+3	9E+3	4E-6	1E-8	4E-5	4E-4
		Y, see ^{86m}Y	–	8E+3	3E-6	1E-8	–	–
39	Yttrium-93	W, see ^{86m}Y	1E+3	3E+3	1E-6	4E-9	2E-5	2E-4
		Y, see ^{86m}Y	–	2E+3	1E-6	3E-9	–	–
39	Yttrium-94[b/]	W, see ^{86m}Y	2E+4	8E+4	3E-5	1E-7	–	–
			St wall (3E+4)	–	–	–	4E-4	4E-3
		Y, see ^{86m}Y	–	8E+4	3E-5	1E-7	–	–
39	Yttrium-95[b/]	W, see ^{86m}Y	4E+4	2E+5	6E-5	2E-7	–	–
			St wall (5E+4)	–	–	–	7E-4	7E-3
		Y, see ^{86m}Y	–	1E+5	6E-5	2E-7	–	–
40	Zirconium-86	D, all compounds except those given for W and Y	1E+3	4E+3	2E-6	6E-9	2E-5	2E-4
		W, oxides, hydroxides, halides, and nitrates	–	3E+3	1E-6	4E-9	–	–
		Y, carbide	–	2E+3	1E-6	3E-9	–	–
40	Zirconium-88	D, see ^{86}Zr	4E+3	2E+2	9E-8	3E-10	5E-5	5E-4
		W, see ^{86}Zr	–	5E+2	2E-7	7E-10	–	–
		Y, see ^{86}Zr	–	3E+2	1E-7	4E-10	–	–
40	Zirconium-89	D, see ^{86}Zr	2E+3	4E+3	1E-6	5E-9	2E-5	2E-4
		W, see ^{86}Zr	–	2E+3	1E-6	3E-9	–	–
		Y, see ^{86}Zr	–	2E+3	1E-6	3E-9	–	–
40	Zirconium-93	D, see ^{86}Zr	1E+3	6E+0	3E-9	–	–	–
			Bone surf (3E+3)	Bone surf (2E+1)	–	2E-11	4E-5	4E-4
		W, see ^{86}Zr	–	2E+1	1E-8	–	–	–
			–	Bone surf (6E+1)	–	9E-11	–	–
		Y, see ^{86}Zr	–	6E+1	2E-8	–	–	–
			–	Bone surf (7E+1)	–	9E-11	–	–
40	Zirconium-95	D, see ^{86}Zr	1E+3	1E+2	5E-8	–	2E-5	2E-4
			–	Bone surf (3E+2)	–	4E-10	–	–
		W, see ^{86}Zr	–	4E+2	2E-7	5E-10	–	–
		Y, see ^{86}Zr	–	3E+2	1E-7	4E-10	–	–
40	Zirconium-97	D, see ^{86}Zr	6E+2	2E+3	8E-7	3E-9	9E-6	9E-5
		W, see ^{86}Zr	–	1E+3	6E-7	2E-9	–	–
		Y, see ^{86}Zr	–	1E+3	5E-7	2E-9	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2 Inhalation	Col. 3	Col. 1	Col. 2	
			ALI (μCi)	ALI (μCi)	DAC (μCi/ml)	Air (μCi/ml)	Water (μCi/ml)	Monthly Average Concentration (μCi/ml)
41	Niobium-88[b/]	W, all compounds except those given for Y	5E+4	2E+5	9E-5	3E-7	–	–
			St wall (7E+4)	–	–	–	1E-3	1E-2
		Y, oxides and hydroxides	–	2E+5	9E-5	3E-7	–	–
41	Niobium-89[b/] (66 min)	W, see ^{88}Nb	1E+4	4E+4	2E-5	6E-8	1E-4	1E-3
		Y, see ^{88}Nb	–	4E+4	2E-5	5E-8	–	–
41	Niobium-89 (122 min)	W, see ^{88}Nb	5E+3	2E+4	8E-6	3E-8	7E-5	7E-4
		Y, see ^{88}Nb	–	2E+4	6E-6	2E-8	–	–
41	Niobium-90	W, see ^{88}Nb	1E+3	3E+3	1E-6	4E-9	1E-5	1E-4
		Y, see ^{88}Nb	–	2E+3	1E-6	3E-9	–	–
41	Niobium-93m	W, see ^{88}Nb	9E+3	2E+3	8E-7	3E-9	–	–
			LLI wall (1E+4)	–	–	–	2E-4	2E-3
		Y, see ^{88}Nb	–	2E+2	7E-8	2E-10	–	–
41	Niobium-94	W, see ^{88}Nb	9E+2	2E+2	8E-8	3E-10	1E-5	1E-4
		Y, see ^{88}Nb	–	2E+1	6E-9	2E-11	–	–
41	Niobium-95m	W, see ^{88}Nb	2E+3	3E+3	1E-6	4E-9	–	–
			LLI wall (2E+3)	–	–	–	3E-5	3E-4
		Y, see ^{88}Nb	–	2E+3	9E-7	3E-9	–	–
41	Niobium-95	W, see ^{88}Nb	2E+3	1E+3	5E-7	2E-9	3E-5	3E-4
		Y, see ^{88}Nb	–	1E+3	5E-7	2E-9	–	–
41	Niobium-96	W, see ^{88}Nb	1E+3	3E+3	1E-6	4E-9	2E-5	2E-4
		Y, see ^{88}Nb	–	2E+3	1E-6	3E-9	–	–
41	Niobium-97[b/]	W, see ^{88}Nb	2E+4	8E+4	3E-5	1E-7	3E-4	3E-3
		Y, see ^{88}Nb	–	7E+4	3E-5	1E-7	–	–
41	Niobium-98[b/]	W, see ^{88}Nb	1E+4	5E+4	2E-5	8E-8	2E-4	2E-3
		Y, see ^{88}Nb	–	5E+4	2E-5	7E-8	–	–
42	Molybdenum-90	D, all compounds except those given for Y	4E+3	7E+3	3E-6	1E-8	3E-5	3E-4
		Y, oxides, hydroxides, and MoS_2	2E+3	5E+3	2E-6	6E-9	–	–
42	Molybdenum-93m	D, see ^{90}Mo	9E+3	2E+4	7E-6	2E-8	6E-5	6E-4
		Y, see ^{90}Mo	4E+3	1E+4	6E-6	2E-8	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
42	Molybdenum-93	D, see ^{90}Mo	4E+3	5E+3	2E-6	8E-9	5E-5	5E-4
		Y, see ^{90}Mo	2E+4	2E+2	8E-8	2E-10	–	–
42	Molybdenum-99	D, see ^{90}Mo	2E+3	3E+3	1E-6	4E-9	–	–
			LLI wall (1E+3)	–	–	–	2E-5	2E-4
		Y, see ^{90}Mo	1E+3	1E+3	6E-7	2E-9	–	–
42	Molybdenum-101[b/]	D, see ^{90}Mo	4E+4	1E+5	6E-5	2E-7	–	–
			St wall (5E+4)	–	–	–	7E-4	7E-3
		Y, see ^{90}Mo	–	1E+5	6E-5	2E-7	–	–
43	Technetium-93m[b/]	D, all compounds except those given for W	7E+4	2E+5	6E-5	2E-7	1E-3	1E-2
		W, oxides, hydroxides, halides, and nitrates	–	3E+5	1E-4	4E-7	–	–
43	Technetium-93	D, see ^{93m}Tc	3E+4	7E+4	3E-5	1E-7	4E-4	4E-3
		W, see ^{93m}Tc	–	1E+5	4E-5	1E-7	–	–
43	Technetium-94m[b/]	D, see ^{93m}Tc	2E+4	4E+4	2E-5	6E-8	3E-4	3E-3
		W, see ^{93m}Tc	–	6E+4	2E-5	8E-8	–	–
43	Technetium-94	D, see ^{93m}Tc	9E+3	2E+4	8E-6	3E-8	1E-4	1E-3
		W, see ^{93m}Tc	–	2E+4	1E-5	3E-8	–	–
43	Technetium-95m	D, see ^{93m}Tc	4E+3	5E+3	2E-6	8E-9	5E-5	5E-4
		W, see ^{93m}Tc	–	2E+3	8E-7	3E-9	–	–
43	Technetium-95	D, see ^{93m}Tc	1E+4	2E+4	9E-6	3E-8	1E-4	1E-3
		W, see ^{93m}Tc	–	2E+4	8E-6	3E-8	–	–
43	Technetium-96m[b/]	D, see ^{93m}Tc	2E+5	3E+5	1E-4	4E-7	2E-3	2E-2
		W, see ^{93m}Tc	–	2E+5	1E-4	3E-7	–	–
43	Technetium-96	D, see ^{93m}Tc	2E+3	3E+3	1E-6	5E-9	3E-5	3E-4
		W, see ^{93m}Tc	–	2E+3	9E-7	3E-9	–	–
43	Technetium-97m	D, see ^{93m}Tc	5E+3	7E+3	3E-6	–	6E-5	6E-4
			–	St wall (7E+3)	–	1E-8	–	–
		W, see ^{93m}Tc	–	1E+3	5E-7	2E-9	–	–
43	Technetium-97	D, see ^{93m}Tc	4E+4	5E+4	2E-5	7E-8	5E-4	5E-3
		W, see ^{93m}Tc	–	6E+3	2E-6	8E-9	–	–
43	Technetium-98	D, see ^{93m}Tc	1E+3	2E+3	7E-7	2E-9	1E-5	1E-4
		W, see ^{93m}Tc	–	3E+2	1E-7	4E-10	–	–
43	Technetium-99m	D, see ^{93m}Tc	8E+4	2E+5	6E-5	2E-7	1E-3	1E-2
		W, see ^{93m}Tc	–	2E+5	1E-4	3E-7	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
43	Technetium-99	D, see ^{93m}Tc	4E+3	5E+3	2E-6	–	6E-5	6E-4
			–	St wall (6E+3)	–	8E-9	–	–
		W, see ^{93m}Tc	–	7E+2	3E-7	9E-10	–	–
43	Technetium-101[b/]	D, see ^{93m}Tc	9E+4	3E+5	1E-4	5E-7	–	–
			St wall (1E+5)	–	–	–	2E-3	2E-2
		W, see ^{93m}Tc	–	4E+5	2E-4	5E-7	–	–
43	Technetium-104[b/]	D, see ^{93m}Tc	2E+4	7E+4	3E-5	1E-7	–	–
			St wall (3E+4)	–	–	–	4E-4	4E-3
		W, see ^{93m}Tc	–	9E+4	4E-5	1E-7	–	–
44	Ruthenium-94[b/]	D, all compounds except those given for W and Y	2E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, halides	–	6E+4	3E-5	9E-8	–	–
		Y, oxides and hydroxides	–	6E+4	2E-5	8E-8	–	–
44	Ruthenium-97	D, see ^{94}Ru	8E+3	2E+4	8E-6	3E-8	1E-4	1E-3
		W, see ^{94}Ru	–	1E+4	5E-6	2E-8	–	–
		Y, see ^{94}Ru	–	1E+4	5E-6	2E-8	–	–
44	Ruthenium-103	D, see ^{94}Ru	2E+3	2E+3	7E-7	2E-9	3E-5	3E-4
		W, see ^{94}Ru	–	1E+3	4E-7	1E-9	–	–
		Y, see ^{94}Ru	–	6E+2	3E-7	9E-10	–	–
44	Ruthenium-105	D, see ^{94}Ru	5E+3	1E+4	6E-6	2E-8	7E-5	7E-4
		W, see ^{94}Ru	–	1E+4	6E-6	2E-8	–	–
		Y, see ^{94}Ru	–	1E+4	5E-6	2E-8	–	–
44	Ruthenium-106	D, see ^{94}Ru	2E+2	9E+1	4E-8	1E-10	–	–
			LLI wall (2E+2)	–	–	–	3E-6	3E-5
		W, see ^{94}Ru	–	5E+1	2E-8	8E-11	–	–
		Y, see ^{94}Ru	–	1E+1	5E-9	2E-11	–	–
45	Rhodium-99m	D, all compounds except those given for W and Y	2E+4	6E+4	2E-5	8E-8	2E-4	2E-3
		W, halides	–	8E+4	3E-5	1E-7	–	–
		Y, oxides and hydroxides	–	7E+4	3E-5	9E-8	–	–
45	Rhodium-99	D, see ^{99m}Rh	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4
		W, see ^{99m}Rh	–	2E+3	9E-7	3E-9	–	–
		Y, see ^{99m}Rh	–	2E+3	8E-7	3E-9	–	–
45	Rhodium-100	D, see ^{99m}Rh	2E+3	5E+3	2E-6	7E-9	2E-5	2E-4
		W, see ^{99m}Rh	–	4E+3	2E-6	6E-9	–	–
		Y, see ^{99m}Rh	–	4E+3	2E-6	5E-9	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
45	Rhodium-101m	D, see ^{99m}Rh	6E+3	1E+4	5E-6	2E-8	8E-5	8E-4
		W, see ^{99m}Rh	–	8E+3	4E-6	1E-8	–	–
		Y, see ^{99m}Rh	–	8E+3	3E-6	1E-8	–	–
45	Rhodium-101	D, see ^{99m}Rh	2E+3	5E+2	2E-7	7E-10	3E-5	3E-4
		W, see ^{99m}Rh	–	8E+2	3E-7	1E-9	–	–
		Y, see ^{99m}Rh	–	2E+2	6E-8	2E-10	–	–
45	Rhodium-102m	D, see ^{99m}Rh	1E+3	5E+2	2E-7	7E-10	–	–
			LLI wall (1E+3)	–	–	–	2E-5	2E-4
		W, see ^{99m}Rh	–	4E+2	2E-7	5E-10	–	–
		Y, see ^{99m}Rh	–	1E+2	5E-8	2E-10	–	–
45	Rhodium-102	D, see ^{99m}Rh	6E+2	9E+1	4E-8	1E-10	8E-6	8E-5
		W, see ^{99m}Rh	–	2E+2	7E-8	2E-10	–	–
		Y, see ^{99m}Rh	–	6E+1	2E-8	8E-11	–	–
45	Rhodium-103m[b/]	D, see ^{99m}Rh	4E+5	1E+6	5E-4	2E-6	6E-3	6E-2
		W, see ^{99m}Rh	–	1E+6	5E-4	2E-6	–	–
		Y, see ^{99m}Rh	–	1E+6	5E-4	2E-6	–	–
45	Rhodium-105	D, see ^{99m}Rh	4E+3	1E+4	5E-6	2E-8	–	–
			LLI wall (4E+3)	–	–	–	5E-5	5E-4
		W, see ^{99m}Rh	–	6E+3	3E-6	9E-9	–	–
		Y, see ^{99m}Rh	–	6E+3	2E-6	8E-9	–	–
45	Rhodium-106m	D, see ^{99m}Rh	8E+3	3E+4	1E-5	4E-8	1E-4	1E-3
		W, see ^{99m}Rh	–	4E+4	2E-5	5E-8	–	–
		Y, see ^{99m}Rh	–	4E+4	1E-5	5E-8	–	–
45	Rhodium-107[b/]	D, see ^{99m}Rh	7E+4	2E+5	1E-4	3E-7	–	–
			St wall (9E+4)	–	–	–	1E-3	1E-2
		W, see ^{99m}Rh	–	3E+5	1E-4	4E-7	–	–
		Y, see ^{99m}Rh	–	3E+5	1E-4	3E-7	–	–
46	Palladium-100	D, all compound44s except those given for W and4 Y	1E+3	1E+3	6E-7	2E-9	2E-5	2E-4
		W, nitrates	–	1E+3	5E-7	2E-9	–	–
		Y, oxides and hydroxides	–	1E+3	6E-7	2E-9	–	–
46	Palladium-101	D, see ^{100}Pd	1E+4	3E+4	1E-5	5E-8	2E-4	2E-3
		W, see ^{100}Pd	–	3E+4	1E-5	5E-8	–	–
		Y, see ^{100}Pd	–	3E+4	1E-5	4E-8	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
46	Palladium-103	D, see ^{100}Pd	6E+3	6E+3	3E-6	9E-9	–	–
			LLI wall (7E+3)	–	–	–	1E-4	1E-3
		W, see ^{100}Pd	–	4E+3	2E-6	6E-9	–	–
		Y, see ^{100}Pd	–	4E+3	1E-6	5E-9	–	–
46	Palladium-107	D, see ^{100}Pd	3E+4	2E+4	9E-6	–	–	–
			LLI wall (4E+4)	Kidneys (2E+4)	–	3E-8	5E-4	5E-3
		W, see ^{100}Pd	–	7E+3	3E-6	1E-8	–	–
		Y, see ^{100}Pd	–	4E+2	2E-7	6E-10	–	–
46	Palladium-109	D, see ^{100}Pd	2E+3	6E+3	3E-6	9E-9	3E-5	3E-4
		W, see ^{100}Pd	–	5E+3	2E-6	8E-9	–	–
		Y, see ^{100}Pd	–	5E+3	2E-6	6E-9	–	–
47	Silver-102[b/]	D, all compounds except those given for W and Y	5E+4	2E+5	8E-5	2E-7	–	–
			St wall (6E+4)	–	–	–	9E-4	9E-3
		W, nitrates and sulfides	–	2E+5	9E-5	3E-7	–	–
		Y, oxides and hydroxides	–	2E+5	8E-5	3E-7	–	–
47	Silver-103[b/]	D, see ^{102}Ag	4E+4	1E+5	4E-5	1E-7	5E-4	5E-3
		W, see ^{102}Ag	–	1E+5	5E-5	2E-7	–	–
		Y, see ^{102}Ag	–	1E+5	5E-5	2E-7	–	–
47	Silver-104m[b/]	D, see ^{102}Ag	3E+4	9E+4	4E-5	1E-7	4E-4	4E-3
		W, see ^{102}Ag	–	1E+5	5E-5	2E-7	–	–
		Y, see ^{102}Ag	–	1E+5	5E-5	2E-7	–	–
47	Silver-104[b/]	D, see ^{102}Ag	2E+4	7E+4	3E-5	1E-7	3E-4	3E-3
		W, see ^{102}Ag	–	1E+5	6E-5	2E-7	–	–
		Y, see ^{102}Ag	–	1E+5	6E-5	2E-7	–	–
47	Silver-105	D, see ^{102}Ag	3E+3	1E+3	4E-7	1E-9	4E-5	4E-4
		W, see ^{102}Ag	–	2E+3	7E-7	2E-9	–	–
		Y, see ^{102}Ag	–	2E+3	7E-7	2E-9	–	–
47	Silver-106m	D, see ^{102}Ag	8E+2	7E+2	3E-7	1E-9	1E-5	1E-4
		W, see ^{102}Ag	–	9E+2	4E-7	1E-9	–	–
		Y, see ^{102}Ag	–	9E+2	4E-7	1E-9	–	–
47	Silver-106[b/]	D, see ^{102}Ag	6E+4	2E+5	8E-5	3E-7	–	–
			St wall (6E+4)	–	–	–	9E-4	9E-3
		W, see ^{102}Ag	–	2E+5	9E-5	3E-7	–	–
		Y, see ^{102}Ag	–	2E+5	8E-5	3E-7	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2 Inhalation	Col. 3	Col. 1	Col. 2	
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
47	Silver-108m	D, see ^{102}Ag	6E+2	2E+2	8E-8	3E-10	9E-6	9E-5
		W, see ^{102}Ag	–	3E+2	1E-7	4E-10	–	–
		Y, see ^{102}Ag	–	2E+1	1E-8	3E-11	–	–
47	Silver-110m	D, see ^{102}Ag	5E+2	1E+2	5E-8	2E-10	6E-6	6E-5
		W, see ^{102}Ag	–	2E+2	8E-8	3E-10	–	–
		Y, see ^{102}Ag	–	9E+1	4E-8	1E-10	–	–
47	Silver-111	D, see ^{102}Ag	9E+2	2E+3	6E-7	–	–	–
			LLI wall (1E+3)	Liver (2E+3)	–	2E-9	2E-5	2E-4
		W, see ^{102}Ag	–	9E+2	4E-7	1E-9	–	–
		Y, see ^{102}Ag	–	9E+2	4E-7	1E-9	–	–
47	Silver-112	D, see ^{102}Ag	3E+3	8E+3	3E-6	1E-8	4E-5	4E-4
		W, see ^{102}Ag	–	1E+4	4E-6	1E-8	–	–
		Y, see ^{102}Ag	–	9E+3	4E-6	1E-8	–	–
47	Silver-115[b/]	D, see ^{102}Ag	3E+4	9E+4	4E-5	1E-7	–	–
			St wall (3E+4)	–	–	–	4E-4	4E-3
		W, see ^{102}Ag	–	9E+4	4E-5	1E-7	–	–
		Y, see ^{102}Ag	–	8E+4	3E-5	1E-7	–	–
48	Cadmium-104[b/]	D, all compounds except those given for W and Y	2E+4	7E+4	3E-5	9E-8	3E-4	3E-3
		W, sulfides, halides, and nitrates	–	1E+5	5E-5	2E-7	–	–
		Y, oxides and hydroxides	–	1E+5	5E-5	2E-7	–	–
48	Cadmium-107	D, see ^{104}Cd	2E+4	5E+4	2E-5	8E-8	3E-4	3E-3
		W, see ^{104}Cd	–	6E+4	2E-5	8E-8	–	–
		Y, see ^{104}Cd	–	5E+4	2E-5	7E-8	–	–
48	Cadmium-109	D, see ^{104}Cd	3E+2	4E+1	1E-8	–	–	–
			Kidneys (4E+2)	Kidneys (5E+1)	–	7E-11	6E-6	6E-5
		W, see ^{104}Cd	–	1E+2	5E-8	–	–	–
			–	Kidneys (1E+2)	–	2E-10	–	–
		Y, see ^{104}Cd	–	1E+2	5E-8	2E-10	–	–
48	Cadmium-113m	D, see ^{104}Cd	2E+1	2E+0	1E-9	–	–	–
			Kidneys (4E+1)	Kidneys (4E+0)	–	5E-12	5E-7	5E-6
		W, see ^{104}Cd	–	8E+0	4E-9	–	–	–
			–	Kidneys (1E+1)	–	2E-11	–	–
		Y, see ^{104}Cd	–	1E+1	5E-9	2E-11	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
48	Cadmium-113	D, see ^{104}Cd	2E+1	2E+0	9E-10	–	–	–
			Kidneys	Kidneys				
			(3E+1)	(3E+0)	–	5E-12	4E-7	4E-6
		W, see ^{104}Cd	–	8E+0	3E-9	–	–	–
				Kidneys				
			–	(1E+1)	–	2E-11	–	–
		Y, see ^{104}Cd	–	1E+1	6E-9	2E-11	–	–
48	Cadmium-115m	D, see ^{104}Cd	3E+2	5E+1	2E-8	–	4E-6	4E-5
				Kidneys				
			–	(8E+1)	–	1E-10	–	–
		W, see ^{104}Cd	–	1E+2	5E-8	2E-10	–	–
		Y, see ^{104}Cd	–	1E+2	6E-8	2E-10	–	–
48	Cadmium-115	D, see ^{104}Cd	9E+2	1E+3	6E-7	2E-9	–	–
			LLI wall					
			(1E+3)	–	–	–	1E-5	1E-4
		W, see ^{104}Cd	–	1E+3	5E-7	2E-9	–	–
		Y, see ^{104}Cd	–	1E+3	6E-7	2E-9	–	–
48	Cadmium-117m	D, see ^{104}Cd	5E+3	1E+4	5E-6	2E-8	6E-5	6E-4
		W, see ^{104}Cd	–	2E+4	7E-6	2E-8	–	–
		Y, see ^{104}Cd	–	1E+4	6E-6	2E-8	–	–
48	Cadmium-117	D, see ^{104}Cd	5E+3	1E+4	5E-6	2E-8	6E-5	6E-4
		W, see ^{104}Cd	–	2E+4	7E-6	2E-8	–	–
		Y, see ^{104}Cd	–	1E+4	6E-6	2E-8	–	–
49	Indium-109	D, all compounds except those given for W	2E+4	4E+4	2E-5	6E-8	3E-4	3E-3
		W, oxides, hydroxides, halides, and nitrates	–	6E+4	3E-5	9E-8	–	–
49	Indium-110[b/] (69.1 min)	D, see ^{109}In	2E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{109}In	–	6E+4	2E-5	8E-8	–	–
49	Indium-110 (4.9 h)	D, see ^{109}In	5E+3	2E+4	7E-6	2E-8	7E-5	7E-4
		W, see ^{109}In	–	2E+4	8E-6	3E-8	–	–
49	Indium-111	D, see ^{109}In	4E+3	6E+3	3E-6	9E-9	6E-5	6E-4
		W, see ^{109}In	–	6E+3	3E-6	9E-9	–	–
49	Indium-112[b/]	D, see ^{109}In	2E+5	6E+5	3E-4	9E-7	2E-3	2E-2
		W, see ^{109}In	–	7E+5	3E-4	1E-6	–	–
49	Indium-113m[b/]	D, see ^{109}In	5E+4	1E+5	6E-5	2E-7	7E-4	7E-3
		W, see ^{109}In	–	2E+5	8E-5	3E-7	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
49	Indium-114m	D, see ^{109}In	3E+2	6E+1	3E-8	9E-11	–	–
			LLI wall (4E+2)	–	–	–	5E-6	5E-5
		W, see ^{109}In	–	1E+2	4E-8	1E-10	–	–
49	Indium-115m	D, see ^{109}In	1E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{109}In	–	5E+4	2E-5	7E-8	–	–
49	Indium-115	D, see ^{109}In	4E+1	1E+0	6E-10	2E-12	5E-7	5E-6
		W, see ^{109}In	–	5E+0	2E-9	8E-12	–	–
49	Indium-116m[b/]	D, see ^{109}In	2E+4	8E+4	3E-5	1E-7	3E-4	3E-3
		W, see ^{109}In	–	1E+5	5E-5	2E-7	–	–
49	Indium-117m[b/]	D, see ^{109}In	1E+4	3E+4	1E-5	5E-8	2E-4	2E-3
		W, see ^{109}In	–	4E+4	2E-5	6E-8	–	–
49	Indium-117[b/]	D, see ^{109}In	6E+4	2E+5	7E-5	2E-7	8E-4	8E-3
		W, see ^{109}In	–	2E+5	9E-5	3E-7	–	–
49	Indium-119m[b/]	D, see ^{109}In	4E+4	1E+5	5E-5	2E-7	–	–
			St wall (5E+4)	–	–	–	7E-4	7E-3
		W, see ^{109}In	–	1E+5	6E-5	2E-7	–	–
50	Tin-110	D, all compounds except those given for W	4E+3	1E+4	5E-6	2E-8	5E-5	5E-4
		W, sulfides, oxides, hydroxides, halides, nitrates, and stannic phosphate	–	1E+4	5E-6	2E-8	–	–
50	Tin-111[b/]	D, see ^{110}Sn	7E+4	2E+5	9E-5	3E-7	1E-3	1E-2
		W, see ^{110}Sn	–	3E+5	1E-4	4E-7	–	–
50	Tin-113	D, see ^{110}Sn	2E+3	1E+3	5E-7	2E-9	–	–
			LLI wall (2E+3)	–	–	–	3E-5	3E-4
		W, see ^{110}Sn	–	5E+2	2E-7	8E-10	–	–
50	Tin-117m	D, see ^{110}Sn	2E+3	1E+3	5E-7	–	–	–
			LLI wall (2E+3)	Bone surf (2E+3)	–	3E-9	3E-5	3E-4
		W, see ^{110}Sn	–	1E+3	6E-7	2E-9	–	–
50	Tin-119m	D, see ^{110}Sn	3E+3	2E+3	1E-6	3E-9	–	–
			LLI wall (4E+3)	–	–	–	6E-5	6E-4
		W, see ^{110}Sn	–	1E+3	4E-7	1E-9	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
50	Tin-121m	D, see ^{110}Sn	3E+3	9E+2	4E-7	1E-9	–	–
			LLI wall (4E+3)	–	–	–	5E-5	5E-4
		W, see ^{110}Sn	–	5E+2	2E-7	8E-10	–	–
50	Tin-121	D, see ^{110}Sn	6E+3	2E+4	6E-6	2E-8	–	–
			LLI wall (6E+3)	–	–	–	8E-5	8E-4
		W, see ^{110}Sn	–	1E+4	5E-6	2E-8	–	–
50	Tin-123m[b/]	D, see ^{110}Sn	5E+4	1E+5	5E-5	2E-7	7E-4	7E-3
		W, see ^{110}Sn	–	1E+5	6E-5	2E-7	–	–
50	Tin-123	D, see ^{110}Sn	5E+2	6E+2	3E-7	9E-10	–	–
			LLI wall (6E+2)	–	–	–	9E-6	9E-5
		W, see ^{110}Sn	–	2E+2	7E-8	2E-10	–	–
50	Tin-125	D, see ^{110}Sn	4E+2	9E+2	4E-7	1E-9	–	–
			LLI wall (5E+2)	–	–	–	6E-6	6E-5
		W, see ^{110}Sn	–	4E+2	1E-7	5E-10	–	–
50	Tin-126	D, see ^{110}Sn	3E+2	6E+1	2E-8	8E-11	4E-6	4E-5
		W, see ^{110}Sn	–	7E+1	3E-8	9E-11	–	–
50	Tin-127	D, see ^{110}Sn	7E+3	2E+4	8E-6	3E-8	9E-5	9E-4
		W, see ^{110}Sn	–	2E+4	8E-6	3E-8	–	–
50	Tin-128[b/]	D, see ^{110}Sn	9E+3	3E+4	1E-5	4E-8	1E-4	1E-3
		W, see ^{110}Sn	–	4E+4	1E-5	5E-8	–	–
51	Antimony-115[b/]	D, all compounds except those given for W	8E+4	2E+5	1E-4	3E-7	1E-3	1E-2
		W, oxides, hydroxides, halides, sulfides, sulfates, and nitrates	–	3E+5	1E-4	4E-7	–	–
51	Antimony-116m[b/]	D, see ^{115}Sb	2E+4	7E+4	3E-5	1E-7	3E-4	3E-3
		W, see ^{115}Sb	–	1E+5	6E-5	2E-7	–	–
51	Antimony-116[b/]	D, see ^{115}Sb	7E+4	3E+5	1E-4	4E-7	–	–
			St wall (9E+4)	–	–	–	1E-3	1E-2
		W, see ^{115}Sb	–	3E+5	1E-4	5E-7	–	–
51	Antimony-117	D, see ^{115}Sb	7E+4	2E+5	9E-5	3E-7	9E-4	9E-3
		W, see ^{115}Sb	–	3E+5	1E-4	4E-7	–	–
51	Antimony-118m	D, see ^{115}Sb	6E+3	2E+4	8E-6	3E-8	7E-5	7E-4
		W, see ^{115}Sb	5E+3	2E+4	9E-6	3E-8	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
51	Antimony-119	D, see ^{115}Sb	2E+4	5E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{115}Sb	2E+4	3E+4	1E-5	4E-8	–	–
51	Antimony-120[b/] (16 min)	D, see ^{115}Sb	1E+5 St wall (2E+5)	4E+5	2E-4	6E-7	–	–
				–	–	–	2E-3	2E-2
		W, see ^{115}Sb	–	5E+5	2E-4	7E-7	–	–
51	Antimony-120 (5.76 d)	D, see ^{115}Sb	1E+3	2E+3	9E-7	3E-9	1E-5	1E-4
		W, see ^{115}Sb	9E+2	1E+3	5E-7	2E-9	–	–
51	Antimony-122	D, see ^{115}Sb	8E+2 LLI wall (8E+2)	2E+3	1E-6	3E-9	–	–
				–	–	–	1E-5	1E-4
		W, see ^{115}Sb	7E+2	1E+3	4E-7	2E-9	–	–
51	Antimony-124m[b/]	D, see ^{115}Sb	3E+5	8E+5	4E-4	1E-6	3E-3	3E-2
		W, see ^{115}Sb	2E+5	6E+5	2E-4	8E-7	–	–
51	Antimony-124	D, see ^{115}Sb	6E+2	9E+2	4E-7	1E-9	7E-6	7E-5
		W, see ^{115}Sb	5E+2	2E+2	1E-7	3E-10	–	–
51	Antimony-125	D, see ^{115}Sb	2E+3	2E+3	1E-6	3E-9	3E-5	3E-4
		W, see ^{115}Sb	–	5E+2	2E-7	7E-10	–	–
51	Antimony-126m[b/]	D, see ^{115}Sb	5E+4 St wall (7E+4)	2E+5	8E-5	3E-7	–	–
				–	–	–	9E-4	9E-3
		W, see ^{115}Sb	–	2E+5	8E-5	3E-7	–	–
51	Antimony-126	D, see ^{115}Sb	6E+2	1E+3	5E-7	2E-9	7E-6	7E-5
		W, see ^{115}Sb	5E+2	5E+2	2E-7	7E-10	–	–
51	Antimony-127	D, see ^{115}Sb	8E+2 LLI wall (8E+2)	2E+3	9E-7	3E-9	–	–
				–	–	–	1E-5	1E-4
		W, see ^{115}Sb	7E+2	9E+2	4E-7	1E-9	–	–
51	Antimony-128[b/] (10.4 min)	D, see ^{115}Sb	8E+4 St wall (1E+5)	4E+5	2E-4	5E-7	–	–
				–	–	–	1E-3	1E-2
		W, see ^{115}Sb	–	4E+5	2E-4	6E-7	–	–
51	Antimony-128 (9.01 h)	D, see ^{115}Sb	1E+3	4E+3	2E-6	6E-9	2E-5	2E-4
		W, see ^{115}Sb	–	3E+3	1E-6	5E-9	–	–
51	Antimony-129	D, see ^{115}Sb	3E+3	9E+3	4E-6	1E-8	4E-5	4E-4
		W, see ^{115}Sb	–	9E+3	4E-6	1E-8	–	–
51	Antimony-130[b/]	D, see ^{115}Sb	2E+4	6E+4	3E-5	9E-8	3E-4	3E-3
		W, see ^{115}Sb	–	8E+4	3E-5	1E-7	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
51	Antimony-131[b/]	D, see ^{115}Sb	1E+4	2E+4	1E-5	–	–	–
			Thyroid (2E+4)	Thyroid (4E+4)	–	6E-8	2E-4	2E-3
		W, see ^{115}Sb	-	2E+4	1E-5	–	–	–
			-	Thyroid (4E+4)	–	6E-8	–	–
52	Tellurium-116	D, all compounds except those given for W	8E+3	2E+4	9E-6	3E-8	1E-4	1E-3
		W, oxides, hydroxides, and nitrates	-	3E+4	1E-5	4E-8	–	–
52	Tellurium-121m	D, see ^{116}Te	5E+2	2E+2	8E-8	–	–	–
			Bone surf (7E+2)	Bone surf (4E+2)	–	5E-10	1E-5	1E-4
		W, see ^{116}Te	–	4E+2	2E-7	6E-10	–	–
52	Tellurium-121	D, see ^{116}Te	3E+3	4E+3	2E-6	6E-9	4E-5	4E-4
		W, see ^{116}Te	–	3E+3	1E-6	4E-9	–	–
52	Tellurium-123m	D, see ^{116}Te	6E+2	2E+2	9E-8	–	–	–
			Bone surf (1E+3)	Bone surf (5E+2)	–	8E-10	1E-5	1E-4
		W, see ^{116}Te	–	5E+2	2E-7	8E-10	–	–
52	Tellurium-123	D, see ^{116}Te	5E+2	2E+2	8E-8	–	–	–
			Bone surf (1E+3)	Bone surf (5E+2)	–	7E-10	2E-5	2E-4
		W, see ^{116}Te	–	4E+2	2E-7	–	–	–
			–	Bone surf (1E+3)	–	2E-9	–	–
52	Tellurium-125m	D, see ^{116}Te	1E+3	4E+2	2E-7	–	–	–
			Bone surf (1E+3)	Bone surf (1E+3)	–	1E-9	2E-5	2E-4
		W, see ^{116}Te	–	7E+2	3E-7	1E-9	–	–
52	Tellurium-127m	D, see ^{116}Te	6E+2	3E+2	1E-7	–	9E-6	9E-5
			–	Bone surf (4E+2)	–	6E-10	–	–
		W, see ^{116}Te	–	3E+2	1E-7	4E-10	–	–
52	Tellurium-127	D, see ^{116}Te	7E+3	2E+4	9E-6	3E-8	1E-4	1E-3
		W, see ^{116}Te	–	2E+4	7E-6	2E-8	–	–
52	Tellurium-129m	D, see ^{116}Te	5E+2	6E+2	3E-7	9E-10	7E-6	7E-5
		W, see ^{116}Te	–	2E+2	1E-7	3E-10	–	–
52	Tellurium-129[b/]	D, see ^{116}Te	3E+4	6E+4	3E-5	9E-8	4E-4	4E-3
		W, see ^{116}Te	–	7E+4	3E-5	1E-7	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
52	Tellurium-131m	D, see ^{116}Te	3E+2 Thyroid (6E+2)	4E+2 Thyroid (1E+3)	2E-7 –	– 2E-9	– 8E-6	– 8E-5
		W, see ^{116}Te	– –	4E+2 Thyroid (9E+2)	2E-7 –	– 1E-9	– –	– –
52	Tellurium-131[b/]	D, see ^{116}Te	3E+3 Thyroid (6E+3)	5E+3 Thyroid (1E+4)	2E-6 –	– 2E-8	– 8E-5	– 8E-4
		W, see ^{116}Te	– –	5E+3 Thyroid (1E+4)	2E-6 –	– 2E-8	– –	– –
52	Tellurium-132	D, see ^{116}Te	2E+2 Thyroid (7E+2)	2E+2 Thyroid (8E+2)	9E-8 –	– 1E-9	– 9E-6	– 9E-5
		W, see ^{116}Te	– –	2E+2 Thyroid (6E+2)	9E-8 –	– 9E-10	– –	– –
52	Tellurium-133m[b/]	D, see ^{116}Te	3E+3 Thyroid (6E+3)	5E+3 Thyroid (1E+4)	2E-6 –	– 2E-8	– 9E-5	– 9E-4
		W, see ^{116}Te	– –	5E+3 Thyroid (1E+4)	2E-6 –	– 2E-8	– –	– –
52	Tellurium-133[b/]	D, see ^{116}Te	1E+4 Thyroid (3E+4)	2E+4 Thyroid (6E+4)	9E-6 –	– 8E-8	– 4E-4	– 4E-3
		W, see ^{116}Te	– –	2E+4 Thyroid (6E+4)	9E-6 –	– 8E-8	– –	– –
52	Tellurium-134[b/]	D, see ^{116}Te	2E+4 Thyroid (2E+4)	2E+4 Thyroid (5E+4)	1E-5 –	– 7E-8	– 3E-4	– 3E-3
		W, see ^{116}Te	– –	2E+4 Thyroid (5E+4)	1E-5 –	– 7E-8	– –	– –
53	Iodine-120m[b/]	D, all compounds	1E+4 Thyroid (1E+4)	2E+4 –	9E-6 –	3E-8 –	– 2E-4	– 2E-3
53	Iodine-120[b/]	D, all compounds	4E+3 Thyroid (8E+3)	9E+3 Thyroid (1E+4)	4E-6 –	– 2E-8	– 1E-4	– 1E-3

Footnotes appear at the end of these three tables.

Appendix B

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
53	Iodine-121	D, all compounds	1E+4 Thyroid (3E+4)	2E+4 Thyroid (5E+4)	8E-6 –	– 7E-8	– 4E-4	– 4E-3
53	Iodine-123	D, all compounds	3E+3 Thyroid (1E+4)	6E+3 Thyroid (2E+4)	3E-6 –	– 2E-8	– 1E-4	– 1E-3
53	Iodine-124	D, all compounds	5E+1 Thyroid (2E+2)	8E+1 Thyroid (3E+2)	3E-8 –	– 4E-10	– 2E-6	– 2E-5
53	Iodine-125	D, all compounds	4E+1 Thyroid (1E+2)	6E+1 Thyroid (2E+2)	3E-8 –	– 3E-10	– 2E-6	– 2E-5
53	Iodine-126	D, all compounds	2E+1 Thyroid (7E+1)	4E+1 Thyroid (1E+2)	1E-8 –	– 2E-10	– 1E-6	– 1E-5
53	Iodine-128[b/]	D, all compounds	4E+4 St wall (6E+4)	1E+5 –	5E-5 –	2E-7 –	– 8E-4	– 8E-3
53	Iodine-129	D, all compounds	5E+0 Thyroid (2E+1)	9E+0 Thyroid (3E+1)	4E-9 –	– 4E-11	– 2E-7	– 2E-6
53	Iodine-130	D, all compounds	4E+2 Thyroid (1E+3)	7E+2 Thyroid (2E+3)	3E-7 –	– 3E-9	– 2E-5	– 2E-4
53	Iodine-131	D, all compounds	3E+1 Thyroid (9E+1)	5E+1 Thyroid (2E+2)	2E-8 –	– 2E-10	– 1E-6	– 1E-5
53	Iodine-132m[b/]	D, all compounds	4E+3 Thyroid (1E+4)	8E+3 Thyroid (2E+4)	4E-6 –	– 3E-8	– 1E-4	– 1E-3
53	Iodine-132	D, all compounds	4E+3 Thyroid (9E+3)	8E+3 Thyroid (1E+4)	3E-6 –	– 2E-8	– 1E-4	– 1E-3
53	Iodine-133	D, all compounds	1E+2 Thyroid (5E+2)	3E+2 Thyroid (9E+2)	1E-7 –	– 1E-9	– 7E-6	– 7E-5
53	Iodine-134[b/]	D, all compounds	2E+4 Thyroid (3E+4)	5E+4 –	2E-5 –	6E-8 –	– 4E-4	– 4E-3

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
53	Iodine-135	D, all compounds	8E+2 Thyroid (3E+3)	2E+3 Thyroid (4E+3)	7E-7 –	– 6E-9	– 3E-5	– 3E-4
54	Xenon-120[b/]	Submersion[a/]	–	–	1E-5	4E-8	–	–
54	Xenon-121[b/]	Submersion[a/]	–	–	2E-6	1E-8	–	–
54	Xenon-122	Submersion[a/]	–	–	7E-5	3E-7	–	–
54	Xenon-123	Submersion[a/]	–	–	6E-6	3E-8	–	–
54	Xenon-125	Submersion[a/]	–	–	2E-5	7E-8	–	–
54	Xenon-127	Submersion[a/]	–	–	1E-5	6E-8	–	–
54	Xenon-129m	Submersion[a/]	–	–	2E-4	9E-7	–	–
54	Xenon-131m	Submersion[a/]	–	–	4E-4	2E-6	–	–
54	Xenon-133m	Submersion[a/]	–	–	1E-4	6E-7	–	–
54	Xenon-133	Submersion[a/]	–	–	1E-4	5E-7	–	–
54	Xenon-135m[b/]	Submersion[a/]	–	–	9E-6	4E-8	–	–
54	Xenon-135	Submersion[a/]	–	–	1E-5	7E-8	–	–
54	Xenon-138[b/]	Submersion[a/]	–	–	4E-6	2E-8	–	–
55	Cesium-125[b/]	D, all compounds	5E+4 St wall (9E+4)	1E+5 –	6E-5 –	2E-7 –	– 1E-3	– 1E-2
55	Cesium-127	D, all compounds	6E+4	9E+4	4E-5	1E-7	9E-4	9E-3
55	Cesium-129	D, all compounds	2E+4	3E+4	1E-5	5E-8	3E-4	3E-3
55	Cesium-130[b/]	D, all compounds	6E+4 St wall (1E+5)	2E+5 –	8E-5 –	3E-7 –	– 1E-3	– 1E-2
55	Cesium-131	D, all compounds	2E+4	3E+4	1E-5	4E-8	3E-4	3E-3
55	Cesium-132	D, all compounds	3E+3	4E+3	2E-6	6E-9	4E-5	4E-4
55	Cesium-134m	D, all compounds	1E+5 St wall (1E+5)	1E+5 –	6E-5 –	2E-7 –	– 2E-3	– 2E-2
55	Cesium-134	D, all compounds	7E+1	1E+2	4E-8	2E-10	9E-7	9E-6

Footnotes appear at the end of these three tables.

Appendix B

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
55	Cesium-135m[b/]	D, all compounds	1E+5	2E+5	8E-5	3E-7	1E-3	1E-2
55	Cesium-135	D, all compounds	7E+2	1E+3	5E-7	2E-9	1E-5	1E-4
55	Cesium-136	D, all compounds	4E+2	7E+2	3E-7	9E-10	6E-6	6E-5
55	Cesium-137	D, all compounds	1E+2	2E+2	6E-8	2E-10	1E-6	1E-5
55	Cesium-138[b/]	D, all compounds	2E+4	6E+4	2E-5	8E-8	–	–
			St wall (3E+4)	–	–	–	4E-4	4E-3
56	Barium-126[b/]	D, all compounds	6E+3	2E+4	6E-6	2E-8	8E-5	8E-4
56	Barium-128	D, all compounds	5E+2	2E+3	7E-7	2E-9	7E-6	7E-5
56	Barium-131m[b/]	D, all compounds	4E+5	1E+6	6E-4	2E-6	–	–
			St wall (5E+5)	–	–	–	7E-3	7E-2
56	Barium-131	D, all compounds	3E+3	8E+3	3E-6	1E-8	4E-5	4E-4
56	Barium-133m	D, all compounds	2E+3	9E+3	4E-6	1E-8	–	–
			LLI wall (3E+3)	–	–	–	4E-5	4E-4
56	Barium-133	D, all compounds	2E+3	7E+2	3E-7	9E-10	2E-5	2E-4
56	Barium-135m	D, all compounds	3E+3	1E+4	5E-6	2E-8	4E-5	4E-4
56	Barium-139[b/]	D, all compounds	1E+4	3E+4	1E-5	4E-8	2E-4	2E-3
56	Barium-140	D, all compounds	5E+2	1E+3	6E-7	2E-9	–	–
			LLI wall (6E+2)	–	–	–	8E-6	8E-5
56	Barium-141[b/]	D, all compounds	2E+4	7E+4	3E-5	1E-7	3E-4	3E-3
56	Barium-142[b/]	D, all compounds	5E+4	1E+5	6E-5	2E-7	7E-4	7E-3
57	Lanthanum-131[b/]	D, all compounds except those given for W	5E+4	1E+5	5E-5	2E-7	6E-4	6E-3
		W, oxides and hydroxides	–	2E+5	7E-5	2E-7	–	–
57	Lanthanum-132	D, see ^{131}La	3E+3	1E+4	4E-6	1E-8	4E-5	4E-4
		W, see ^{131}La	–	1E+4	5E-6	2E-8	–	–
57	Lanthanum-135	D, see ^{131}La	4E+4	1E+5	4E-5	1E-7	5E-4	5E-3
		W, see ^{131}La	–	9E+4	4E-5	1E-7	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1 Oral Ingestion ALI (µCi)	Col. 2 Inhalation ALI (µCi)	Col. 3 Inhalation DAC (µCi/ml)	Col. 1 Air (µCi/ml)	Col. 2 Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
57	Lanthanum-137	D, see ^{131}La	1E+4	6E+1	3E-8	–	2E-4	2E-3
			–	Liver (7E+1)	–	1E-10	–	–
		W, see ^{131}La	–	3E+2	1E-7	–	–	–
			–	Liver (3E+2)	–	4E-10	–	–
57	Lanthanum-138	D, see ^{131}La	9E+2	4E+0	1E-9	5E-12	1E-5	1E-4
		W, see ^{131}La	–	1E+1	6E-9	2E-11	–	–
57	Lanthanum-140	D, see ^{131}La	6E+2	1E+3	6E-7	2E-9	9E-6	9E-5
		W, see ^{131}La	–	1E+3	5E-7	2E-9	–	–
57	Lanthanum-141	D, see ^{131}La	4E+3	9E+3	4E-6	1E-8	5E-5	5E-4
		W, see ^{131}La	–	1E+4	5E-6	2E-8	–	–
57	Lanthanum-142[b/]	D, see ^{131}La	8E+3	2E+4	9E-6	3E-8	1E-4	1E-3
		W, see ^{131}La	–	3E+4	1E-5	5E-8	–	–
57	Lanthanum-143[b/]	D, see ^{131}La	4E+4	1E+5	4E-5	1E-7	–	–
			St wall (4E+4)	–	–	–	5E-4	5E-3
		W, see ^{131}La	–	9E+4	4E-5	1E-7	–	–
58	Cerium-134	W, all compounds except those given for Y	5E+2	7E+2	3E-7	1E-9	–	–
			LLI wall (6E+2)	–	–	–	8E-6	8E-5
		Y, oxides, hydroxides, and fluorides	–	7E+2	3E-7	9E-10	–	–
58	Cerium-135	W, see ^{134}Ce	2E+3	4E+3	2E-6	5E-9	2E-5	2E-4
		Y, see ^{134}Ce	–	4E+3	1E-6	5E-9	–	–
58	Cerium-137m	W, see ^{134}Ce	2E+3	4E+3	2E-6	6E-9	–	–
			LLI wall (2E+3)	–	–	–	3E-5	3E-4
		Y, see ^{134}Ce	–	4E+3	2E-6	5E-9	–	–
58	Cerium-137	W, see ^{134}Ce	5E+4	1E+5	6E-5	2E-7	7E-4	7E-3
		Y, see ^{134}Ce	–	1E+5	5E-5	2E-7	–	–
58	Cerium-139	W, see ^{134}Ce	5E+3	8E+2	3E-7	1E-9	7E-5	7E-4
		Y, see ^{134}Ce	–	7E+2	3E-7	9E-10	–	–
58	Cerium-141	W, see ^{134}Ce	2E+3	7E+2	3E-7	1E-9	–	–
			LLI wall (2E+3)	–	–	–	3E-5	3E-4
		Y, see ^{134}Ce	–	6E+2	2E-7	8E-10	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
58	Cerium-143	W, see ^{134}Ce	1E+3	2E+3	8E-7	3E-9	–	–
			LLI wall (1E+3)	–	–	–	2E-5	2E-4
		Y, see ^{134}Ce	–	2E+3	7E-7	2E-9	–	–
58	Cerium-144	W, see ^{134}Ce	2E+2	3E+1	1E-8	4E-11	–	–
			LLI wall (3E+2)	–	–	–	3E-6	3E-5
		Y, see ^{134}Ce	–	1E+1	6E-9	2E-11	–	–
59	Praseodymium-136[b/]	W, all compounds except those given for Y	5E+4	2E+5	1E-4	3E-7	–	–
			St wall (7E+4)	–	–	–	1E-3	1E-2
		Y, oxides, hydroxides, carbides, and fluorides	–	2E+5	9E-5	3E-7	–	–
59	Praseodymium-137[b/]	W, see ^{136}Pr	4E+4	2E+5	6E-5	2E-7	5E-4	5E-3
		Y, see ^{136}Pr	–	1E+5	6E-5	2E-7	–	–
59	Praseodymium-138m	W, see ^{136}Pr	1E+4	5E+4	2E-5	8E-8	1E-4	1E-3
		Y, see ^{136}Pr	–	4E+4	2E-5	6E-8	–	–
59	Praseodymium-139	W, see ^{136}Pr	4E+4	1E+5	5E-5	2E-7	6E-4	6E-3
		Y, see ^{136}Pr	–	1E+5	5E-5	2E-7	–	–
59	Praseodymium-142m[b/]	W, see ^{136}Pr	8E+4	2E+5	7E-5	2E-7	1E-3	1E-2
		Y, see ^{136}Pr	–	1E+5	6E-5	2E-7	–	–
59	Praseodymium-142	W, see ^{136}Pr	1E+3	2E+3	9E-7	3E-9	1E-5	1E-4
		Y, see ^{136}Pr	–	2E+3	8E-7	3E-9	–	–
59	Praseodymium-143	W, see ^{136}Pr	9E+2	8E+2	3E-7	1E-9	–	–
			LLI wall (1E+3)	–	–	–	2E-5	2E-4
		Y, see ^{136}Pr	–	7E+2	3E-7	9E-10	–	–
59	Praseodymium-144[b/]	W, see ^{136}Pr	3E+4	1E+5	5E-5	2E-7	–	–
			St wall (4E+4)	–	–	–	6E-4	6E-3
		Y, see ^{136}Pr	–	1E+5	5E-5	2E-7	–	–
59	Praseodymium-145	W, see ^{136}Pr	3E+3	9E+3	4E-6	1E-8	4E-5	4E-4
		Y, see ^{136}Pr	–	8E+3	3E-6	1E-8	–	–
59	Praseodymium-147[b/]	W, see ^{136}Pr	5E+4	2E+5	8E-5	3E-7	–	–
			St wall (8E+4)	–	–	–	1E-3	1E-2
		Y, see ^{136}Pr	–	2E+5	8E-5	3E-7	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2 Inhalation	Col. 3	Col. 1	Col. 2	
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
60	Neodymium-136[b/]	W, all compounds except those given for Y	1E+4	6E+4	2E-5	8E-8	2E-4	2E-3
		Y, oxides, hydroxides, carbides, and fluorides	–	5E+4	2E-5	8E-8	–	–
60	Neodymium-138	W, see ^{136}Nd	2E+3	6E+3	3E-6	9E-9	3E-5	3E-4
		Y, see ^{136}Nd	-	5E+3	2E-6	7E-9	-	-
60	Neodymium-139m	W, see ^{136}Nd	5E+3	2E+4	7E-6	2E-8	7E-5	7E-4
		Y, see ^{136}Nd	–	1E+4	6E-6	2E-8	–	–
60	Neodymium-139[b/]	W, see ^{136}Nd	9E+4	3E+5	1E-4	5E-7	1E-3	1E-2
		Y, see ^{136}Nd	–	3E+5	1E-4	4E-7	–	–
60	Neodymium-141	W, see ^{136}Nd	2E+5	7E+5	3E-4	1E-6	2E-3	2E-2
		Y, see ^{136}Nd	–	6E+5	3E-4	9E-7	–	–
60	Neodymium-147	W, see ^{136}Nd	1E+3	9E+2	4E-7	1E-9	–	–
			LLI wall (1E+3)	–	–	–	2E-5	2E-4
		Y, see ^{136}Nd	–	8E+2	4E-7	1E-9	–	–
60	Neodymium-149[b/]	W, see ^{136}Nd	1E+4	3E+4	1E-5	4E-8	1E-4	1E-3
		Y, see ^{136}Nd	–	2E+4	1E-5	3E-8	–	–
60	Neodymium-151[b/]	W, see ^{136}Nd	7E+4	2E+5	8E-5	3E-7	9E-4	9E-3
		Y, see ^{136}Nd	–	2E+5	8E-5	3E-7	–	–
61	Promethium-141[b/]	W, all compounds except those given for Y	5E+4	2E+5	8E-5	3E-7	–	–
			St wall (6E+4)	–	–	–	8E-4	8E-3
		Y, oxides, hydroxides, carbides, and fluorides	–	2E+5	7E-5	2E-7	–	–
61	Promethium-143	W, see ^{141}Pm	5E+3	6E+2	2E-7	8E-10	7E-5	7E-4
		Y, see ^{141}Pm	–	7E+2	3E-7	1E-9	–	–
61	Promethium-144	W, see ^{141}Pm	1E+3	1E+2	5E-8	2E-10	2E-5	2E-4
		Y, see ^{141}Pm	–	1E+2	5E-8	2E-10	–	–
61	Promethium-145	W, see ^{141}Pm	1E+4	2E+2	7E-8	–	1E-4	1E-3
			–	Bone surf (2E+2)	–	3E-10	–	–
		Y, see ^{141}Pm	–	2E+2	8E-8	3E-10	–	–
61	Promethium-146	W, see ^{141}Pm	2E+3	5E+1	2E-8	7E-11	2E-5	2E-4
		Y, see ^{141}Pm	–	4E+1	2E-8	6E-11	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
61	Promethium-147	W, see ^{141}Pm	4E+3	1E+2	5E-8	–	–	–
			LLI wall (5E+3)	Bone surf (2E+2)	–	3E-10	7E-5	7E-4
		Y, see ^{141}Pm	–	1E+2	6E-8	2E-10	–	–
61	Promethium-148m	W, see ^{141}Pm	7E+2	3E+2	1E-7	4E-10	1E-5	1E-4
		Y, see ^{141}Pm	–	3E+2	1E-7	5E-10	–	–
61	Promethium-148	W, see ^{141}Pm	4E+2	5E+2	2E-7	8E-10	–	–
			LLI wall (5E+2)	–	–	–	7E-6	7E-5
		Y, see ^{141}Pm	–	5E+2	2E-7	7E-10	–	–
61	Promethium-149	W, see ^{141}Pm	1E+3	2E+3	8E-7	3E-9	–	–
			LLI wall (1E+3)	–	–	–	2E-5	2E-4
		Y, see ^{141}Pm	–	2E+3	8E-7	2E-9	–	–
61	Promethium-150	W, see ^{141}Pm	5E+3	2E+4	8E-6	3E-8	7E-5	7E-4
		Y, see ^{141}Pm	–	2E+4	7E-6	2E-8	–	–
61	Promethium-151	W, see ^{141}Pm	2E+3	4E+3	1E-6	5E-9	2E-5	2E-4
		Y, see ^{141}Pm	–	3E+3	1E-6	4E-9	–	–
62	Samarium-141m[b/]	W, all compounds	3E+4	1E+5	4E-5	1E-7	4E-4	4E-3
62	Samarium-141[b/]	W, all compounds	5E+4	2E+5	8E-5	2E-7	–	–
			St wall (6E+4)	–	–	–	8E-4	8E-3
62	Samarium-142[b/]	W, all compounds	8E+3	3E+4	1E-5	4E-8	1E-4	1E-3
62	Samarium-145	W, all compounds	6E+3	5E+2	2E-7	7E-10	8E-5	8E-4
62	Samarium-146	W, all compounds	1E+1	4E-2	1E-11	–	–	–
			Bone surf (3E+1)	Bone surf (6E-2)	–	9E-14	3E-7	3E-6
62	Samarium-147	W, all compounds	2E+1	4E-2	2E-11	–	–	–
			Bone surf (3E+1)	Bone surf (7E-2)	–	1E-13	4E-7	4E-6
62	Samarium-151	W, all compounds	1E+4	1E+2	4E-8	–	–	–
			LLI wall (1E+4)	Bone surf (2E+2)	–	2E-10	2E-4	2E-3
62	Samarium-153	W, all compounds	2E+3	3E+3	1E-6	4E-9	–	–
			LLI wall (2E+3)	–	–	–	3E-5	3E-4

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2 Inhalation	Col. 3	Col. 1	Col. 2	
			ALI (μCi)	ALI (μCi)	DAC (μCi/ml)	Air (μCi/ml)	Water (μCi/ml)	Monthly Average Concentration (μCi/ml)
62	Samarium-155[b/]	W, all compounds	6E+4	2E+5	9E-5	3E-7	–	–
		St wall	(8E+4)	–	–	–	1E-3	1E-2
62	Samarium-156	W, all compounds	5E+3	9E+3	4E-6	1E-8	7E-5	7E-4
63	Europium-145	W, all compounds	2E+3	2E+3	8E-7	3E-9	2E-5	2E-4
63	Europium-146	W, all compounds	1E+3	1E+3	5E-7	2E-9	1E-5	1E-4
63	Europium-147	W, all compounds	3E+3	2E+3	7E-7	2E-9	4E-5	4E-4
63	Europium-148	W, all compounds	1E+3	4E+2	1E-7	5E-10	1E-5	1E-4
63	Europium-149	W, all compounds	1E+4	3E+3	1E-6	4E-9	2E-4	2E-3
63	Europium-150 (12.62 h)	W, all compounds	3E+3	8E+3	4E-6	1E-8	4E-5	4E-4
63	Europium-150 (34.2 y)	W, all compounds	8E+2	2E+1	8E-9	3E-11	1E-5	1E-4
63	Europium-152m	W, all compounds	3E+3	6E+3	3E-6	9E-9	4E-5	4E-4
63	Europium-152	W, all compounds	8E+2	2E+1	1E-8	3E-11	1E-5	1E-4
63	Europium-154	W, all compounds	5E+2	2E+1	8E-9	3E-11	7E-6	7E-5
63	Europium-155	W, all compounds	4E+3	9E+1	4E-8	–	5E-5	5E-4
				Bone surf				
			–	(1E+2)	–	2E-10	–	–
63	Europium-156	W, all compounds	6E+2	5E+2	2E-7	6E-10	8E-6	8E-5
63	Europium-157	W, all compounds	2E+3	5E+3	2E-6	7E-9	3E-5	3E-4
63	Europium-158[b/]	W, all compounds	2E+4	6E+4	2E-5	8E-8	3E-4	3E-3
64	Gadolinium-145[b/]	D, all compounds except those given for W	5E+4	2E+5	6E-5	2E-7	–	–
			St wall (5E+4)	–	–	–	6E-4	6E-3
		W, oxides, hydroxides, and fluorides	–	2E+5	7E-5	2E-7	–	–
64	Gadolinium-146	D, see ^{145}Gd	1E+3	1E+2	5E-8	2E-10	2E-5	2E-4
		W, see ^{145}Gd	–	3E+2	1E-7	4E-10	–	–
64	Gadolinium-147	D, see ^{145}Gd	2E+3	4E+3	2E-6	6E-9	3E-5	3E-4
		W, see ^{145}Gd	–	4E+3	1E-6	5E-9	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
64	Gadolinium-148	D, see ^{145}Gd	1E+1 Bone surf (2E+1)	8E+3 Bone surf (2E-2)	3E-12 –	– 2E-14	– 3E-7	– 3E-6
		W, see ^{145}Gd	– –	3E-2 Bone surf (6E-2)	1E-11 –	– 8E-14	– –	– –
64	Gadolinium-149	D, see ^{145}Gd	3E+3	2E+3	9E-7	3E-9	4E-5	4E-4
		W, see ^{145}Gd	–	2E+3	1E-6	3E-9	–	–
64	Gadolinium-151	D, see ^{145}Gd	6E+3 –	4E+2 Bone surf (6E+2)	2E-7 –	– 9E-10	9E-5 –	9E-4 –
		W, see ^{145}Gd	–	1E+3	5E-7	2E-9	–	–
64	Gadolinium-152	D, see ^{145}Gd	2E+1 Bone surf (3E+1)	1E-2 Bone surf (2E-2)	4E-12 –	– 3E-14	– 4E-7	– 4E-6
		W, see ^{145}Gd	– –	4E-2 Bone surf (8E-2)	2E-11 –	– 1E-13	– –	– –
64	Gadolinium-153	D, see ^{145}Gd	5E+3 –	1E+2 Bone surf (2E+2)	6E-8 –	– 3E-10	6E-5 –	6E-4 –
		W, see ^{145}Gd	–	6E+2	2E-7	8E-10	–	–
64	Gadolinium-159	D, see ^{145}Gd	3E+3	8E+3	3E-6	1E-8	4E-5	4E-4
		W, see ^{145}Gd	–	6E+3	2E-6	8E-9	–	–
65	Terbium-147[b/]	W, all compounds	9E+3	3E+4	1E-5	5E-8	1E-4	1E-3
65	Terbium-149	W, all compounds	5E+3	7E+2	3E-7	1E-9	7E-5	7E-4
65	Terbium-150	W, all compounds	5E+3	2E+4	9E-6	3E-8	7E-5	7E-4
65	Terbium-151	W, all compounds	4E+3	9E+3	4E-6	1E-8	5E-5	5E-4
65	Terbium-153	W, all compounds	5E+3	7E+3	3E-6	1E-8	7E-5	7E-4
65	Terbium-154	W, all compounds	2E+3	4E+3	2E-6	6E-9	2E-5	2E-4
65	Terbium-155	W, all compounds	6E+3	8E+3	3E-6	1E-8	8E-5	8E-4
65	Terbium-156m (5.0 h)	W, all compounds	2E+4	3E+4	1E-5	4E-8	2E-4	2E-3
65	Terbium-156m (24.4 h)	W, all compounds	7E+3	8E+3	3E-6	1E-8	1E-4	1E-3
65	Terbium-156	W, all compounds	1E+3	1E+3	6E-7	2E-9	1E-5	1E-4

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
65	Terbium-157	W, all compounds	5E+4	3E+2	1E-7	–	–	–
			LLI wall (5E+4)	Bone surf (6E+2)	–	8E-10	7E-4	7E-3
65	Terbium-158	W, all compounds	1E+3	2E+1	8E-9	3E-11	2E-5	2E-4
65	Terbium-160	W, all compounds	8E+2	2E+2	9E-8	3E-10	1E-5	1E-4
65	Terbium-161	W, all compounds	2E+3	2E+3	7E-7	2E-9	–	–
			LLI wall (2E+3)	–	–	–	3E-5	3E-4
66	Dysprosium-155	W, all compounds	9E+3	3E+4	1E-5	4E-8	1E-4	1E-3
66	Dysprosium-157	W, all compounds	2E+4	6E+4	3E-5	9E-8	3E-4	3E-3
66	Dysprosium-159	W, all compounds	1E+4	2E+3	1E-6	3E-9	2E-4	2E-3
66	Dysprosium-165	W, all compounds	1E+4	5E+4	2E-5	6E-8	2E-4	2E-3
66	Dysprosium-166	W, all compounds	6E+2	7E+2	3E-7	1E-9	–	–
			LLI wall (8E+2)	–	–	–	1E-5	1E-4
67	Holmium-155[b/]	W, all compounds	4E+4	2E+5	6E-5	2E-7	6E-4	6E-3
67	Holmium-157[b/]	W, all compounds	3E+5	1E+6	6E-4	2E-6	4E-3	4E-2
67	Holmium-159[b/]	W, all compounds	2E+5	1E+6	4E-4	1E-6	3E-3	3E-2
67	Holmium-161	W, all compounds	1E+5	4E+5	2E-4	6E-7	1E-3	1E-2
67	Holmium-162m[b/]	W, all compounds	5E+4	3E+5	1E-4	4E-7	7E-4	7E-3
67	Holmium-162[b/]	W, all compounds	5E+5	2E+6	1E-3	3E-6	–	–
			St wall (8E+5)	–	–	–	1E-2	1E-1
67	Holmium-164m[b/]	W, all compounds	1E+5	3E+5	1E-4	4E-7	1E-3	1E-2
67	Holmium-164[b/]	W, all compounds	2E+5	6E+5	3E-4	9E-7	–	–
			St wall (2E+5)	–	–	–	3E-3	3E-2
67	Holmium-166m	W, all compounds	6E+2	7E+0	3E-9	9E-12	9E-6	9E-5
67	Holmium-166	W, all compounds	9E+2	2E+3	7E-7	2E-9	–	–
			LLI wall (9E+2)	–	–	–	1E-5	1E-4
67	Holmium-167	W, all compounds	2E+4	6E+4	2E-5	8E-8	2E-4	2E-3

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
68	Erbium-161	W, all compounds	2E+4	6E+4	3E-5	9E-8	2E-4	2E-3
68	Erbium-165	W, all compounds	6E+4	2E+5	8E-5	3E-7	9E-4	9E-3
68	Erbium-169	W, all compounds	3E+3	3E+3	1E-6	4E-9	–	-
			LLI wall (4E+3)	–	–	–	5E-5	5E-4
68	Erbium-171	W, all compounds	4E+3	1E+4	4E-6	1E-8	5E-5	5E-4
68	Erbium-172	W, all compounds	1E+3	1E+3	6E-7	2E-9	–	-
			LLI wall (1E+3)	–	–	–	2E-5	2E-4
69	Thulium-162[b/]	W, all compounds	7E+4	3E+5	1E-4	4E-7	–	-
			St wall (7E+4)	–	–	–	1E-3	1E-2
69	Thulium-166	W, all compounds	4E+3	1E+4	6E-6	2E-8	6E-5	6E-4
69	Thulium-167	W, all compounds	2E+3	2E+3	8E-7	3E-9	–	-
			LLI wall (2E+3)	–	–	–	3E-5	3E-4
69	Thulium-170	W, all compounds	8E+2	2E+2	9E-8	3E-10	–	-
			LLI wall (1E+3)	–	–	–	1E-5	1E-4
69	Thulium-171	W, all compounds	1E+4	3E+2	1E-7	–	–	-
			LLI wall (1E+4)	Bone surf (6E+2)	–	8E-10	2E-4	2E-3
69	Thulium-172	W, all compounds	7E+2	1E+3	5E-7	2E-9	–	-
			LLI wall (8E+2)	–	–	–	1E-5	1E-4
69	Thulium-173	W, all compounds	4E+3	1E+4	5E-6	2E-8	6E-5	6E-4
69	Thulium-175[b/]	W, all compounds	7E+4	3E+5	1E-4	4E-7	–	-
			St wall (9E+4)	–	–	–	1E-3	1E-2
70	Ytterbium-162[b/]	W, all compounds except those given for Y	7E+4	3E+5	1E-4	4E-7	1E-3	1E-2
		Y, oxides, hydroxides, and fluorides	–	3E+5	1E-4	4E-7	–	-
70	Ytterbium-166	W, see ^{162}Yb	1E+3	2E+3	8E-7	3E-9	2E-5	2E-4
		Y, see ^{162}Yb	–	2E+3	8E-7	3E-9	–	-

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2 Inhalation	Col. 3	Col. 1	Col. 2	
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
70	Ytterbium-167[b/]	W, see ^{162}Yb	3E+5	8E+5	3E-4	1E-6	4E-3	4E-2
		Y, see ^{162}Yb	–	7E+5	3E-4	1E-6	–	–
70	Ytterbium-169	W, see ^{162}Yb	2E+3	8E+2	4E-7	1E-9	2E-5	2E-4
		Y, see ^{162}Yb	–	7E+2	3E-7	1E-9	–	–
70	Ytterbium-175	W, see ^{162}Yb	3E+3	4E+3	1E-6	5E-9	–	–
			LLI wall (3E+3)	–	–	–	4E-5	4E-4
		Y, see ^{162}Yb	–	3E+3	1E-6	5E-9	–	–
70	Ytterbium-177[b/]	W, see ^{162}Yb	2E+4	5E+4	2E-5	7E-8	2E-4	2E-3
		Y, see ^{162}Yb	–	5E+4	2E-5	6E-8	–	–
70	Ytterbium-178[b/]	W, see ^{162}Yb	1E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		Y, see ^{162}Yb	–	4E+4	2E-5	5E-8	–	–
71	Lutetium-169	W, all compounds except those given for Y	3E+3	4E+3	2E-6	6E-9	3E-5	3E-4
		Y, oxides, hydroxides, and fluorides	–	4E+3	2E-6	6E-9	–	–
71	Lutetium-170	W, see ^{169}Lu	1E+3	2E+3	9E-7	3E-9	2E-5	2E-4
		Y, see ^{169}Lu	–	2E+3	8E-7	3E-9	–	–
71	Lutetium-171	W, see ^{169}Lu	2E+3	2E+3	8E-7	3E-9	3E-5	3E-4
		Y, see ^{169}Lu	–	2E+3	8E-7	3E-9	–	–
71	Lutetium-172	W, see ^{169}Lu	1E+3	1E+3	5E-7	2E-9	1E-5	1E-4
		Y, see ^{169}Lu	–	1E+3	5E-7	2E-9	–	–
71	Lutetium-173	W, see ^{169}Lu	5E+3	3E+2	1E-7	–	7E-5	7E-4
			–	Bone surf (5E+2)	-	6E-10	–	–
		Y, see ^{169}Lu	–	3E+2	1E-7	4E-10	–	–
71	Lutetium-174m	W, see ^{169}Lu	2E+3	2E+2	1E-7	–	–	–
			LLI wall (3E+3)	Bone surf (3E+2)	–	5E-10	4E-5	4E-4
		Y, see ^{169}Lu	–	2E+2	9E-8	3E-10	–	–
71	Lutetium-174	W, see ^{169}Lu	5E+3	1E+2	5E-8	–	7E-5	7E-4
			–	Bone surf (2E+2)	–	3E-10	–	–
		Y, see ^{169}Lu	–	2E+2	6E-8	2E-10	–	–
71	Lutetium-176m	W, see ^{169}Lu	8E+3	3E+4	1E-5	3E-8	1E-4	1E-3
		Y, see ^{169}Lu	–	2E+4	9E-6	3E-8	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
71	Lutetium-176	W, see ^{169}Lu	7E+2	5E+0	2E-9	–	1E-5	1E-4
			–	Bone surf (1E+1)	–	2E-11	–	–
		Y, see ^{169}Lu	–	8E+0	3E-9	1E-11	–	–
71	Lutetium-177m	W, see ^{169}Lu	7E+2	1E+2	5E-8	–	1E-5	1E-4
			–	Bone surf (1E+2)	–	2E-10	–	–
		Y, see ^{169}Lu	–	8E+1	3E-8	1E-10	–	–
71	Lutetium-177	W, see ^{169}Lu	2E+3	2E+3	9E-7	3E-9	–	–
			LLI wall (3E+3)	–	–	–	4E-5	4E-4
		Y, see ^{169}Lu	–	2E+3	9E-7	3E-9	–	–
71	Lutetium-178m[b/]	W, see ^{169}Lu	5E+4	2E+5	8E-5	3E-7	–	–
			St wall (6E+4)	–	–	–	8E-4	8E-3
		Y, see ^{169}Lu	–	2E+5	7E-5	2E-7	–	–
71	Lutetium-178[b/]	W, see ^{169}Lu	4E+4	1E+5	5E-5	2E-7	–	–
			St wall (4E+4)	–	–	–	6E-4	6E-3
		Y, see ^{169}Lu	–	1E+5	5E-5	2E-7	–	–
71	Lutetium-179	W, see ^{169}Lu	6E+3	2E+4	8E-6	3E-8	9E-5	9E-4
		Y, see ^{169}Lu	–	2E+4	6E-6	3E-8	–	–
72	Hafnium-170	D, all compounds except those given for W	3E+3	6E+3	2E-6	8E-9	4E-5	4E-4
		W, oxides, hydroxides, carbides, and nitrates	–	5E+3	2E-6	6E-9	–	–
72	Hafnium-172	D, see ^{170}Hf	1E+3	9E+0	4E-9	–	2E-5	2E-4
			–	Bone surf (2E+1)	–	3E-11	–	–
		W, see ^{170}Hf	–	4E+1	2E-8	–	–	–
			–	Bone surf (6E+1)	–	8E-11	–	–
72	Hafnium-173	D, see ^{170}Hf	5E+3	1E+4	5E-6	2E-8	7E-5	7E-4
		W, see ^{170}Hf	–	1E+4	5E-6	2E-8	–	–
72	Hafnium-175	D, see ^{170}Hf	3E+3	9E+2	4E-7	–	4E-5	4E-4
			–	Bone surf (1E+3)	–	1E-9	–	–
		W, see ^{170}Hf	–	1E+3	5E-7	2E-9	–	–
72	Hafnium-177m[b/]	D, see ^{170}Hf	2E+4	6E+4	2E-5	8E-8	3E-4	3E-3
		W, see ^{170}Hf	–	9E+4	4E-5	1E-7	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
72	Hafnium-178m	D, see ^{170}Hf	3E+2	1E+0	5E-10	–	3E-6	3E-5
			–	Bone surf (2E+0)	–	3E-12	–	–
		W, see ^{170}Hf	–	5E+0	2E-9	–	–	–
			–	Bone surf (9E+0)	–	1E-11	–	–
72	Hafnium-179m	D, see ^{170}Hf	1E+3	3E+2	1E-7	–	1E-5	1E-4
			–	Bone surf (6E+2)	–	8E-10	–	–
		W, see ^{170}Hf	–	6E+2	3E-7	8E-10	–	–
72	Hafnium-180m	D, see ^{170}Hf	7E+3	2E+4	9E-6	3E-8	1E-4	1E-3
		W, see ^{170}Hf	–	3E+4	1E-5	4E-8	–	–
72	Hafnium-181	D, see ^{170}Hf	1E+3	2E+2	7E-8	–	2E-5	2E-4
			–	Bone surf (4E+2)	–	6E-10	–	–
		W, see ^{170}Hf	–	4E+2	2E-7	6E-10	–	–
72	Hafnium-182m[b/]	D, see ^{170}Hf	4E+4	9E+4	4E-5	1E-7	5E-4	5E-3
		W, see ^{170}Hf	–	1E+5	6E-5	2E-7	–	–
72	Hafnium-182	D, see ^{170}Hf	2E+2	8E-1	3E-10	–	–	–
			Bone surf (4E+2)	Bone surf (2E+0)	–	2E-12	5E-6	5E-5
		W, see ^{170}Hf	–	3E+0	1E-9	–	–	–
			–	Bone surf (7E+0)	–	1E-11	–	–
72	Hafnium-183[b/]	D, see ^{170}Hf	2E+4	5E+4	2E-5	6E-8	3E-4	3E-3
		W, see ^{170}Hf	–	6E+4	2E-5	8E-8	–	–
72	Hafnium-184	D, see ^{170}Hf	2E+3	8E+3	3E-6	1E-8	3E-5	3E-4
		W, see ^{170}Hf	–	6E+3	3E-6	9E-9	–	–
73	Tantalum-172[b/]	W, all compounds except those given for Y	4E+4	1E+5	5E-5	2E-7	5E-4	5E-3
		Y, elemental Ta, oxides, hydroxides, halides, carbides, nitrates, and nitrides	–	1E+5	4E-5	1E-7	–	–
73	Tantalum-173	W, see ^{172}Ta	7E+3	2E+4	8E-6	3E-8	9E-5	9E-4
		Y, see ^{172}Ta	–	2E+4	7E-6	2E-8	–	–
73	Tantalum-174[b/]	W, see ^{172}Ta	3E+4	1E+5	4E-5	1E-7	4E-4	4E-3
		Y, see ^{172}Ta	–	9E+4	4E-5	1E-7	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
73	Tantalum-175	W, see ^{172}Ta	6E+3	2E+4	7E-6	2E-8	8E-5	8E-4
		Y, see ^{172}Ta	–	1E+4	6E-6	2E-8	–	–
73	Tantalum-176	W, see ^{172}Ta	4E+3	1E+4	5E-6	2E-8	5E-5	5E-4
		Y, see ^{172}Ta	–	1E+4	5E-6	2E-8	–	–
73	Tantalum-177	W, see ^{172}Ta	1E+4	2E+4	8E-6	3E-8	2E-4	2E-3
		Y, see ^{172}Ta	–	2E+4	7E-6	2E-8	–	–
73	Tantalum-178	W, see ^{172}Ta	2E+4	9E+4	4E-5	1E-7	2E-4	2E-3
		Y, see ^{172}Ta	–	7E+4	3E-5	1E-7	–	–
73	Tantalum-179	W, see ^{172}Ta	2E+4	5E+3	2E-6	8E-9	3E-4	3E-3
		Y, see ^{172}Ta	–	9E+2	4E-7	1E-9	–	–
73	Tantalum-180m	W, see ^{172}Ta	2E+4	7E+4	3E-5	9E-8	3E-4	3E-3
		Y, see ^{172}Ta	–	6E+4	2E-5	8E-8	–	–
73	Tantalum-180	W, see ^{172}Ta	1E+3	4E+2	2E-7	6E-10	2E-5	2E-4
		Y, see ^{172}Ta	–	2E+1	1E-8	3E-11	–	–
73	Tantalum-182m[b/]	W, see ^{172}Ta	2E+5	5E+5	2E-4	8E-7	–	–
			St wall (2E+5)	–	–	–	3E-3	3E-2
		Y, see ^{172}Ta	–	4E+5	2E-4	6E-7	–	–
73	Tantalum-182	W, see ^{172}Ta	8E+2	3E+2	1E-7	5E-10	1E-5	1E-4
		Y, see ^{172}Ta	–	1E+2	6E-8	2E-10	–	–
73	Tantalum-183	W, see ^{172}Ta	9E+2	1E+3	5E-7	2E-9	–	–
			LLI wall (1E+3)	–	–	–	2E-5	2E-4
		Y, see ^{172}Ta	–	1E+3	4E-7	1E-9	–	–
73	Tantalum-184	W, see ^{172}Ta	2E+3	5E+3	2E-6	8E-9	3E-5	3E-4
		Y, see ^{172}Ta	–	5E+3	2E-6	7E-9	–	–
73	Tantalum-185[b/]	W, see ^{172}Ta	3E+4	7E+4	3E-5	1E-7	4E-4	4E-3
		Y, see ^{172}Ta	–	6E+4	3E-5	9E-8	–	–
73	Tantalum-186[b/]	W, see ^{172}Ta	5E+4	2E+5	1E-4	3E-7	–	–
			St wall (7E+4)	–	–	–	1E-3	1E-2
		Y, see ^{172}Ta	–	2E+5	9E-5	3E-7	–	–
74	Tungsten-176	D, all compounds	1E+4	5E+4	2E-5	7E-8	1E-4	1E-3
74	Tungsten-177	D, all compounds	2E+4	9E+4	4E-5	1E-7	3E-4	3E-3
74	Tungsten-178	D, all compounds	5E+3	2E+4	8E-6	3E-8	7E-5	7E-4

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
74	Tungsten-179[b/]	D, all compounds	5E+5	2E+6	7E-4	2E-6	7E-3	7E-2
74	Tungsten-181	D, all compounds	2E+4	3E+4	1E-5	5E-8	2E-4	2E-3
74	Tungsten-185	D, all compounds	2E+3	7E+3	3E-6	9E-9	–	–
			LLI wall (3E+3)	–	–	–	4E-5	4E-4
74	Tungsten-187	D, all compounds	2E+3	9E+3	4E-6	1E-8	3E-5	3E-4
74	Tungsten-188	D, all compounds	4E+2	1E+3	5E-7	2E-9	–	–
			LLI wall (5E+2)	–	–	–	7E-6	7E-5
75	Rhenium-177[b/]	D, all compounds except those given for W	9E+4	3E+5	1E-4	4E-7	–	–
			St wall (1E+5)	–	–	–	2E-3	2E-2
		W, oxides, hydroxides, and nitrates	–	4E+5	1E-4	5E-7	–	–
75	Rhenium-178[b/]	D, see ^{177}Re	7E+4	3E+5	1E-4	4E-7	–	–
			St wall (1E+5)	–	–	–	1E-3	1E-2
		W, see ^{177}Re	–	3E+5	1E-4	4E-7	–	–
75	Rhenium-181	D, see ^{177}Re	5E+3	9E+3	4E-6	1E-8	7E-5	7E-4
		W, see ^{177}Re	–	9E+3	4E-6	1E-8	–	–
75	Rhenium-182 (12.7 h)	D, see ^{177}Re	7E+3	1E+4	5E-6	2E-8	9E-5	9E-4
		W, see ^{177}Re	–	2E+4	6E-6	2E-8	–	–
75	Rhenium-182 (64.0 h)	D, see ^{177}Re	1E+3	2E+3	1E-6	3E-9	2E-5	2E-4
		W, see ^{177}Re	–	2E+3	9E-7	3E-9	–	–
75	Rhenium-184m	D, see ^{177}Re	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4
		W, see ^{177}Re	–	4E+2	2E-7	6E-10	–	–
75	Rhenium-184	D, see ^{177}Re	2E+3	4E+3	1E-6	5E-9	3E-5	3E-4
		W, see ^{177}Re	–	1E+3	6E-7	2E-9	–	–
75	Rhenium-186m	D, see ^{177}Re	1E+3	2E+3	7E-7	–	–	–
			St wall (2E+3)	St wall (2E+3)	–	3E-9	2E-5	2E-4
		W, see ^{177}Re	–	2E+2	6E-8	2E-10	–	–
75	Rhenium-186	D, see ^{177}Re	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4
		W, see ^{177}Re	–	2E+3	7E-7	2E-9	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Inhalation Col. 2 ALI (µCi)	Table I Occupational Values Inhalation Col. 3 DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
75	Rhenium-187	D, see ^{177}Re	6E+5	8E+5	4E-4	–	8E-3	8E-2
			–	St wall (9E+5)	–	1E-6	–	–
		W, see ^{177}Re	–	1E+5	4E-5	1E-7	–	–
75	Rhenium-188m[b/]	D, see ^{177}Re	8E+4	1E+5	6E-5	2E-7	1E-3	1E-2
		W, see ^{177}Re	–	1E+5	6E-5	2E-7	–	–
75	Rhenium-188	D, see ^{177}Re	2E+3	3E+3	1E-6	4E-9	2E-5	2E-4
		W, see ^{177}Re	–	3E+3	1E-6	4E-9	–	–
75	Rhenium-189	D, see ^{177}Re	3E+3	5E+3	2E-6	7E-9	4E-5	4E-4
		W, see ^{177}Re	–	4E+3	2E-6	6E-9	–	–
76	Osmium-180[b/]	D, all compounds except those given for W and Y	1E+5	4E+5	2E-4	5E-7	1E-3	1E-2
		W, halides and nitrates	–	5E+5	2E-4	7E-7	–	–
		Y, oxides and hydroxides	–	5E+5	2E-4	6E-7	–	–
76	Osmium-181[b/]	D, see ^{180}Os	1E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{180}Os	–	5E+4	2E-5	6E-8	–	–
		Y, see ^{180}Os	–	4E+4	2E-5	6E-8	–	–
76	Osmium-182	D, see ^{180}Os	2E+3	6E+3	2E-6	8E-9	3E-5	3E-4
		W, see ^{180}Os	–	4E+3	2E-6	6E-9	–	–
		Y, see ^{180}Os	–	4E+3	2E-6	6E-9	–	–
76	Osmium-185	D, see ^{180}Os	2E+3	5E+2	2E-7	7E-10	3E-5	3E-4
		W, see ^{180}Os	–	8E+2	3E-7	1E-9	–	–
		Y, see ^{180}Os	–	8E+2	3E-7	1E-9	–	–
76	Osmium-189m	D, see ^{180}Os	8E+4	2E+5	1E-4	3E-7	1E-3	1E-2
		W, see ^{180}Os	–	2E+5	9E-5	3E-7	–	–
		Y, see ^{180}Os	–	2E+5	7E-5	2E-7	–	–
76	Osmium-191m	D, see ^{180}Os	1E+4	3E+4	1E-5	4E-8	2E-4	2E-3
		W, see ^{180}Os	–	2E+4	8E-6	3E-8	–	–
		Y, see ^{180}Os	–	2E+4	7E-6	2E-8	–	–
76	Osmium-191	D, see ^{180}Os	2E+3	2E+3	9E-7	3E-9	–	–
			LLI wall (3E+3)	–	–	–	3E-5	3E-4
		W, see ^{180}Os	–	2E+3	7E-7	2E-9	–	–
		Y, see ^{180}Os	–	1E+3	6E-7	2E-9	–	–
76	Osmium-193	D, see ^{180}Os	2E+3	5E+3	2E-6	6E-9	–	–
			LLI wall (2E+3)	–	–	–	2E-5	2E-4
		W, see ^{180}Os	–	3E+3	1E-6	4E-9	–	–
		Y, see ^{180}Os	–	3E+3	1E-6	4E-9	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
76	Osmium-194	D, see ^{180}Os	4E+2	4E+1	2E-8	6E-11	–	–
			LLI wall (6E+2)	–	–	–	8E-6	8E-5
		W, see ^{180}Os	–	6E+1	2E-8	8E-11	–	–
		Y, see ^{180}Os	–	8E+0	3E-9	1E-11	–	–
77	Iridium-182[b/]	D, all compounds except those given for W and Y	4E+4	1E+5	6E-5	2E-7	–	–
			St wall (4E+4)	–	–	–	6E-4	6E-3
		W, halides, nitrates, and metallic iridium	–	2E+5	6E-5	2E-7	–	–
		Y, oxides and hydroxides	–	1E+5	5E-5	2E-7	–	–
77	Iridium-184	D, see ^{182}Ir	8E+3	2E+4	1E-5	3E-8	1E-4	1E-3
		W, see ^{182}Ir	–	3E+4	1E-5	5E-8	–	–
		Y, see ^{182}Ir	–	3E+4	1E-5	4E-8	–	–
77	Iridium-185	D, see ^{182}Ir	5E+3	1E+4	5E-6	2E-8	7E-5	7E-4
		W, see ^{182}Ir	–	1E+4	5E-6	2E-8	–	–
		Y, see ^{182}Ir	–	1E+4	4E-6	1E-8	–	–
77	Iridium-186	D, see ^{182}Ir	2E+3	8E+3	3E-6	1E-8	3E-5	3E-4
		W, see ^{182}Ir	–	6E+3	3E-6	9E-9	–	–
		Y, see ^{182}Ir	–	6E+3	2E-6	8E-9	–	–
77	Iridium-187	D, see ^{182}Ir	1E+4	3E+4	1E-5	5E-8	1E-4	1E-3
		W, see ^{182}Ir	–	3E+4	1E-5	4E-8	–	–
		Y, see ^{182}Ir	–	3E+4	1E-5	4E-8	–	–
77	Iridium-188	D, see ^{182}Ir	2E+3	5E+3	2E-6	6E-9	3E-5	3E-4
		W, see ^{182}Ir	–	4E+3	1E-6	5E-9	–	–
		Y, see ^{182}Ir	–	3E+3	1E-6	5E-9	–	–
77	Iridium-189	D, see ^{182}Ir	5E+3	5E+3	2E-6	7E-9	–	–
			LLI wall (5E+3)	–	–	–	7E-5	7E-4
		W, see ^{182}Ir	–	4E+3	2E-6	5E-9	–	–
		Y, see ^{182}Ir	–	4E+3	1E-6	5E-9	–	–
77	Iridium-190m[b/]	D, see ^{182}Ir	2E+5	2E+5	8E-5	3E-7	2E-3	2E-2
		W, see ^{182}Ir	–	2E+5	9E-5	3E-7	–	–
		Y, see ^{182}Ir	–	2E+5	8E-5	3E-7	–	–
77	Iridium-190	D, see ^{182}Ir	1E+3	9E+2	4E-7	1E-9	1E-5	1E-4
		W, see ^{182}Ir	–	1E+3	4E-7	1E-9	–	–
		Y, see ^{182}Ir	–	9E+2	4E-7	1E-9	–	–
77	Iridium-192m	D, see ^{182}Ir	3E+3	9E+1	4E-8	1E-10	4E-5	4E-4
		W, see ^{182}Ir	–	2E+2	9E-8	3E-10	–	–
		Y, see ^{182}Ir	–	2E+1	6E-9	2E-11	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
77	Iridium-192	D, see ^{182}Ir	9E+2	3E+2	1E-7	4E-10	1E-5	1E-4
		W, see ^{182}Ir	–	4E+2	2E-7	6E-10	–	–
		Y, see ^{182}Ir	–	2E+2	9E-8	3E-10	–	–
77	Iridium-194m	D, see ^{182}Ir	6E+2	9E+1	4E-8	1E-10	9E-6	9E-5
		W, see ^{182}Ir	–	2E+2	7E-8	2E-10	–	–
		Y, see ^{182}Ir	–	1E+2	4E-8	1E-10	–	–
77	Iridium-194	D, see ^{182}Ir	1E+3	3E+3	1E-6	4E-9	1E-5	1E-4
		W, see ^{182}Ir	–	2E+3	9E-7	3E-9	–	–
		Y, see ^{182}Ir	–	2E+3	8E-7	3E-9	–	–
77	Iridium-195m	D, see ^{182}Ir	8E+3	2E+4	1E-5	3E-8	1E-4	1E-3
		W, see ^{182}Ir	–	3E+4	1E-5	4E-8	–	–
		Y, see ^{182}Ir	–	2E+4	9E-6	3E-8	–	–
77	Iridium-195	D, see ^{182}Ir	1E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{182}Ir	–	5E+4	2E-5	7E-8	–	–
		Y, see ^{182}Ir	–	4E+4	2E-5	6E-8	–	–
78	Platinum-186	D, all compounds	1E+4	4E+4	2E-5	5E-8	2E-4	2E-3
78	Platinum-188	D, all compounds	2E+3	2E+3	7E-7	2E-9	2E-5	2E-4
78	Platinum-189	D, all compounds	1E+4	3E+4	1E-5	4E-8	1E-4	1E-3
78	Platinum-191	D, all compounds	4E+3	8E+3	4E-6	1E-8	5E-5	5E-4
78	Platinum-193m	D, all compounds	3E+3	6E+3	3E-6	8E-9	–	–
			LLI wall (3E+4)	–	–	–	4E-5	4E-4
78	Platinum-193	D, all compounds	4E+4	2E+4	1E-5	3E-8	–	–
			LLI wall (5E+4)	–	–	–	6E-4	6E-3
78	Platinum-195m	D, all compounds	2E+3	4E+3	2E-6	6E-9	–	–
			LLI wall (2E+3)	–	–	–	3E-5	3E-4
78	Platinum-197m[b/]	D, all compounds	2E+4	4E+4	2E-5	6E-8	2E-4	2E-3
78	Platinum-197	D, all compounds	3E+3	1E+4	4E-6	1E-8	4E-5	4E-4
78	Platinum-199[b/]	D, all compounds	5E+4	1E+5	6E-5	2E-7	7E-4	7E-3
78	Platinum-200	D, all compounds	1E+3	3E+3	1E-6	5E-9	2E-5	2E-4

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2 Inhalation	Col. 3	Col. 1	Col. 2	
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
79	Gold-193	D, all compounds except those given for W and Y	9E+3	3E+4	1E-5	4E-8	1E-4	1E-3
		W, halides and nitrates	–	2E+4	9E-6	3E-8	–	–
		Y, oxides and hydroxides	–	2E+4	8E-6	3E-8	–	–
79	Gold-194	D, see ^{193}Au	3E+3	8E+3	3E-6	1E-8	4E-5	4E-4
		W, see ^{193}Au	–	5E+3	2E-6	8E-9	–	–
		Y, see ^{193}Au	–	5E+3	2E-6	7E-9	–	–
79	Gold-195	D, see ^{193}Au	5E+3	1E+4	5E-6	2E-8	7E-5	7E-4
		W, see ^{193}Au	–	1E+3	6E-7	2E-9	–	–
		Y, see ^{193}Au	–	4E+2	2E-7	6E-10	–	–
79	Gold-198m	D, see ^{193}Au	1E+3	3E+3	1E-6	4E-9	1E-5	1E-4
		W, see ^{193}Au	–	1E+3	5E-7	2E-9	–	–
		Y, see ^{193}Au	–	1E+3	5E-7	2E-9	–	–
79	Gold-198	D, see ^{193}Au	1E+3	4E+3	2E-6	5E-9	2E-5	2E-4
		W, see ^{193}Au	–	2E+3	8E-7	3E-9	–	–
		Y, see ^{193}Au	–	2E+3	7E-7	2E-9	–	–
79	Gold-199	D, see ^{193}Au	3E+3	9E+3	4E-6	1E-8	–	–
			LLI wall (3E+3)	–	–	–	4E-5	4E-4
		W, see ^{193}Au	–	4E+3	2E-6	6E-9	–	–
		Y, see ^{193}Au	–	4E+3	2E-6	5E-9	–	–
79	Gold-200m	D, see ^{193}Au	1E+3	4E+3	1E-6	5E-9	2E-5	2E-4
		W, see ^{193}Au	–	3E+3	1E-6	4E-9	–	–
		Y, see ^{193}Au	–	2E+4	1E-6	3E-9	–	–
79	Gold-200[b/]	D, see ^{193}Au	3E+4	6E+4	3E-5	9E-8	4E-4	4E-3
		W, see ^{193}Au	–	8E+4	3E-5	1E-7	–	–
		Y, see ^{193}Au	–	7E+4	3E-5	1E-7	–	–
79	Gold-201[b/]	D, see ^{193}Au	7E+4	2E+5	9E-5	3E-7	–	–
			St wall (9E+4)	–	–	–	1E-3	1E-2
		W, see ^{193}Au	–	2E+5	1E-4	3E-7	–	–
		Y, see ^{193}Au	–	2E+5	9E-5	3E-7	–	–
80	Mercury-193m	Vapor	–	8E+3	4E-6	1E-8	–	–
		Organic D	4E+3	1E+4	5E-6	2E-8	6E-5	6E-4
		D, sulfates	3E+3	9E+3	4E-6	1E-8	4E-5	4E-4
		W, oxides, hydroxides, halides, nitrates, and sulfides	–	8E+3	3E-6	1E-8	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
80	Mercury-193	Vapor	–	3E+4	1E-5	4E-8	–	–
		Organic D	2E+4	6E+4	3E-5	9E-8	3E-4	3E-3
		D, see ^{193m}Hg	2E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{193m}Hg	–	4E+4	2E-5	6E-8	–	–
80	Mercury-194	Vapor	–	3E+1	1E-8	4E-11	–	–
		Organic D	2E+1	3E+1	1E-8	4E-11	2E-7	2E-6
		D, see ^{193m}Hg	8E+2	4E+1	2E-8	6E-11	1E-5	1E-4
		W, see ^{193m}Hg	–	1E+2	5E-8	2E-10	–	–
80	Mercury-195m	Vapor	–	4E+3	2E-6	6E-9	–	–
		Organic D	3E+3	6E+3	3E-6	8E-9	4E-5	4E-4
		D, see ^{193m}Hg	2E+3	5E+3	2E-6	7E-9	3E-5	3E-4
		W, see ^{193m}Hg	–	4E+3	2E-6	5E-9	–	–
80	Mercury-195	Vapor	–	3E+4	1E-5	4E-8	–	–
		Organic D	2E+4	5E+4	2E-5	6E-8	2E-4	2E-3
		D, see ^{193m}Hg	1E+4	4E+4	1E-5	5E-8	2E-4	2E-3
		W, see ^{193m}Hg	–	3E+4	1E-5	5E-8	–	–
80	Mercury-197m	Vapor	–	5E+3	2E-6	7E-9	–	–
		Organic D	4E+3	9E+3	4E-6	1E-8	5E-5	5E-4
		D, see ^{193m}Hg	3E+3	7E+3	3E-6	1E-8	4E-5	4E-4
		W, see ^{193m}Hg	–	5E+3	2E-6	7E-9	–	–
80	Mercury-197	Vapor	–	8E+3	4E-6	1E-8	–	–
		Organic D	7E+3	1E+4	6E-6	2E-8	9E-5	9E-4
		D, see ^{193m}Hg	6E+3	1E+4	5E-6	2E-8	8E-5	8E-4
		W, see ^{193m}Hg	–	9E+3	4E-6	1E-8	–	–
80	Mercury-199m[b/]	Vapor	–	8E+4	3E-5	1E-7	–	–
		Organic D	6E+4	2E+5	7E-5	2E-7	–	–
			St wall (1E+5)	–	–	–	1E-3	1E-2
		D, see ^{193m}Hg	6E+4	1E+5	6E-5	2E-7	8E-4	8E-3
		W, see ^{193m}Hg	–	2E+5	7E-5	2E-7	–	–
80	Mercury-203	Vapor	–	8E+2	4E-7	1E-9	–	–
		Organic D	5E+2	8E+2	3E-7	1E-9	7E-6	7E-5
		D, see ^{193m}Hg	2E+3	1E+3	5E-7	2E-9	3E-5	3E-4
		W, see ^{193m}Hg	–	1E+3	5E-7	2E-9	–	–
81	Thallium-194m[b/]	D, all compounds	5E+4	2E+5	6E-5	2E-7	–	–
			St wall (7E+4)	–	–	–	1E-3	1E-2
81	Thallium-194[b/]	D, all compounds	3E+5	6E+5	2E-4	8E-7	–	–
			St wall (3E+5)	–	–	–	4E-3	4E-2
81	Thallium-195[b/]	D, all compounds	6E+4	1E+5	5E-5	2E-7	9E-4	9E-3

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2 Inhalation	Col. 3	Col. 1	Col. 2	
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
81	Thallium-197	D, all compounds	7E+4	1E+5	5E-5	2E-7	1E-3	1E-2
81	Thallium-198m[b/]	D, all compounds	3E+4	5E+4	2E-5	8E-8	4E-4	4E-3
81	Thallium-198	D, all compounds	2E+4	3E+4	1E-5	5E-8	3E-4	3E-3
81	Thallium-199	D, all compounds	6E+4	8E+4	4E-5	1E-7	9E-4	9E-3
81	Thallium-200	D, all compounds	8E+3	1E+4	5E-6	2E-8	1E-4	1E-3
81	Thallium-201	D, all compounds	2E+4	2E+4	9E-6	3E-8	2E-4	2E-3
81	Thallium-202	D, all compounds	4E+3	5E+3	2E-6	7E-9	5E-5	5E-4
81	Thallium-204	D, all compounds	2E+3	2E+3	9E-7	3E-9	2E-5	2E-4
82	Lead-195m[b/]	D, all compounds	6E+4	2E+5	8E-5	3E-7	8E-4	8E-3
82	Lead-198	D, all compounds	3E+4	6E+4	3E-5	9E-8	4E-4	4E-3
82	Lead-199[b/]	D, all compounds	2E+4	7E+4	3E-5	1E-7	3E-4	3E-3
82	Lead-200	D, all compounds	3E+3	6E+3	3E-6	9E-9	4E-5	4E-4
82	Lead-201	D, all compounds	7E+3	2E+4	8E-6	3E-8	1E-4	1E-3
82	Lead-202m	D, all compounds	9E+3	3E+4	1E-5	4E-8	1E-4	1E-3
82	Lead-202	D, all compounds	1E+2	5E+1	2E-8	7E-11	2E-6	2E-5
82	Lead-203	D, all compounds	5E+3	9E+3	4E-6	1E-8	7E-5	7E-4
82	Lead-205	D, all compounds	4E+3	1E+3	6E-7	2E-9	5E-5	5E-4
82	Lead-209	D, all compounds	2E+4	6E+4	2E-5	8E-8	3E-4	3E-3
82	Lead-210	D, all compounds	6E-1 Bone surf (1E+0)	2E-1 Bone surf (4E-1)	1E-10 –	– 6E-13	– 1E-8	– 1E-7
82	Lead-211[b/]	D, all compounds	1E+4	6E+2	3E-7	9E-10	2E-4	2E-3
82	Lead-212	D, all compounds	8E+1 Bone surf (1E+2)	3E+1 –	1E-8 –	5E-11 –	– 2E-6	– 2E-5
82	Lead-214[b/]	D, all compounds	9E+3	8E+2	3E-7	1E-9	1E-4	1E-3
83	Bismuth-200[b/]	D, nitrates W, all other compounds	3E+4 –	8E+4 1E+5	4E-5 4E-5	1E-7 1E-7	4E-4 –	4E-3 –

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (μCi)	Table I Occupational Values Col. 2 Inhalation ALI (μCi)	Table I Occupational Values Col. 3 Inhalation DAC (μCi/ml)	Table II Effluent Concentrations Col. 1 Air (μCi/ml)	Table II Effluent Concentrations Col. 2 Water (μCi/ml)	Table III Releases to Sewers Monthly Average Concentration (μCi/ml)
83	Bismuth-201[b/]	D, see ^{200}Bi	1E+4	3E+4	1E-5	4E-8	2E-4	2E-3
		W, see ^{200}Bi	–	4E+4	2E-5	5E-8	–	–
83	Bismuth-202[b/]	D, see ^{200}Bi	1E+4	4E+4	2E-5	6E-8	2E-4	2E-3
		W, see ^{200}Bi	–	8E+4	3E-5	1E-7	–	–
83	Bismuth-203	D, see ^{200}Bi	2E+3	7E+3	3E-6	9E-9	3E-5	3E-4
		W, see ^{200}Bi	–	6E+3	3E-6	9E-9	–	–
83	Bismuth-205	D, see ^{200}Bi	1E+3	3E+3	1E-6	3E-9	2E-5	2E-4
		W, see ^{200}Bi	–	1E+3	5E-7	2E-9	–	–
83	Bismuth-206	D, see ^{200}Bi	6E+2	1E+3	6E-7	2E-9	9E-6	9E-5
		W, see ^{200}Bi	–	9E+2	4E-7	1E-9	–	–
83	Bismuth-207	D, see ^{200}Bi	1E+3	2E+3	7E-7	2E-9	1E-5	1E-4
		W, see ^{200}Bi	–	4E+2	1E-7	5E-10	–	–
83	Bismuth-210m	D, see ^{200}Bi	4E+1 Kidneys (6E+1)	5E+0 Kidneys (6E+0)	2E-9 –	– 9E-12	– 8E-7	– 8E-6
		W, see ^{200}Bi	–	7E-1	3E-10	9E-13	–	–
83	Bismuth-210	D, see ^{200}Bi	8E+2 –	2E+2 Kidneys	1E-7	–	1E-5	1E-4
			–	(4E+2)	–	5E-10	–	–
		W, see ^{200}Bi	–	3E+1	1E-8	4E-11	–	–
83	Bismuth-212[b/]	D, see ^{200}Bi	5E+3	2E+2	1E-7	3E-10	7E-5	7E-4
		W, see ^{200}Bi	–	3E+2	1E-7	4E-10	–	–
83	Bismuth-213[b/]	D, see ^{200}Bi	7E+3	3E+2	1E-7	4E-10	1E-4	1E-3
		W, see ^{200}Bi	–	4E+2	1E-7	5E-10	–	–
83	Bismuth-214[b/]	D, see ^{200}Bi	2E+4 St wall (2E+4)	8E+2 –	3E-7 –	1E-9 –	– 3E-4	– 3E-3
		W, see ^{200}Bi	–	9E-2	4E-7	1E-9	–	–
84	Polonium-203[b/]	D, all compounds except those given for W	3E+4	6E+4	3E-5	9E-8	3E-4	3E-3
		W, oxides, hydroxides, and nitrates	–	9E+4	4E-5	1E-7	–	–
84	Polonium-205[b/]	D, see ^{203}Po	2E+4	4E+4	2E-5	5E-8	3E-4	3E-3
		W, see ^{203}Po	–	7E+4	3E-5	1E-7	–	–
84	Polonium-207	D, see ^{203}Po	8E+3	3E+4	1E-5	3E-8	1E-4	1E-3
		W, see ^{203}Po	–	3E+4	1E-5	4E-8	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2 Inhalation	Col. 3	Col. 1	Col. 2	
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
84	Polonium-210	D, see ^{203}Po	3E+0	6E-1	3E-10	9E-13	4E-8	4E-7
		W, see ^{203}Po	–	6E-1	3E-10	9E-13	–	–
85	Astatine-207[b/]	D, halides	6E+3	3E+3	1E-6	4E-9	8E-5	8E-4
		W	–	2E+3	9E-7	3E-9	–	–
85	Astatine-211	D, halides	1E+2	8E+1	3E-8	1E-10	2E-6	2E-5
		W	–	5E+1	2E-8	8E-11	–	–
86	Radon-220	With daughters removed	–	2E+4	7E-6	2E-8	–	–
		With daughters present	–	2E+1 (or 12 WLM)	9E-9 (or 1.0 WL)	3E-11	–	–
86	Radon-222	With daughters removed	–	1E+4	4E-6	1E-8	–	–
		With daughters present	–	1E+2 (or 4 WLM)	3E-8 (or 0.33 WL)	1E-10	–	–
87	Francium-222[b/]	D, all compounds	2E+3	5E+2	2E-7	6E-10	3E-5	3E-4
87	Francium-223[b/]	D, all compounds	6E+2	8E+2	3E-7	1E-9	8E-6	8E-5
88	Radium-223	W, all compounds	5E+0 Bone surf (9E+0)	7E-1	3E-10	9E-13	–	–
				–	–	–	1E-7	1E-6
88	Radium-224	W, all compounds	8E+0 Bone surf (2E+1)	2E+0	7E-10	2E-12	–	–
				–	–	–	2E-7	2E-6
88	Radium-225	W, all compounds	8E+0 Bone surf (2E+1)	7E-1	3E-10	9E-13	–	–
				–	–	–	2E-7	2E-6
88	Radium-226	W, all compounds	2E+0 Bone surf (5E+0)	6E-1	3E-10	9E-13	–	–
				–	–	–	6E-8	6E-7
88	Radium-227[b/]	W, all compounds	2E+4 Bone surf (2E+4)	1E+4 Bone surf (2E+4)	6E-6	–	–	–
					–	3E-8	3E-4	3E-3
88	Radium-228	W, all compounds	2E+0 Bone surf (4E+0)	1E+0	5E-10	2E-12	–	–
				–	–	–	6E-8	6E-7

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (μCi)	Table I Occupational Values Col. 2 Inhalation ALI (μCi)	Table I Occupational Values Col. 3 Inhalation DAC (μCi/ml)	Table II Effluent Concentrations Col. 1 Air (μCi/ml)	Table II Effluent Concentrations Col. 2 Water (μCi/ml)	Table III Releases to Sewers Monthly Average Concentration (μCi/ml)
89	Actinium-224	D, all compounds except those given for W and Y	2E+3	3E+1	1E-8	–	–	–
			LLI wall (2E+3)	Bone surf (4E+1)	–	5E-11	3E-5	3E-4
		W, halides and nitrates	–	5E+1	2E-8	7E-11	–	–
		Y, oxides and hydroxides	–	5E+1	2E-8	6E-11	–	–
89	Actinium-225	D, see ^{224}Ac	5E+1	3E-1	1E-10	–	–	–
			LLI wall (5E+1)	Bone surf (5E-1)	-	7E-13	7E-7	7E-6
		W, see ^{224}Ac	–	6E-1	3E-10	9E-13	–	–
		Y, see ^{224}Ac	–	6E-1	3E-10	9E-13	–	–
89	Actinium-226	D, see ^{224}Ac	1E+2	3E+0	1E-9	–	–	–
			LLI wall (1E+2)	Bone surf (4E+0)	–	5E-12	2E-6	2E-5
		W, see ^{224}Ac	–	5E+0	2E-9	7E-12	–	–
		Y, see ^{224}Ac	–	5E+0	2E-9	6E-12	–	–
89	Actinium-227	D, see ^{224}Ac	2E-1	4E-4	2E-13	–	–	–
			Bone surf (4E-1)	Bone surf (8E-4)	–	1E-15	5E-9	5E-8
		W, see ^{224}Ac	–	2E-3	7E-13	–	–	–
			–	Bone surf (3E-3)	–	4E-15	–	–
		Y, see ^{224}Ac	–	4E-3	2E-12	6E-15	–	–
89	Actinium-228	D, see ^{224}Ac	2E+3	9E+0	4E-9	–	3E-5	3E-4
			–	Bone surf (2E+1)	–	2E-11	–	–
		W, see ^{224}Ac	–	4E+1	2E-8	–	–	–
			–	Bone surf (6E+1)	–	8E-11	–	–
		Y, see ^{224}Ac	–	4E+1	2E-8	6E-11	–	–
90	Thorium-226[b/]	W, all compounds except those given for Y	5E+3	2E+2	6E-8	2E-10	–	–
			St wall (5E+3)	–	–	–	7E-5	7E-4
		Y, oxides and hydroxides	–	1E+2	6E-8	2E-10	–	–
90	Thorium-227	W, see ^{226}Th	1E+2	3E-1	1E-10	5E-13	2E-6	2E-5
		Y, see ^{226}Th	–	3E-1	1E-10	5E-13	–	–
90	Thorium-228	W, see ^{226}Th	6E+0	1E-2	4E-12	–	–	–
			Bone surf (1E+1)	Bone surf (2E-2)	–	3E-14	2E-7	2E-6
		Y, see ^{226}Th	–	2E-2	7E-12	2E-14	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2 Inhalation		Col. 1	Col. 2	
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
90	Thorium-229	W, see ^{226}Th	6E-1	9E-4	4E-13	–	–	–
			Bone surf (1E+0)	Bone surf (2E-3)	–	3E-15	2E-8	2E-7
		Y, see ^{226}Th	–	2E-3	1E-12	–	–	–
				Bone surf (3E-3)	–	4E-15	–	–
90	Thorium-230	W, see ^{226}Th	4E+0	6E-3	3E-12	–	–	–
			Bone surf (9E+0)	Bone surf (2E-2)	–	2E-14	1E-7	1E-6
		Y, see ^{226}Th	–	2E-2	6E-12	–	–	–
				Bone surf (2E-2)	–	3E-14	–	–
90	Thorium-231	W, see ^{226}Th	4E+3	6E+3	3E-6	9E-9	5E-5	5E-4
		Y, see ^{226}Th	–	6E+3	3E-6	9E-9	–	–
90	Thorium-232	W, see ^{226}Th	7E-1	1E-3	5E-13	–	–	–
			Bone surf (2E+0)	Bone surf (3E-3)	–	4E-15	3E-8	3E-7
		Y, see ^{226}Th	–	3E-3	1E-12	–	–	–
				Bone sur (4E-3)	–	6E-15	–	–
90	Thorium-234	W, see ^{226}Th	3E+2	2E+2	8E-8	3E-10	–	–
			LLI wall (4E+2)	–	–	–	5E-6	5E-5
		Y, see ^{226}Th	–	2E+2	6E-8	2E-10	–	–
91	Protactinium-227[b/]	W, all compounds except those given for Y	4E+3	1E+2	5E-8	2E-10	5E-5	5E-4
		Y, oxides and hydroxides	–	1E+2	4E-8	1E-10	–	–
91	Protactinium-228	W, see ^{227}Pa	1E+3	1E+1	5E-9	–	2E-5	2E-4
				Bone surf (2E+1)	–	3E-11	–	–
		Y, see ^{227}Pa	–	1E+1	5E-9	2E-11	–	–
91	Protactinium-230	W, see ^{227}Pa	6E+2	5E+0	2E-9	7E-12	–	–
			Bone surf (9E+2)	–	–	–	1E-5	1E-4
		Y, see ^{227}Pa	–	4E+0	1E-9	5E-12	–	–
91	Protactinium-231	W, see ^{227}Pa	2E-1	2E-3	6E-13	–	–	–
			Bone surf (5E-1)	Bone surf (4E-3)	–	6E-15	6E-9	6E-8
		Y, see ^{227}Pa	–	4E-3	2E-12	–	–	–
				Bone surf (6E-3)	–	8E-15	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Inhalation Col. 2 ALI (µCi)	Table I Occupational Values Inhalation Col. 3 DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
91	Protactinium-232	W, see ^{227}Pa	1E+3	2E+1	9E-9	–	2E-5	2E-4
			–	Bone surf (6E+1)	–	8E-11	–	–
		Y, see ^{227}Pa	–	6E+1	2E-8	–	–	–
			–	Bone surf (7E+1)	–	1E-10	–	–
91	Protactinium-233	W, see ^{227}Pa	1E+3	7E+2	3E-7	1E-9	–	–
			LLI wall (2E+3)	–	–	–	2E-5	2E-4
		Y, see ^{227}Pa	–	6E+2	2E-7	8E-10	–	–
91	Protactinium-234	W, see ^{227}Pa	2E+3	8E+3	3E-6	1E-8	3E-5	3E-4
		Y, see ^{227}Pa	–	7E+3	3E-6	9E-9	–	–
92	Uranium-230	D, UF_6, UO_2F_2, UO_2,$(NO_3)_2$	4E+0	4E-1	2E-10	–	–	–
			Bone surf (6E+0)	Bone surf (6E-1)	–	8E-13	8E-8	8E-7
		W, UO_3, UF_4, UCl_4	–	4E-1	1E-10	5E-13	–	–
		Y, UO_2, U_3O_8	–	3E-1	1E-10	4E-13	–	–
92	Uranium-231	D, see ^{230}U	5E+3	8E+3	3E-6	1E-8	–	–
			LLI wall (4E+3)	–	–	–	6E-5	6E-4
		W, see ^{230}U	–	6E+3	2E-6	8E-9	–	–
		Y, see ^{230}U	–	5E+3	2E-6	6E-9	–	–
92	Uranium-232	D, see ^{230}U	2E+0	2E-1	9E-11	–	–	–
			Bone surf (4E+0)	Bone surf (4E-1)	–	6E-13	6E-8	6E-7
		W, see ^{230}U	–	4E-1	2E-10	5E-13	–	–
		Y, see ^{230}U	–	8E-3	3E-12	1E-14	–	–
92	Uranium-233	D, see ^{230}U	1E+1	1E+0	5E-10	–	–	–
			Bone surf (2E+1)	Bone surf (2E+0)	–	3E-12	3E-7	3E-6
		W, see ^{230}U	–	7E-1	3E-10	1E-12	–	–
		Y, see ^{230}U	–	4E-2	2E-11	5E-14	–	–
92	Uranium-234[c/]	D, see ^{230}U	1E+1	1E+0	5E-10	–	–	–
			Bone surf (2E+1)	Bone surf (2E+0)	–	3E-12	3E-7	3E-6
		W, see ^{230}U	–	7E-1	3E-10	1E-12	–	–
		Y, see ^{230}U	–	4E-2	2E-11	5E-14	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values: Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values: Col. 2 Inhalation ALI (µCi)	Table I Occupational Values: Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations: Col. 1 Air (µCi/ml)	Table II Effluent Concentrations: Col. 2 Water (µCi/ml)	Table III Releases to Sewers: Monthly Average Concentration (µCi/ml)
92	Uranium-235[c/]	D, see ^{230}U	1E+1 Bone surf (2E+1)	1E+0 Bone surf (2E+0)	6E-10 –	– 3E-12	– 3E-7	– 3E-6
		W, see ^{230}U	–	8E-1	3E-10	1E-12	–	–
		Y, see ^{230}U	–	4E-2	2E-11	6E-14	–	–
92	Uranium-236	D, see ^{230}U	1E+1 Bone surf (2E+1)	1E+0 Bone surf (2E+0)	5E-10 –	– 3E-12	– 3E-7	– 3E-6
		W, see ^{230}U	–	8E-1	3E-10	1E-12	–	–
		Y, see ^{230}U	–	4E-2	2E-11	6E-14	–	–
92	Uranium-237	D, see ^{230}U	2E+3 LLI wall (2E+3)	3E+3 –	1E-6 –	4E-9 -	– 3E-5	– 3E-4
		W, see ^{230}U	–	2E+3	7E-7	2E-9	–	–
		Y, see ^{230}U	–	2E+3	6E-7	2E-9	–	–
92	Uranium-238[c/]	D, see ^{230}U	1E+1 Bone surf (2E+1)	1E+0 Bone surf (2E+0)	6E-10 –	– 3E-12	– 3E-7	– 3E-6
		W, see ^{230}U	–	8E-1	3E-10	1E-12	–	–
		Y, see ^{230}U	–	4E-2	2E-11	6E-14	–	–
92	Uranium-239[b/]	D, see ^{230}U	7E+4	2E+5	8E-5	3E-7	9E-4	9E-3
		W, see ^{230}U	–	2E+5	7E-5	2E-7	–	–
		Y, see ^{230}U	–	2E+5	6E-5	2E-7	–	–
92	Uranium-240	D, see ^{230}U	1E+3	4E+3	2E-6	5E-9	2E-5	2E-4
		W, see ^{230}U	–	3E+3	1E-6	4E-9	–	–
		Y, see ^{230}U	–	2E+3	1E-6	3E-9	–	–
92	Uranium-natural[c/]	D, see ^{230}U	1E+1 Bone surf (2E+1)	1E+0 Bone surf (2E+0)	5E-10 –	– 3E-12	– 3E-7	– 3E-6
		W, see ^{230}U	–	8E-1	3E-10	9E-13	–	–
		Y, see ^{230}U	–	5E-2	2E-11	9E-14	–	–
93	Neptunium-232[b/]	W, all compounds	1E+5 –	2E+3 Bone surf (5E+2)	7E-7 –	– 6E-9	2E-3 –	2E-2 –
93	Neptunium-233[b/]	W, all compounds	8E+5	3E+6	1E-3	4E-6	1E-2	1E-1
93	Neptunium-234	W, all compounds	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4
93	Neptunium-235	W, all compounds	2E+4 LLI wall (2E+4)	8E+2 Bone surf (1E+3)	3E-7 –	– 2E-9	– 3E-4	– 3E-3

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
93	Neptunium-236 (1.15E+5 y)	W, all compounds	3E+0 Bone surf (6E+0)	2E-2 Bone surf (5E-2)	9E-12 –	– 8E-14	– 9E-8	– 9E-7
93	Neptunium-236 (22.5 h)	W, all compounds	3E+3 Bone surf (4E+3)	3E+1 Bone surf (7E+1)	1E-8 –	– 1E-10	– 5E-5	– 5E-4
93	Neptunium-237	W, all compounds	5E-1 Bone surf (1E+0)	4E-3 Bone surf (1E-2)	2E-12 –	– 1E-14	– 2E-8	– 2E-7
93	Neptunium-238	W, all compounds	1E+3 –	6E+1 Bone surf (2E+2)	3E-8 –	– 2E-10	2E-5 –	2E-4 –
93	Neptunium-239	W, all compounds	2E+3 LLI wall (2E+3)	2E+3 –	9E-7 –	3E-9 –	– 2E-5	– 2E-4
93	Neptunium-240[b/]	W, all compounds	2E+4	8E+4	3E-5	1E-7	3E-4	3E-3
94	Plutonium-234	W, all compounds except PuO_2	8E+3	2E+2	9E-8	3E-10	1E-4	1E-3
		Y, PuO_2	–	2E+2	8E-8	3E-10	–	–
94	Plutonium-235[b/]	W, see ^{234}Pu	9E+5	3E+6	1E-3	4E-6	1E-2	1E-1
		Y, see ^{234}Pu	–	3E+6	1E-3	3E-6	–	–
94	Plutonium-236	W, see ^{234}Pu	2E+0 Bone surf (4E+0)	2E-2 Bone surf (4E-2)	8E-12 –	– 5E-14	– 6E-8	– 6E-7
		Y, see ^{234}Pu	–	4E-2	2E-11	6E-14	–	–
94	Plutonium-237	W, see ^{234}Pu	1E+4	3E+3	1E-6	5E-9	2E-4	2E-3
		Y, see ^{234}Pu	–	3E+3	1E-6	4E-9	–	–
94	Plutonium-238	W, see ^{234}Pu	9E-1 Bone surf (2E+0)	7E-3 Bone surf (1E-2)	3E-12 –	– 2E-14	– 2E-8	– 2E-7
		Y, see ^{234}Pu	–	2E-2	8E-12	2E-14	–	–
94	Plutonium-239	W, see ^{234}Pu	8E-1 Bone surf (1E+0)	6E-3 Bone surf (1E-2)	3E-12 –	– 2E-14	– 2E-8	– 2E-7
		Y, see ^{234}Pu	– –	2E-2 Bone surf (2E-2)	7E-12 –	– 2E-14	– –	– –

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2 Inhalation	Col. 3	Col. 1	Col. 2	
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
94	Plutonium-240	W, see ^{234}Pu	8E-1	6E-3	3E-12	–	–	–
			Bone surf (1E+0)	Bone surf (1E-2)	–	2E-14	2E-8	2E-7
		Y, see ^{234}Pu	–	2E-2	7E-12	–	–	–
			–	Bone surf (2E-2)	–	2E-14	–	–
94	Plutonium-241	W, see ^{234}Pu	4E+1	3E-1	1E-10	–	–	–
			Bone surf (7E+1)	Bone surf (6E-1)	–	8E-13	1E-6	1E-5
		Y, see ^{234}Pu	–	8E-1	3E-10	–	–	–
			–	Bone surf (1E+0)	–	1E-12	–	–
94	Plutonium-242	W, see ^{234}Pu	8E-1	7E-3	3E-12	–	–	–
			Bone surf (1E+0)	Bone surf (1E-2)	–	2E-14	2E-8	2E-7
		Y, see ^{234}Pu	–	2E-2	7E-12	–	–	–
			–	Bone surf (2E-2)	–	2E-14	–	–
94	Plutonium-243	W, see ^{234}Pu	2E+4	4E+4	2E-5	5E-8	2E-4	2E-3
		Y, see ^{234}Pu	–	4E+4	2E-5	5E-8	–	–
94	Plutonium-244	W, see ^{234}Pu	8E-1	7E-3	3E-12	–	–	–
			Bone surf (2E+0)	Bone surf (1E-2)	–	2E-14	2E-8	2E-7
		Y, see ^{234}Pu	–	2E-2	7E-12	–	–	–
			–	Bone surf (2E-2)	–	2E-14	–	–
94	Plutonium-245	W, see ^{234}Pu	2E+3	5E+3	2E-6	6E-9	3E-5	3E-4
		Y, see ^{234}Pu	–	4E+3	2E-6	6E-9	–	–
94	Plutonium-246	W, see ^{234}Pu	4E+2	3E+2	1E-7	4E-10	–	–
			LLI wall (4E+2)	–	–	–	6E-6	6E-5
		Y, see ^{234}Pu	–	3E+2	1E-7	4E-10	–	–
95	Americium-237[b/]	W, all compounds	8E+4	3E+5	1E-4	4E-7	1E-3	1E-2
95	Americium-238[b/]	W, all compounds	4E+4	3E+3	1E-6	–	5E-4	5E-3
			–	Bone surf (6E+3)	–	9E-9	–	–
95	Americium-239	W, all compounds	5E+3	1E+4	5E-6	2E-8	7E-5	7E-4
95	Americium-240	W, all compounds	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
95	Americium-241	W, all compounds	8E-1 Bone surf (1E+0)	6E-3 Bone surf (1E-2)	3E-12 –	– 2E-14	– 2E-8	– 2E-7
95	Americium-242m	W, all compounds	8E-1 Bone surf (1E+0)	6E-3 Bone surf (1E-2)	3E-12 –	– 2E-14	– 2E-8	– 2E-7
95	Americium-242	W, all compounds	4E+3 –	8E+1 Bone surf (9E+1)	4E-8 –	– 1E-10	5E-5 –	5E-4 –
95	Americium-243	W, all compounds	8E-1 Bone surf (1E+0)	6E-3 Bone surf (1E-2)	3E-12 –	– 2E-14	– 2E-8	– 2E-7
95	Americium-244m[b/]	W, all compounds	6E+4 St wall (8E+4)	4E+3 Bone surf (7E+3)	2E-6 –	– 1E-8	– 1E-3	– 1E-2
95	Americium-244	W, all compounds	3E+3 –	2E+2 Bone surf (3E+2)	8E-8 –	– 4E-10	4E-5 –	4E-4 –
95	Americium-245	W, all compounds	3E+4	8E+4	3E-5	1E-7	4E-4	4E-3
95	Americium-246m[b/]	W, all compounds	5E+4 St wall (6E+4)	2E+5 –	8E-5 –	3E-7 –	– 8E-4	– 8E-3
95	Americium-246[b/]	W, all compounds	3E+4	1E+5	4E-5	1E-7	4E-4	4E-3
96	Curium-238	W, all compounds	2E+4	1E+3	5E-7	2E-9	2E-4	2E-3
96	Curium-240	W, all compounds	6E+1 Bone surf (8E+1)	6E-1 Bone surf (6E-1)	2E-10 –	– 9E-13	– 1E-6	– 1E-5
96	Curium-241	W, all compounds	1E+3 –	3E+1 Bone surf (4E+1)	1E-8 –	– 5E-11	2E-5 –	2E-4 –
96	Curium-242	W, all compounds	3E+1 Bone surf (5E+1)	3E-1 Bone surf (3E-1)	1E-10 –	– 4E-13	– 7E-7	– 7E-6
96	Curium-243	W, all compounds	1E+0 Bone surf (2E+0)	9E-3 Bone surf (2E-2)	4E-12 –	– 2E-14	– 3E-8	– 3E-7

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
96	Curium-244	W, all compounds	1E+0	1E-2	5E-12	–	–	–
			Bone surf (3E+0)	Bone surf (2E-2)	–	3E-14	3E-8	3E-7
96	Curium-245	W, all compounds	7E-1	6E-3	3E-12	–	–	–
			Bone surf (1E+0)	Bone surf (1E-2)	–	2E-14	2E-8	2E-7
96	Curium-246	W, all compounds	7E-1	6E-3	3E-12	–	–	–
			Bone surf (1E+0)	Bone surf (1E-2)	–	2E-14	2E-8	2E-7
96	Curium-247	W, all compounds	8E-1	6E-3	3E-12	–	–	–
			Bone surf (1E+0)	Bone surf (1E-2)	–	2E-14	2E-8	2E-7
96	Curium-248	W, all compounds	2E-1	2E-3	7E-13	–	–	–
			Bone surf (4E-1)	Bone surf (3E-3)	–	4E-15	5E-9	5E-8
96	Curium-249[b/]	W, all compounds	5E+4	2E+4	7E-6	–	7E-4	7E-3
			–	Bone surf (3E+4)	–	4E-8	–	–
96	Curium-250	W, all compounds	4E-2	3E-4	1E-13	–	–	–
			Bone surf (6E-2)	Bone surf (5E-4)	–	8E-16	9E-10	9E-9
97	Berkelium-245	W, all compounds	2E+3	1E+3	5E-7	2E-9	3E-5	3E-4
97	Berkelium-246	W, all compounds	3E+3	3E+3	1E-6	4E-9	4E-5	4E-4
97	Berkelium-247	W, all compounds	5E-1	4E-3	2E-12	–	–	–
			Bone surf (1E+0)	Bone surf (9E-3)	–	1E-14	2E-8	2E-7
97	Berkelium-249	W, all compounds	2E+2	2E+0	7E-10	–	–	–
			Bone surf (5E+2)	Bone surf (4E+0)	–	5E-12	6E-6	6E-5
97	Berkelium-250	W, all compounds	9E+3	3E+2	1E-7	–	1E-4	1E-3
			–	Bone surf (7E+2)	–	1E-9	–	–
98	Californium-244[b/]	W, all compounds except those given for Y	3E+4	6E+2	2E-7	8E-10	–	–
			St wall (3E+4)	–	–	–	4E-4	4E-3
		Y, oxides and hydroxides	–	6E+2	2E-7	8E-10	–	–

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
98	Californium-246	W, see ^{244}Cf	4E+2	9E+0	4E-9	1E-11	5E-6	5E-5
		Y, see ^{244}Cf	–	9E+0	4E-9	1E-11	–	–
98	Californium-248	W, see ^{244}Cf	8E+0 Bone surf (2E+1)	6E-2 Bone surf (1E-1)	3E-11 –	– 2E-13	– 2E-7	– 2E-6
		Y, see ^{244}Cf	–	1E-1	4E-11	1E-13	–	–
98	Californium-249	W, see ^{244}Cf	5E-1 Bone surf (1E+0)	4E-3 Bone surf (9E-3)	2E-12 –	– 1E-14	– 2E-8	– 2E-7
		Y, see ^{244}Cf	–	1E-2 Bone surf (1E-2)	4E-12 –	– 2E-14	– –	– –
98	Californium-250	W, see ^{244}Cf	1E+0 Bone surf (2E+0)	9E-3 Bone surf (2E-2)	4E-12 –	– 3E-14	– 3E-8	– 3E-7
		Y, see ^{244}Cf	–	3E-2	1E-11	4E-14	–	–
98	Californium-251	W, see ^{244}Cf	5E-1 Bone surf (1E+0)	4E-3 Bone surf (9E-3)	2E-12 –	– 1E-14	– 2E-8	– 2E-7
		Y, see ^{244}Cf	–	1E-2 Bone surf (1E-2)	4E-12 –	– 2E-14	– –	– –
98	Californium-252	W, see ^{244}Cf	2E+0 Bone surf (5E+0)	2E-2 Bone surf (4E-2)	8E-12 –	– 5E-14	– 7E-8	– 7E-7
		Y, see ^{244}Cf	–	3E-2	1E-11	5E-14	–	–
98	Californium-253	W, see ^{244}Cf	2E+2 Bone surf (4E+2)	2E+0 –	8E-10 –	3E-12 –	– 5E-6	– 5E-5
		Y, see ^{244}Cf	–	2E+0	7E-10	2E-12	–	–
98	Californium-254	W, see ^{244}Cf	2E+0	2E-2	9E-12	3E-14	3E-8	3E-7
		Y, see ^{244}Cf	–	2E-2	7E-12	2E-14	–	–
99	Einsteinium-250	W, all compounds	4E+4	5E+2 Bone surf (1E+3)	2E-7 –	– 2E-9	6E-4 –	6E-3 –
99	Einsteinium-251	W, all compounds	7E+3	9E+2 Bone surf (1E+3)	4E-7 –	– 2E-9	1E-4 –	1E-3 –
99	Einsteinium-253	W, all compounds	2E+2	1E+0	6E-10	2E-12	2E-6	2E-5

Footnotes appear at the end of these three tables.

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values Col. 1 Oral Ingestion ALI (µCi)	Table I Occupational Values Col. 2 Inhalation ALI (µCi)	Table I Occupational Values Col. 3 Inhalation DAC (µCi/ml)	Table II Effluent Concentrations Col. 1 Air (µCi/ml)	Table II Effluent Concentrations Col. 2 Water (µCi/ml)	Table III Releases to Sewers Monthly Average Concentration (µCi/ml)
99	Einsteinium-254m	W, all compounds	3E+2	1E+1	4E-9	1E-11	–	–
			LLI wall (3E+2)	–	–	–	4E-6	4E-5
99	Einsteinium-254	W, all compounds	8E+0	7E-2	3E-11	–	–	–
			Bone surf (2E+1)	Bone surf (1E-1)	–	2E-13	2E-7	2E-6
100	Fermium-252	W, all compounds	5E+2	1E+1	5E-9	2E-11	6E-6	6E-5
100	Fermium-253	W, all compounds	1E+3	1E+1	4E-9	1E-11	1E-5	1E-4
100	Fermium-254	W, all compounds	3E+3	9E+1	4E-8	1E-10	4E-5	4E-4
100	Fermium-255	W, all compounds	5E+2	2E+1	9E-9	3E-11	7E-6	7E-5
100	Fermium-257	W, all compounds	2E+1	2E-1	7E-11	–	–	–
			Bone surf (4E+1)	Bone surf (2E-1)	–	3E-13	5E-7	5E-6
101	Mendelevium-257	W, all compounds	7E+3	8E+1	4E-8	–	1E-4	1E-3
			–	Bone surf (9E+1)	–	1E-10	–	–
101	Mendelevium-258	W, all compounds	3E+1	2E-1	1E-10	–	–	–
			Bone surf (5E+1)	Bone surf (3E-1)	–	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[a/]	–	2E+2	1E-7	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		....	–	2E-1	1E-10	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		....	–	4E-4	2E-13	1E-15	2E-9	2E-8

Footnotes appear at the end of these three tables.

Footnotes:

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

[b] *These radionuclides have radiological half-lives of less than 2 hours. The total effective dose equivalent received during operations with these radionuclides might include a significant contribution from external exposure. The DAC values for all radionuclides, other than those designated Class "Submersion," are based upon the committed effective dose equivalent due to the intake of the radionuclide into the body and do NOT include potentially significant contributions to dose equivalent from external exposures. The licensee may substitute 1E-7 µCi/ml for the listed DAC to account for the submersion dose prospectively, but should use individual monitoring devices or other radiation measuring instruments that measure external exposure to demonstrate compliance with the limits. (See D.203.)*

[c] *For soluble mixtures of U-238, U-234, and U-235 in air, chemical toxicity may be the limiting factor (see D.201e.). If the percent by weight (enrichment) of U-235 is not greater than 5, the concentration value for a 40-hour workweek is 0.2 milligrams uranium per cubic meter of air average. For any enrichment, the product of the average concentration and time of exposure during a 40-hour workweek shall not exceed 8E-3 (SA) µCi-hr/ml, where SA is the specific activity of the uranium inhaled. The specific activity for natural uranium is 6.77E-7 curies per gram U. The specific activity for other mixtures of U-238, U-235, and U-234, if not known, shall be:*

SA = 3.6E-7 curies/gram U U-depleted

SA = [0.4 + 0.38 (enrichment) + 0.0034 (enrichment)^2] E-6, enrichment $\geq$ 0.72

where enrichment is the percentage by weight of U-235, expressed as percent.

Note:

1. If the identity of each radionuclide in a mixture is known but the concentration of one or more of the radionuclides in the mixture is not known, the DAC for the mixture shall be the most restrictive DAC of any radionuclide in the mixture.

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

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Concentration (µCi/ml)
If it is known that Ac-227-D and Cm-250-W are not present			–	7E-4	3E-13	–	–	–
If, in addition, it is known that Ac-227-W,Y, Th-229-W,Y, Th-230-W, Th-232-W,Y, Pa-231-W,Y, Np-237-W, Pu-239-W, Pu-240-W, Pu-242-W, Am-241-W, Am-242m-W, Am-243-W, Cm-245-W, Cm-246-W, Cm-247-W, Cm-248-W, Bk-247-W, Cf-249-W, and Cf-251-W are not present			–	7E-3	3E-12	–	–	–
If, in addition, it is known that Sm-146-W, Sm-147-W, Gd-148-D,W, Gd-152-D,W, Th-228-W,Y, Th-230-Y, U-232-Y, U-233-Y, U-234-Y, U-235-Y, U-236-Y, U-238-Y, Np-236-W, Pu-236-W,Y, Pu-238-W,Y, Pu-239-Y, Pu-240-Y, Pu-242-Y, Pu-244-W,Y, Cm-243-W, Cm-244-W, Cf-248-W, Cf-249-Y, Cf-250-W,Y, Cf-251-Y, Cf-252-W,Y, and Cf-254-W,Y are not presen			–	7E-2	3E-11	–	–	–

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure
Effluent Concentrations
Concentrations for Release to Sanitary Sewerage *(Continued)*

Atomic No.	Radionuclide	Class	Table I Occupational Values			Table II Effluent Concentrations		Table III Releases to Sewers
			Col. 1 Oral Ingestion	Col. 2 Inhalation	Col. 3	Col. 1	Col. 2	
			ALI (µCi)	ALI (µCi)	DAC (µCi/ml)	Air (µCi/ml)	Water (µCi/ml)	Monthly Average Concentration (µCi/ml)
	If, in addition, it is known that 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, Pu-241-W, Cm-240-W, Cm-242-W, Cf-248-Y, Es-254-W, Fm-257-W, and Md-258-W are not present		–	7E-1	3E-10	–	–	–
	If, in addition, it is known that Si-32-Y, Ti-44-Y, Fe-60-D, Sr-90-Y, Zr-93-D, Cd-113m-D, Cd-113-D, In-115-D,W, La-138-D, Lu-176-W, Hf-178m-D,W, Hf-182-D,W, Bi-210m-D, Ra-224-W, Ra-228-W, Ac-226-D,W,Y, Pa-230-W,Y, U-233-D,W, U-234-D,W, U-235-D,W, U-236-D,W, U-238-D,W, Pu-241-Y, Bk-249-W, Cf-253-W,Y, and Es-253-W are not present		–	7E+0	3E-9	–	–	–
	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

3. If a mixture of radionuclides consists of uranium and its daughters in ore dust (10 µm AMAD particle distribution assumed) prior to chemical separation of the uranium from the ore, the following values may be used for the DAC of the mixture: 6E-11 µCi of gross alpha activity from uranium-238, uranium-234, thorium-230, and radium-226 per milliliter of air; 3E-11 µCi of natural uranium per milliliter of air; or 45 micrograms of natural uranium per cubic meter of air.

4. 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 B 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 DACs are DAC_A, DAC_B, and DAC_C, respectively, then the concentrations shall be limited so that the following relationship exists:

$$\frac{C_A}{DAC_A} + \frac{C_B}{DAC} SUBB + \frac{C_C}{DAC_C} \quad 1$$

PART D

APPENDIX C

QUANTITIES[a/] OF LICENSED OR REGISTERED MATERIAL REQUIRING LABELING

(In Atomic Number Order)

Radionuclide	Quantity (µCi)[b/]	Radionuclide	Quantity (µCi)[b/]
Hydrogen-3	1,000	Scandium-47	100
Beryllium-7	1,000	Scandium-48	100
Beryllium-10	1	Scandium-49	1,000
Carbon-11	1,000	Titanium-44	1
Carbon-14	100	Titanium-45	1,000
Fluorine-18	1,000	Vanadium-47	1,000
Sodium-22	10	Vanadium-48	100
Sodium-24	100	Vanadium-49	1,000
Magnesium-28	100	Chromium-48	1,000
Aluminum-26	10	Chromium-49	1,000
Silicon-31	1,000	Chromium-51	1,000
Silicon-32	1	Manganese-51	1,000
Phosphorus-32	10	Manganese-52m	1,000
Phosphorus-33	100	Manganese-52	100
Sulfur-35	100	Manganese-53	1,000
Chlorine-36	10	Manganese-54	100
Chlorine-38	1,000	Manganese-56	1,000
Chlorine-39	1,000	Iron-52	100
Argon-39	1,000	Iron-55	100
Argon-41	1,000	Iron-59	10
Potassium-40	100	Iron-60	1
Potassium-42	1,000	Cobalt-55	100
Potassium-43	1,000	Cobalt-56	10
Potassium-44	1,000	Cobalt-57	100
Potassium-45	1,000	Cobalt-58m	1,000
Calcium-41	100	Cobalt-58	100
Calcium-45	100	Cobalt-60m	1,000
Calcium-47	100	Cobalt-60	1
Scandium-43	1,000	Cobalt-61	1,000
Scandium-44m	100	Cobalt-62m	1,000
Scandium-44	100	Nickel-56	100
Scandium-46	10	Nickel-57	100
Nickel-59	100	Copper-60	1,000
Nickel-63	100	Copper-61	1,000
Nickel-65	1,000	Copper-64	1,000
Nickel-66	10	Copper-67	1,000

Radionuclide	Quantity (µCi)[b/]	Radionuclide	Quantity (µCi)[b/]
Zinc-62	100	Selenium-70	1,000
Zinc-63	1,000	Selenium-73m	1,000
Zinc-65	10	Selenium-73	100
Zinc-69m	100	Selenium-75	100
Zinc-69	1,000	Selenium-79	100
Zinc-71m	1,000	Selenium-81m	1,000
Zinc-72	100	Selenium-81	1,000
Gallium-65	1,000	Selenium-83	1,000
Gallium-66	100	Bromine-74m	1,000
Gallium-67	1,000	Bromine-74	1,000
Gallium-68	1,000	Bromine-75	1,000
Gallium-70	1,000	Bromine-76	100
Gallium-72	100	Bromine-77	1,000
Gallium-73	1,000	Bromine-80m	1,000
Germanium-66	1,000	Bromine-80	1,000
Germanium-67	1,000	Bromine-82	100
Germanium-68	10	Bromine-83	1,000
Germanium-69	1,000	Bromine-84	1,000
Germanium-71	1,000	Krypton-74	1,000
Germanium-75	1,000	Krypton-76	1,000
Germanium-77	1,000	Krypton-77	1,000
Germanium-78	1,000	Krypton-79	1,000
Arsenic-69	1,000	Krypton-81	1,000
Arsenic-70	1,000	Krypton-83m	1,000
Arsenic-71	100	Krypton-85m	1,000
Arsenic-72	100	Krypton-85	1,000
Arsenic-73	100	Krypton-87	1,000
Arsenic-74	100	Krypton-88	1,000
Arsenic-76	100	Rubidium-79	1,000
Arsenic-77	100	Rubidium-81m	1,000
Arsenic-78	1,000	Rubidium-81	1,000
Rubidium-82m	1,000	Strontium-81	1,000
Rubidium-83	100	Strontium-83	100
Rubidium-84	100	Strontium-85m	1,000
Rubidium-86	100	Strontium-85	100
Rubidium-87	100	Strontium-87m	1,000
Rubidium-88	1,000	Strontium-89	10
Rubidium-89	1,000	Strontium-90	0.1
Strontium-80	100	Strontium-91	100

Radionuclide	Quantity (µCi)[b/]	Radionuclide	Quantity (µCi)[b/]
Strontium-92	100	Niobium-96	100
Yttrium-86m	1,000	Niobium-97	1,000
Yttrium-86	100	Niobium-98	1,000
Yttrium-87	100	Molybdenum-90	100
Yttrium-88	10	Molybdenum-93m	100
Yttrium-90m	1,000	Molybdenum-93	10
Yttrium-90	10	Molybdenum-99	100
Yttrium-91m	1,000	Molybdenum-101	1,000
Yttrium-91	10	Technetium-93m	1,000
Yttrium-92	100	Technetium-93	1,000
Yttrium-93	100	Technetium-94m	1,000
Yttrium-94	1,000	Technetium-94	1,000
Yttrium-95	1,000	Technetium-96m	1,000
Zirconium-86	100	Technetium-96	100
Zirconium-88	10	Technetium-97m	100
Zirconium-89	100	Technetium-97	1,000
Zirconium-93	1	Technetium-98	10
Zirconium-95	10	Technetium-99m	1,000
Zirconium-97	100	Technetium-99	100
Niobium-88	1,000	Technetium-101	1,000
Niobium-89m (66 min)	1,000	Technetium-104	1,000
Niobium-89 (122 min)	1,000	Ruthenium-94	1,000
Niobium-90	100	Ruthenium-97	1,000
Niobium-93m	10	Ruthenium-103	100
Niobium-94	1	Ruthenium-105	1,000
Niobium-95m	100	Ruthenium-106	1
Niobium-95	100	Rhodium-99m	1,000
Rhodium-99	100	Palladium-103	100
Rhodium-100	100	Palladium-107	10
Rhodium-101m	1,000	Palladium-109	100
Rhodium-101	10	Silver-102	1,000
Rhodium-102m	10	Silver-103	1,000
Rhodium-102	10	Silver-104m	1,000
Rhodium-103m	1,000	Silver-104	1,000
Rhodium-105	100	Silver-105	100
Rhodium-106m	1,000	Silver-106m	100
Rhodium-107	1,000	Silver-106	1,000
Palladium-100	100	Silver-108m	1
Palladium-101	1,000	Silver-11Om	10

Radionuclide	Quantity (µCi)[b/]	Radionuclide	Quantity (µCi)[b/]
Silver-111	100	Antimony-116m	1,000
Silver-112	100	Antimony-116	1,000
Silver-115	1,000	Antimony-117	1,000
Cadmium-104	1,000	Antimony-118m	1,000
Cadmium-107	1,000	Antimony-119	1,000
Cadmium-109	1	Antimony-120 (16 min)	1,000
Cadmium-113m	0.1	Antimony-120 (5.76 d)	100
Cadmium-113	100	Antimony-122	100
Cadmium-115m	10	Antimony-124m	1,000
Cadmium-115	100	Antimony-124	10
Cadmium-117m	1,000	Antimony-125	100
Cadmium-117	1,000	Antimony-126m	1,000
Indium-109	1,000	Antimony-126	100
Indium-110 (69.1 min)	1,000	Antimony-127	100
Indium-11O (4.9 h)	1,000	Antimony-128 (10.4 min)	1,000
Indium-111	100	Antimony-128 (9.O1 h)	100
Indium-112	1,000	Antimony-129	100
Indium-113m	1,000	Antimony-130	1,000
Indium-114m	10	Antimony-131	1,000
Indium-115m	1,000	Tellurium-116	1,000
Indium-115	100	Tellurium-121m	10
Indium-116m	1,000	Tellurium-121	100
Indium-117m	1,000	Tellurium-123m	10
Indium-117	1,000	Tellurium-123	100
Indium-119m	1,000	Tellurium-125m	10
Tin-110	100	Tellurium-127m	10
Tin-111	1,000	Tellurium-127	1,000
Tin-113	100	Tellurium-129m	10
Tin-117m	100	Tellurium-129	1,000
Tin-119m	100	Tellurium-131m	10
Tin-121m	100	Tellurium-131	100
Tin-121	1,000	Tellurium-132	10
Tin-123m	1,000	Tellurium-133m	100
Tin-123	10	Tellurium-133	1,000
Tin-125	10	Tellurium-134	1,000
Tin-126	10	Iodine-120m	1,000
Tin-127	1,000	Iodine-120	100
Tin-128	1,000	Iodine-121	1,000
Antimony-115	1,000	Iodine-123	100

Radionuclide	Quantity (µCi)[b/]	Radionuclide	Quantity (µCi)[b/]
Iodine-124	10	Xenon-131m	1,000
Iodine-125	1	Xenon-133m	1,000
Iodine-126	1	Xenon-133	1,000
Iodine-128	1,000	Xenon-135m	1,000
Iodine-129	1	Xenon-135	1,000
Iodine-130	10	Xenon-138	1,000
Iodine-131	1	Cesium-125	1,000
Iodine-132m	100	Cesium-127	1,000
Iodine-132	100	Cesium-129	1,000
Iodine-133	10	Cesium-130	1,000
Iodine-134	1,000	Cesium-131	1,000
Iodine-135	100	Cesium-132	100
Xenon-120	1,000	Cesium-134m	1,000
Xenon-121	1,000	Cesium-134	10
Xenon-122	1,000	Cesium-135m	1,000
Xenon-123	1,000	Cesium-135	100
Xenon-125	1,000	Cesium-136	10
Xenon-127	1,000	Cesium-137	10
Xenon-129m	1,000	Cesium-138	1,000
Barium-126	1,000	Cerium-134	100
Barium-128	100	Cerium-135	100
Barium-131m	1,000	Cerium-137m	100
Barium-131	100	Cerium-137	1,000
Barium-133m	100	Cerium-139	100
Barium-133	100	Cerium-141	100
Barium-135m	100	Cerium-143	100
Barium-139	1,000	Cerium-144	1
Barium-140	100	Praseodymium-136	1,000
Barium-141	1,000	Praseodymium-137	1,000
Barium-142	1,000	Praseodymium-138m	1,000
Lanthanum-131	1,000	Praseodymium-139	1,000
Lanthanum-132	100	Praseodymium-142m	1,000
Lanthanum-135	1,000	Praseodymium-142	100
Lanthanum-137	10	Praseodymium-143	100
Lanthanum-138	100	Praseodymium-144	1,000
Lanthanum-140	100	Praseodymium-145	100
Lanthanum-141	100	Praseodymium-147	1,000
Lanthanum-142	1,000	Neodymium-136	1,000
Lanthanum-143	1,000	Neodymium-138	100

Radionuclide	Quantity (µCi)[b/]	Radionuclide	Quantity (µCi)[b/]
Neodymium-139m	1,000	Promethium-150	1,000
Neodymium-139	1,000	Promethium-151	100
Neodymium-141	1,000	Samarium-141m	1,000
Neodymium-147	100	Samarium-141	1,000
Neodymium-149	1,000	Samarium-142	1,000
Neodymium-151	1,000	Samarium-145	100
Promethium-141	1,000	Samarium-146	1
Promethium-143	100	Samarium-147	100
Promethium-144	10	Samarium-151	10
Promethium-145	10	Samarium-153	100
Promethium-146	1	Samarium-155	1,000
Promethium-147	10	Samarium-156	1,000
Promethium-148m	10	Europium-145	100
Promethium-148	10	Europium-146	100
Promethium-149	100	Europium-147	100
Europium-148	10	Terbium-153	1,000
Europium-149	100	Terbium-154	100
Europium-150 (12.62 h)	100	Terbium-155	1,000
Europium-150 (34.2 y)	1	Terbium-156m (5.O h)	1,000
Europium-152m	100	Terbium-156m (24.4 h)	1,000
Europium-152	1	Terbium-156	100
Europium-154	1	Terbium-157	10
Europium-155	10	Terbium-158	1
Europium-156	100	Terbium-160	10
Europium-157	100	Terbium-161	100
Europium-158	1,000	Dysprosium-155	1,000
Gadolinium-145	1,000	Dysprosium-157	1,000
Gadolinium-146	10	Dysprosium-159	100
Gadolinium-147	100	Dysprosium-165	1,000
Gadolinium-148	0.001	Dysprosium-166	100
Gadolinium-149	100	Holmium-155	1,000
Gadolinium-151	10	Holmium-157	1,000
Gadolinium-152	100	Holmium-159	1,000
Gadolinium-153	10	Holmium-161	1,000
Gadolinium-159	100	Holmium-162m	1,000
Terbium-147	1,000	Holmium-162	1,000
Terbium-149	100	Holmium-164m	1,000
Terbium-150	1,000	Holmium-164	1,000
Terbium-151	100	Holmium-166m	1

Radionuclide	Quantity (µCi)[b/]	Radionuclide	Quantity (µCi)[b/]
Holmium-166	100	Thulium-171	10
Holmium-167	1,000	Thulium-172	100
Erbium-161	1,000	Thulium-173	100
Erbium-165	1,000	Thulium-175	1,000
Erbium-169	100	Ytterbium-162	1,000
Erbium-171	100	Ytterbium-166	100
Erbium-172	100	Ytterbium-167	1,000
Thulium-162	1,000	Ytterbium-169	100
Thulium-166	100	Ytterbium-175	100
Thulium-167	100	Ytterbium-177	1,000
Thulium-170	10	Ytterbium-178	1,000
Lutetium-169	100	Tantalum-173	1,000
Lutetium-170	100	Tantalum-174	1,000
Lutetium-171	100	Tantalum-175	1,000
Lutetium-172	100	Tantalum-176	100
Lutetium-173	10	Tantalum-177	1,000
Lutetium-174m	10	Tantalum-178	1,000
Lutetium-174	10	Tantalum-179	100
Lutetium-176m	1,000	Tantalum-180m	1,000
Lutetium-176	100	Tantalum-180	100
Lutetium-177m	10	Tantalum-182m	1,000
Lutetium-177	100	Tantalum-182	10
Lutetium-178m	1,000	Tantalum-183	100
Lutetium-178	1,000	Tantalum-184	100
Lutetium-179	1,000	Tantalum-185	1,000
Hafnium-170	100	Tantalum-186	1,000
Hafnium-172	1	Tungsten-176	1,000
Hafnium-173	1,000	Tungsten-177	1,000
Hafnium-175	100	Tungsten-178	1,000
Hafnium-177m	1,000	Tungsten-179	1,000
Hafnium-178m	0.1	Tungsten-181	1,000
Hafnium-179m	10	Tungsten-185	100
Hafnium-180m	1,000	Tungsten-187	100
Hafnium-181	10	Tungsten-188	10
Hafnium-182m	1,000	Rhenium-177	1,000
Hafnium-182	0.1	Rhenium-178	1,000
Hafnium-183	1,000	Rhenium-181	1,000
Hafnium-184	100	Rhenium-182 (12.7 h)	1,000
Tantalum-172	1,000	Rhenium-182 (64.O h)	100

Radionuclide	Quantity (µCi)[b/]	Radionuclide	Quantity (µCi)[b/]
Rhenium-184m	10	Rhenium-189	100
Rhenium-184	100	Osmium-180	1,000
Rhenium-186m	10	Osmium-181	1,000
Rhenium-186	100	Osmium-182	100
Rhenium-187	1,000	Osmium-185	100
Rhenium-188m	1,000	Osmium-189m	1,000
Rhenium-188	100	Osmium-191m	1,000
Osmium-191	100	Gold-198m	100
Osmium-193	100	Gold-198	100
Osmium-194	1	Gold-199	100
Iridium-182	1,000	Gold-200m	100
Iridium-184	1,000	Gold-200	1,000
Iridium-185	1,000	Gold-201	1,000
Iridium-186	100	Mercury-193m	100
Iridium-187	1,000	Mercury-193	1,000
Iridium-188	100	Mercury-194	1
Iridium-189	100	Mercury-195m	100
Iridium-190m	1,000	Mercury-195	1,000
Iridium-190	100	Mercury-197m	100
Iridium-192m (1.4 min)	10	Mercury-197	1,000
Iridium-192 (73.8 d)	1	Mercury-199m	1,000
Iridium-194m	10	Mercury-203	100
Iridium-194	100	Thallium-194m	1,000
Iridium-195m	1,000	Thallium-194	1,000
Iridium-195	1,000	Thallium-195	1,000
Platinum-186	1,000	Thallium-197	1,000
Platinum-188	100	Thallium-198m	1,000
Platinum-189	1,000	Thallium-198	1,000
Platinum-191	100	Thallium-199	1,000
Platinum-193m	100	Thallium-201	1,000
Platinum-193	1,000	Thallium-200	1,000
Platinum-195m	100	Thallium-202	100
Platinum-197m	1,000	Thallium-204	100
Platinum-197	100	Lead-195m	1,000
Platinum-199	1,000	Lead-198	1,000
Platinum-200	100	Lead-199	1,000
Gold-193	1,000	Lead-200	100
Gold-194	100	Lead-201	1,000
Gold-195	10	Lead-202m	1,000

Radionuclide	Quantity (µCi)[b/]	Radionuclide	Quantity (µCi)[b/]
Lead-202	10	Lead-209	1,000
Lead-203	1,000	Lead-210	0.01
Lead-205	100	Lead-211	100
Lead-212	1	Thorium-226	10
Lead-214	100	Thorium-227	0.01
Bismuth-200	1,000	Thorium-228	0.001
Bismuth-201	1,000	Thorium-229	0.001
Bismuth-202	1,000	Thorium-230	0.001
Bismuth-203	100	Thorium-231	100
Bismuth-205	100	Thorium-232	100
Bismuth-206	100	Thorium-234	10
Bismuth-207	10	Thorium-natural	100
Bismuth-210m	0.1	Protactinium-227	10
Bismuth-210	1	Protactinium-228	1
Bismuth-212	10	Protactinium-230	0.1
Bismuth-213	10	Protactinium-231	0.001
Bismuth-214	100	Protactinium-232	1
Polonium-203	1,000	Protactinium-233	100
Polonium-205	1,000	Protactinium-234	100
Polonium-207	1,000	Uranium-230	0.01
Polonium-210	0.1	Uranium-231	100
Astatine-207	100	Uranium-232	0.001
Astatine-211	10	Uranium-233	0.001
Radon-220	1	Uranium-234	0.001
Radon-222	1	Uranium-235	0.001
Francium-222	100	Uranium-236	0.001
Francium-223	100	Uranium-237	100
Radium-223	0.1	Uranium-238	100
Radium-224	0.1	Uranium-239	1,000
Radium-225	0.1	Uranium-240	100
Radium-226	0.1	Uranium-natural	100
Radium-227	1,000	Neptunium-232	100
Radium-228	0.1	Neptunium-233	1,000
Actinium-224	1	Neptunium-234	100
Actinium-225	0.01	Neptunium-235	100
Actinium-226	0.1	Neptunium-236 (1.15E+5 y)	0.001
Actinium-227	0.001	Neptunium-236 (22.5 h)	1
Actinium-228	1	Neptunium-237	0.001
Neptunium-238	10	Neptunium-239	100

Radionuclide	Quantity (µCi)[b/]	Radionuclide	Quantity (µCi)[b/]
Neptunium-240	1,000	Berkelium-247	0.001
Plutonium-234	10	Berkelium-249	0.1
Plutonium-235	1,000	Berkelium-250	10
Plutonium-236	0.001	Californium-244	100
Plutonium-237	100	Californium-246	1
Plutonium-238	0.001	Californium-248	0.01
Plutonium-239	0.001	Californium-249	0.001
Plutonium-240	0.001	Californium-250	0.001
Plutonium-241	0.01	Californium-251	0.001
Plutonium-242	0.001	Californium-252	0.001
Plutonium-243	1,000	Californium-253	0.1
Plutonium-244	0.001	Californium-254	0.001
Plutonium-245	100	Einsteinium-250	100
Americium-237	1,000	Einsteinium-251	100
Americium-238	100	Einsteinium-253	0.1
Americium-239	1,000	Einsteinium-254m	1
Americium-240	100	Einsteinium-254	0.01
Americium-241	0.001	Fermium-252	1
Americium-242m	0.001	Fermium-253	1
Americium-242	10	Fermium-254	10
Americium-243	0.001	Fermium-255	1
Americium-244m	100	Fermium-257	0.01
Americium-244	10	Mendelevium-257	10
Americium-245	1,000	Mendelevium-258	0.01
Americium-246m	1,000		
Americium-246	1,000		
Curium-238	100		
Curium-240	0.1		
Curium-241	1		
Curium-242	0.01		
Curium-243	0.001		
Curium-244	0.001		
Curium-245	0.001		
Curium-246	0.001		
Curium-247	0.001		
Curium-248	0.001		
Curium-249	1,000		
Berkelium-245	100		
Berkelium-246	100		

Radionuclide	Quantity (µCi)[b/]	Radionuclide	Quantity (µCi)[b/]
Any alpha-emitting radionuclide not listed above or mixtures of alpha emitters of unknown composition	0.001	Any radionuclide other than alpha-emitting radionuclides not listed above, or mixtures of beta emitters of unknown composition	0.01

NOTE: For purposes of D.902e., D.905a., and D.1201a. where there is involved a combination of radionuclides in known amounts, the limit for the combination shall be derived as follows: determine, for each radionuclide in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific radionuclide when not in combination. The sum of such ratios for all radionuclides in the combination may not exceed "1" -- that is, unity.

[a/] *The quantities listed above were derived by taking 1/10th of the most restrictive ALI listed in Table I, Columns 1 and 2, of Appendix B to Part D, rounding to the nearest factor of 10, and constraining the values listed between 37 Bq and 37 MBq (0.001 and 1,000 µCi). Values of 3.7 MBq (100 µCi) have been assigned for radionuclides having a radioactive half-life in excess of E+9 years, except rhenium, 37 MBq (1,000 Ci), to take into account their low specific activity.*

[b/] *To convert µCi to kBq, multiply the µCi value by 37.*

Appendix D

SAMPLE LETTER for DECLARING PREGNANCY
(Please print legibly all entries)

CONFIDENTIAL HEALTH INFORMATION

DATE: _____
(Specify Date)

TO: Radiation Safety Officer

_____
(Your Employer Facility Name)

_____
(Your Employer Facility Address)

FROM: _____
(Your Name)

_____
(Your Department)

_____
(Your Inter-Office Mailing Address)

_____
(Your Work Phone No.)

SUBJECT: Declaration of Pregnancy

In accordance with Delaware Administrative Code 4465, Delaware Radiation Control Regulations Sec.D.1208 "Dose equivalent to an Embryo/Fetus", I am declaring that I am (or suspect I am) pregnant.

I believe that I became pregnant in the month of _____ of _____
(specify month) **(specify year)**

I understand that the radiation dose to my embryo/fetus during my entire pregnancy will not be allowed to exceed 5 millisievert (0.5 rem, or 500 millirems) unless that dose has already been exceeded between the time of conception and the submission of this letter. I understand that meeting the lower dose limit may require a change in job or job responsibilities during my pregnancy. I also understand that this declaration and my dose history will be reviewed by the Radiation Safety Officer and/or his staff and that the recommended or required changes in my job or job responsibilities during my pregnancy may result from that review. Finally, I understand that I may un-declare my pregnancy at any time by informing the Radiation Safety Officer in writing.

Employee Signature	**Employee Printed Name**	**Date**

Employer Representative Signature	**Employer Representative Printed Name**	**Date**

Appendix E (reserved)

[PART D

APPENDIX F

QUANTITIES FOR USE WITH DECOMMISSIONING[a/]

Material	Microcurie[b/]
Americium-241	0.01
Antimony-122	100
Antimony-124	10
Antimony-125	10
Arsenic-73	100
Arsenic-74	10
Arsenic-76	10
Arsenic-77	100
Barium-131	10
Barium-133	10
Barium-140	10
Bismuth-210	1
Bromine-82	10
Cadmium-109	10
Cadmium-115m	10
Cadmium-115	100
Calcium-45	10
Calcium-47	10
Carbon-14	100
Cerium-141	100
Cerium-143	100
Cerium-144	1
Cesium-131	1,000
Cesium-134m	100
Cesium-134	1
Cesium-135	10
Cesium-136	10
Cesium-137	10
Chlorine-36	10
Chlorine-38	10
Chromium-51	1,000
Cobalt-58m	10
Cobalt-58	10

[a/] *This Appendix is retained for use by those Agreement States that need to adopt decommissioning regulations compatible with the Nuclear Regulatory Commission.*

[b/] *To convert µCi to kBq, multiply the µCi value by 37.*

QUANTITIES FOR USE WITH DECOMMISSIONING[a/] *(Continued)*

Material	Microcurie[b/]
Cobalt-60	1
Copper-64	100
Dysprosium-165	10
Dysprosium-166	100
Erbium-169	100
Erbium-171	100
Europium-152 (9.2 h)	100
Europium-152 (13 yr)	1
Europium-154	1
Europium-155	10
Florine-18	1,000
Gadolinium-153	10
Gadolinium-159	100
Gallium-72	10
Germanium-71	0
Hafnium-181	10
Holmium-166	100
Hydrogen-3	1,000
Indium-113m	100
Indium-114m	10
Indium-115m	100
Indium-115	10
Iodine-125	1
Iodine-126	1
Iodine-129	0.1
Iodine-131	1
Iodine-132	10
Iodine-133	1
Iodine-134	10
Iodine-135	10
Iridium-192	10
Iridium-194	100
Iron-55	100
Iron-59	10
Krypton-85	100
Krypton-87	10
Lanthanum-140	10

QUANTITIES FOR USE WITH DECOMMISSIONING[a/] *(Continued)*

Material	Microcurie[b/]
Lutetium-177	100
Manganese-52	10
Manganese-54	10
Manganese-56	10
Mercury-197m	100
Mercury-197	100
Mercury-203	10
Molybdenum-99	100
Neodymium-147	100
Neodymium-149	100
Nickel-59	100
Nickel-63	10
Nickel-65	100
Niobium-93m	10
Niobium-95	10
Niobium-97	10
Osmium-185	10
Osmium-191m	100
Osmium-191	100
Osmium-193	100
Palladium-103	100
Palladium-109	100
Phosphorus-32	10
Platinum-191	100
Platinum-193m	100
Platinum-193	100
Platinum-197m	100
Platinum-197	100
Plutonium-239	0.01
Polonium-210	0.1
Potassium-42	10
Praseodymium-142	100
Praseodymium-143	100
Promethium-147	10
Promethium-149	10
Radium-226	0.01
Rhenium-186	100

[a/] *This Appendix is retained for use by those Agreement States that need to adopt decommissioning regulations compatible with the Nuclear Regulatory Commission.*

[b/] *To convert µCi to kBq, multiply the µCi value by 37.*

QUANTITIES FOR USE WITH DECOMMISSIONING[a/] *(Continued)*

Material	Microcurie[b/]
Rhenium-188	100
Rhodium-103m	100
Rhodium-105	100
Rubidium-86	10
Rubidium-87	10
Ruthenium-97	100
Ruthenium-103	10
Ruthenium-105	10
Ruthenium-106	1
Samarium-151	10
Samarium-153	100
Scandium-46	10
Scandium-47	100
Scandium-48	10
Selenium-75	10
Silicon-31	100
Silver-105	10
Silver-11Om	1
Silver-111	100
Sodium-22	1
Sodium-24	10
Strontium-85	10
Strontium-89	1
Strontium-90	0.1
Strontium-91	10
Strontium-92	10
Sulfur -35	100
Tantalum-182	10
Technetium-96	10
Technetium-97m	100
Technetium-97	100
Technetium-99m	100
Technetium-99	10
Tellurium-125m	10
Tellurium-127m	10
Tellurium-127	100
Tellurium-129m	10

QUANTITIES FOR USE WITH DECOMMISSIONING[a/] *(Continued)*

Material	Microcurie[b/]
Tellurium-129	100
Tellurium-131m	10
Tellurium-132	10
Terbium-160	10
Thallium-200	100
Thallium-201	100
Thallium-202	100
Thallium-204	10
Thorium (natural)[c/]	100
Thulium-170	10
Thulium-171	10
Tin-113	10
Tin-125	10
Tungsten-181	10
Tungsten-185	10
Tungsten-187	100
Uranium (natural)[d/]	100
Uranium-233	0.01
Uranium-234	0.01
Uranium-235	0.01
Vanadium-48	10
Xenon-131m	1,000
Xenon-133	100
Xenon-135	100
Ytterbium-175	100
Yttrium-90	10
Yttrium-91	10
Yttrium-92	100
Yttrium-93	100
Zinc-65	10
Zinc-69m	100
Zinc-69	1,000
Zirconium-93	10
Zirconium-95	10
Zirconium-97	10

[a/] *This Appendix is retained for use by those Agreement States that need to adopt decommissioning regulations compatible with the Nuclear Regulatory Commission.*

[b/] *To convert µCi to kBq, multiply the µCi value by 37.*

[c/] *Based on alpha disintegration rate of Th-232, Th-230 and their daughter products.*

[d/] *Based on alpha disintegration rate of U-238, U-234, and U-235.*

QUANTITIES FOR USE WITH DECOMMISSIONING[a/] *(Continued)*

Material	Microcurie[b/]
Any alpha emitting radionuclide not listed above or mixtures of alpha emitters of unknown composition	0.01
Any radionuclide other than alpha emitting radionuclides, not listed above or mixtures of beta emitters of unknown composition	0.1

NOTE: Where there is involved a combination of isotopes in known amounts, the limit for the combination should be derived as follows: Determine, for each isotope in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific isotope when not in combination. The sum of such ratios for all the isotopes in the combination may not exceed "1" -- that is, unity.

[a/] *This Appendix is retained for use by those Agreement States that need to adopt decommissioning regulations compatible with the Nuclear Regulatory Commission.*

[b/] *To convert µCi to kBq, multiply the µCi value by 37.*

Appendix G

Requirements for Transfers of Low-Level Radioactive Waste Intended for Disposal at Licensed Land Disposal Facilities and Manifests

I. Manifest

A waste generator, collector, or processor who transports, or offers for transportation, low-level radioactive waste intended for ultimate disposal at a licensed low-level radioactive waste land disposal facility must prepare a Manifest reflecting information requested on applicable Agency Forms XX (Uniform Low-Level Radioactive Waste Manifest (Shipping Paper)) and XY (Uniform Low-Level Radioactive Waste Manifest (Container and Waste Description)) and, if necessary, on an applicable Agency Form XZ (Uniform Low-Level Radioactive Waste Manifest (Manifest Index and Regional Compact Tabulation)). Agency Forms XX and XXA must be completed and must physically accompany the pertinent low-level waste shipment. Upon agreement between shipper and consignee, Agency Forms XY and XYA and XZ and XZA may be completed, transmitted, and stored in electronic media with the capability for producing legible, accurate, and complete records on the respective forms. Licensees are not required by Agency to comply with the manifesting requirements of this part when they ship:

(a) LLW for processing and expect its return (i.e., for storage under their license) prior to disposal at a licensed land disposal facility;

(b) LLW that is being returned to the licensee who is the "waste generator" or "generator," as defined in this part; or

(c) Radioactively contaminated material to a "waste processor" that becomes the processor's "residual waste."

For guidance in completing these forms, refer to the instructions that accompany the forms. Copies of manifests required by this appendix may be legible carbon copies, photocopies, or computer printouts that reproduce the data in the format of the uniform manifest.

Agency Forms XX, XXA, XY, XYA, XZ and XZA, and the accompanying instructions, in hard copy, may be obtained from the [cite appropriate Agency address]

This appendix includes information requirements of the Department of Transportation, as codified in 49 CFR part 172. Information on hazardous, medical, or other waste, required to meet Environmental Protection Agency regulations, as codified in 40 CFR parts 259, 261 or elsewhere, is not addressed in this section, and must be provided on the required EPA forms. However, the required EPA forms must accompany the Uniform Low-Level Radioactive Waste Manifest required by this appendix.

As used in this appendix, the following definitions apply:

Agency Forms XX, XXA, XY, XYA, XZ, and XZA are official Agency Forms referenced in this appendix. Licensees need not use originals of these Agency Forms as long as any substitute forms are equivalent to the original documentation in respect to content, clarity, size, and location of information. Upon agreement between the shipper and consignee, Agency Forms XY (and XYA) and Agency Forms XZ (and XZA) may be completed, transmitted, and stored in electronic media. The electronic media must have the capability for producing legible, accurate, and complete records in the format of the uniform manifest.

Chemical description means a description of the principal chemical characteristics of a low-level radioactive waste.

Computer-readable medium means that the regulatory agency's computer can transfer the information from the medium into its memory.

Consignee means the designated receiver of the shipment of low-level radioactive waste.

Decontamination facility means a facility operating under a Commission or Agreement State license whose principal purpose is decontamination of equipment or materials to accomplish recycle, reuse, or other waste management objectives, and, for purposes of this part, is not considered to be a consignee for LLW shipments.

Disposal container means a container principally used to confine low-level radioactive waste during disposal operations at a land disposal facility (also see "high integrity container"). Note that for some shipments, the disposal container may be the transport package.

EPA identification number means the number received by a transporter following application to the Administrator of EPA as required by 40 CFR part 263.

Generator means a licensee operating under a Commission or Agreement State license who (1) is a waste generator as defined in this part, or (2) is the licensee to whom waste can be attributed within the context of the Low-Level Radioactive Waste Policy Amendments Act of 1985 (e.g., waste generated as a result of decontamination or recycle activities).

High integrity container (HIC) means a container commonly designed to meet the structural stability requirements of section V of this appendix, and to meet Department of Transportation requirements for a Type A package.

Land disposal facility means the land, buildings and structures, and equipment, which are intended to be used for the disposal of radioactive wastes. For purposes of this chapter, a "geologic repository" is not considered a "land disposal facility.
Package means the assembly of components necessary to ensure compliance with the packaging requirements of DOT regulations, together with its radioactive contents, as presented for transport.
Physical description means the items called for on Agency Form XY to describe a low-level radioactive waste.

Residual waste means low-level radioactive waste resulting from processing or decontamination activities that cannot be easily separated into distinct batches attributable to specific waste

generators. This waste is attributable to the processor or decontamination facility, as applicable.

Shipper means the licensed entity (i.e., the waste generator, waste collector, or waste processor) who offers low-level radioactive waste for transportation, typically consigning this type of waste to a licensed waste collector, waste processor, or land disposal facility operator.

Shipping paper means Agency Form XX and, if required, Agency Form XXA, which includes the information, required by DOT in 49 CFR part 172.

Uniform Low-Level Radioactive Waste Manifest or *uniform manifest* means the combination of Agency Forms XX, XY, and, if necessary, XZ, and their respective continuation sheets as needed, or equivalent.

Waste collector means an entity, operating under a Commission or Agreement State license, whose principal purpose is to collect and consolidate waste generated by others, and to transfer this waste, without processing or repackaging the collected waste, to another licensed waste collector, licensed waste processor, or licensed land disposal facility.

Waste description means the physical, chemical and radiological description of a low-level radioactive waste as called for on Agency Form XY.

Waste generator means an entity, operating under a Commission or Agreement State license, who (1) possesses any material or component that contains radioactivity or is radioactively contaminated for which the licensee foresees no further use, and (2) transfers this material or component to a licensed land disposal facility or to a licensed waste collector or processor for handling or treatment prior to disposal. A licensee performing processing or decontamination services may be a "waste generator" if the transfer of low-level radioactive waste from its facility is defined as "residual waste."

Waste processor means an entity, operating under a Commission or Agreement State license, whose principal purpose is to process, repackage, or otherwise treat low-level radioactive material or waste generated by others prior to eventual transfer of waste to a licensed low-level radioactive waste land disposal facility.

Waste type means a waste within a disposal container having a unique physical description (i.e., a specific waste descriptor code or description; or a waste sorbed on or solidified in a specifically defined media).

Information Requirements

A. General Information

The shipper of the radioactive waste, shall provide the following information on the uniform manifest:

1. The name, facility address, and telephone number of the licensee shipping the waste;

2. An explicit declaration indicating whether the shipper is acting as a waste generator, collector,

processor, or a combination of these identifiers for purposes of the manifested shipment; and

3. The name, address, and telephone number, or the name and EPA identification number for the carrier transporting the waste.

B. Shipment Information

The shipper of the radioactive waste shall provide the following information regarding the waste shipment on the uniform manifest:

1. The date of the waste shipment;

2. The total number of packages/disposal containers;

3. The total disposal volume and disposal weight in the shipment;

4. The total radionuclide activity in the shipment;

5. The activity of each of the radionuclides H - 3, C - 14, Tc-99, and I - 129 contained in the shipment; and

6. The total masses of U - 233, U - 235, and plutonium in special nuclear material, and the total mass of uranium and thorium in source material.

C. Disposal Container and Waste Information

The shipper of the radioactive waste shall provide the following information on the uniform manifest regarding the waste and each disposal container of waste in the shipment:

1. An alphabetic or numeric identification that uniquely identifies each disposal container in the shipment;

2. A physical description of the disposal container, including the manufacturer and model of any high integrity container;

3. The volume displaced by the disposal container;

4. The gross weight of the disposal container, including the waste;

5. For waste consigned to a disposal facility, the maximum radiation level at the surface of each disposal container;

6. A physical and chemical description of the waste;

7. The total weight percentage of chelating agent for any waste containing more than 0.1% chelating agent by weight, plus the identity of the principal chelating agent;

8. The approximate volume of waste within a container;

9. The sorbing or solidification media, if any, and the identity of the solidification media vendor and brand name;

10. The identities and activities of individual radionuclides contained in each container, the masses of U - 233, U - 235, and plutonium in special nuclear material, and the masses of uranium and thorium in source material. For discrete waste types (i.e., activated materials, contaminated equipment, mechanical filters, sealed source/devices, and wastes in solidification/stabilization media), the identities and activities of individual radionuclides associated with or contained on these waste types within a disposal container shall be reported;

11. The total radioactivity within each container; and

12. For wastes consigned to a disposal facility, the classification of the waste pursuant to section IV of this appendix. Waste not meeting the structural stability requirements of section V(b) of this appendix must be identified.

D. Uncontainerized Waste Information

The shipper of the radioactive waste shall provide the following information on the uniform manifest regarding a waste shipment delivered without a disposal container:

1. The approximate volume and weight of the waste;

2. A physical and chemical description of the waste;

3. The total weight percentage of chelating agent if the chelating agent exceeds 0.1% by weight, plus the identity of the principal chelating agent;

4. For waste consigned to a disposal facility, the classification of the waste pursuant to section IV. of this appendix. Waste not meeting the structural stability requirements of section V(b) of this appendix must be identified;

5. The identities and activities of individual radionuclides contained in the waste, the masses of U - 233, U - 235, and plutonium in special nuclear material, and the masses of uranium and thorium in source material; and

6. For wastes consigned to a disposal facility, the maximum radiation levels at the surface of the waste.

E. Multi-Generator Disposal Container Information

This section applies to disposal containers enclosing mixtures of waste originating from different generators. (Note: The origin of the LLW resulting from a processor's activities may be attributable to one or more "generators" (including "waste generators") as defined in this part). It also applies to mixtures of wastes shipped in an uncontainerized form, for which portions of the mixture within the shipment originate from different generators.

1. For homogeneous mixtures of waste, such as incinerator ash, provide the waste description applicable to the mixture and the volume of the waste attributed to each generator.

2. For heterogeneous mixtures of waste, such as the combined products from a large compactor, identify each generator contributing waste to the disposal container, and, for discrete waste types (i.e., activated materials, contaminated equipment, mechanical filters, sealed source/devices, and wastes in solidification/stabilization media), the identities and activities of individual radionuclides contained on these waste types within the disposal container. For each generator, provide the following:

(a) The volume of waste within the disposal container;

(b) A physical and chemical description of the waste, including the solidification agent, if any;

(c) The total weight percentage of chelating agents for any disposal container containing more than 0.1% chelating agent by weight, plus the identity of the principal chelating agent;

(d) The sorbing or solidification media, if any, and the identity of the solidification media vendor and brand name if the media is claimed to meet stability requirements in section V(b) of this appendix; and

(e) Radionuclide identities and activities contained in the waste, the masses of U - 233, U - 235, and plutonium in special nuclear material, and the masses of uranium and thorium in source material if contained in the waste.

II. Certification

An authorized representative of the waste generator, processor, or collector shall certify by signing and dating the shipment manifest that the transported materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation and the Agency. A collector in signing the certification is certifying that nothing has been done to the collected waste, which would invalidate the waste generator's certification.

III. Control and Tracking

A. Any licensee or registrant who transfers radioactive waste to a land disposal facility or a licensed waste collector shall comply with the requirements in paragraphs A.1 through 9 of this appendix. Any licensee or registrant who transfers waste to a licensed waste processor for waste treatment or repackaging shall comply with the requirements of paragraphs A.4 through 9 of this appendix. A licensee shall:

1. Prepare all wastes so that the waste is classified according to section IV. of this appendix and meets the waste characteristics requirements in section V. of this appendix;

2. Label each disposal container (or transport package if potential radiation hazards preclude labeling

of the individual disposal container) of waste to identify whether it is Class A waste, Class B waste, Class C waste, or greater then Class C waste, in accordance with section IV. of this appendix;

3. Conduct a quality assurance program to assure compliance with sections IV. and V. of this appendix (the program must include management evaluation of audits);

4. Prepare the Agency Uniform Low-Level Radioactive Waste Manifest as required by this appendix;

5. Forward a copy or electronically transfer the Uniform Low-Level Radioactive Waste Manifest to the intended consignee so that either (i) receipt of the manifest precedes the LLW shipment or (ii) the manifest is delivered to the consignee with the waste at the time the waste is transferred to the consignee. Using both (i) and (ii) is also acceptable;

6. Include Agency Form XX (and Agency Form XXA, if required) with the shipment regardless of the option chosen in paragraph A.5 of this section;

7. Receive acknowledgement of the receipt of the shipment in the form of a signed copy of Agency Form XX;

8. Retain a copy of or electronically store the Uniform Low-Level Radioactive Waste Manifest and documentation of acknowledgement of receipt as the record of transfer of licensed material as required by these regulations; and

9. For any shipments or any part of a shipment for which acknowledgement of receipt has not been received within the times set forth in this appendix, conduct an investigation in accordance with paragraph E of this appendix.

B. Any waste collector licensee who handles only prepackaged waste shall:

1. Acknowledge receipt of the waste from the shipper within one week of receipt by returning a signed copy of Agency Form XX;

2. Prepare a new manifest to reflect consolidated shipments that meet the requirements of this appendix. The waste collector shall ensure that, for each container of waste in the shipment, the manifest identifies the generator of that container of waste;

3. Forward a copy or electronically transfer the Uniform Low-Level Radioactive Waste Manifest to the intended consignee so that either: (i) Receipt of the manifest precedes the LLW shipment or (ii) the manifest is delivered to the consignee with the waste at the time the waste is transferred to the consignee. Using both (i) and (ii) is also acceptable;

4. Include Agency Form XX (and Agency Form XXA, if required) with the shipment regardless of the option chosen in paragraph B.3 of this appendix;

5. Receive acknowledgement of the receipt of the shipment in the form of a signed copy of Agency Form XX;

6. Retain a copy of or electronically store the Uniform Low-Level Radioactive Waste Manifest and documentation of acknowledgement of receipt as the record of transfer of licensed material as required by these regulations;

7. For any shipments or any part of a shipment for which acknowledgement of receipt has not been received within the times set forth in this appendix, conduct an investigation in accordance with paragraph E of this appendix; and

8. Notify the shipper and the Agency when any shipment, or part of a shipment, has not arrived within 60 days after receipt of an advance manifest, unless notified by the shipper that the shipment has been cancelled.

C. Any licensed waste processor who treats or repackages waste shall:

1. Acknowledge receipt of the waste from the shipper within one week of receipt by returning a signed copy of Agency Form XX;

2. Prepare a new manifest that meets the requirements of this appendix. Preparation of the new manifest reflects that the processor is responsible for meeting these requirements. For each container of waste in the shipment, the manifest shall identify the waste generators, the preprocessed waste volume, and the other information as required in paragraph I.E. of this appendix;

3. Prepare all wastes so that the waste is classified according to section IV. of this appendix and meets the waste characteristics requirements in section V. of this appendix;

4. Label each package of waste to identify whether it is Class A waste, Class B waste, or Class C waste, in accordance with sections IV. and VI. of this appendix;

5. Conduct a quality assurance program to assure compliance with sections IV. and V. of this appendix (the program shall include management evaluation of audits);

6. Forward a copy or electronically transfer the Uniform Low-Level Radioactive Waste Manifest to the intended consignee so that either: (i) Receipt of the manifest precedes the LLW shipment or (ii) the manifest is delivered to the consignee with the waste at the time the waste is transferred to the consignee. Using both (i) and (ii) is also acceptable;

7. Include Agency Form XX (and Agency Form XXA, if required) with the shipment regardless of the option chosen in paragraph C.6 of this section;

8. Receive acknowledgement of the receipt of the shipment in the form of a signed copy of Agency Form XX;

9. Retain a copy of or electronically store the Uniform Low-Level Radioactive Waste Manifest and documentation of acknowledgement of receipt as the record of transfer of licensed material as required by these regulations;

10. For any shipment or any part of a shipment for which acknowledgement of receipt has not been

received within the times set forth in this appendix, conduct an investigation in accordance with paragraph E of this appendix; and

11. Notify the shipper and the Agency when any shipment, or part of a shipment, has not arrived within 60 days after receipt of an advance manifest, unless notified by the shipper that the shipment has been cancelled.

D. The land disposal facility operator shall:

1. Acknowledge receipt of the waste within one week of receipt by returning, as a minimum, a signed copy of Agency Form XX to the shipper. The shipper to be notified is the licensee who last possessed the waste and transferred the waste to the operator. If any discrepancy exists between materials listed on the Uniform Low-Level Radioactive Waste Manifest and materials received, copies or electronic transfer of the affected forms must be returned indicating the discrepancy;

2. Maintain copies of all completed manifests and electronically store the information required by this Appendix until the Agency terminates the license; and

3. Notify the shipper and the Agency when any shipment, or part of a shipment, has not arrived within 60 days after receipt of an advance manifest, unless notified by the shipper that the shipment has been cancelled.

E. Any shipment or part of a shipment for which acknowledgement is not received within the times set forth in this section must:

1. Be investigated by the shipper if the shipper has not received notification or receipt within 20 days after transfer; and

2. Be traced and reported. The investigation shall include tracing the shipment and filing a report with the Agency. Each licensee who conducts a trace investigation shall file a written report with the Agency within 2 weeks of completion of the investigation.

IV. Classification of Waste

(a) Classification of waste for near surface disposal. (1) *Considerations*. Determination of the classification of radioactive waste involves two considerations. First, consideration must be given to the concentration of long-lived radionuclides (and their shorter-lived precursors) whose potential hazard will persist long after such precautions as institutional controls, improved waste form, and deeper disposal have ceased to be effective. These precautions delay the time when long-lived radionuclides could cause exposures. In addition, the magnitude of the potential dose is limited by the concentration and availability of the radionuclide at the time of exposure. Second, consideration must be given to the concentration of shorter-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are effective.

(2) *Classes of waste*. (i) Class A waste is waste that is usually segregated from other waste classes at the disposal site. The physical form and characteristics of Class A waste must meet the minimum requirements set forth in V.(a) of this appendix. If Class A waste also meets the stability requirements set forth in V.(b) of this appendix, it is not necessary to segregate the waste for

disposal.

(ii) Class B waste is waste that must meet more rigorous requirements on waste form to ensure stability after disposal. The physical form and characteristics of Class B waste must meet both the minimum and stability requirements set forth in section V of this appendix.

(iii) Class C waste is waste that not only must meet more rigorous requirements on waste form to ensure stability but also requires additional measures at the disposal facility to protect against inadvertent intrusion. The physical form and characteristics of Class C waste must meet both the minimum and stability requirements set forth in section V of this appendix.

(iv) Waste that is not generally acceptable for near-surface disposal is waste for which form and disposal methods must be different, and in general more stringent, than those specified for Class C waste. In the absence of specific requirements in this part, such waste must be disposed of in a geologic repository as defined in 10 CFR part 60 unless proposals for disposal of such waste in a disposal site licensed pursuant to 10 CFR Part 61 are approved by the Nuclear Regulatory Commission.

(3) Classification determined by long-lived radionuclides. If radioactive waste contains only radionuclides listed in Table 1, classification shall be determined as follows:

(i) If the concentration does not exceed 0.1 times the value in Table 1, the waste is Class A.

(ii) If the concentration exceeds 0.1 times the value in Table 1 but does not exceed the value in Table 1, the waste is Class C.

(iii) If the concentration exceeds the value in Table 1, the waste is not generally acceptable for near-surface disposal.

(iv) For wastes containing mixtures of radionuclides listed in Table 1, the total concentration shall be determined by the sum of fractions

Table 1	
Radionuclide	**Concentration curies per cubic meter**
C-14	8
C-14 in activated metal	80
Ni-59 in activated metal	220
Nb-94 in activated metal	0.2
Tc-99	3
I-129	0.08
Alpha emitting transuranic nuclides with half-life greater than 5 years	[1]100
Pu-241	[1]3,500
Cm-242	[1]20,000

[1]Units are nanocuries per gram.

(4) Classification determined by short-lived radionuclides. If radioactive waste does not contain any of the radionuclides listed in Table 1, classification shall be determined based on the concentrations shown in Table 2. However, as specified in paragraph (a)(6) of this section, if radioactive waste does not contain any nuclides listed in either Table 1 or 2, it is Class A.

(i) If the concentration does not exceed the value in Column 1, the waste is Class A.

(ii) If the concentration exceeds the value in Column 1, but does not exceed the value in Column 2, the waste is Class B.

(iii) If the concentration exceeds the value in Column 2, but does not exceed the value in Column 3, the waste is Class C.

(iv) If the concentration exceeds the value in Column 3, the waste is not generally acceptable for near-surface disposal.

(v) For wastes containing mixtures of the nuclides listed in Table 2, the total concentration shall be determined by the sum of fractions rule

Table 2			
Radionuclide	**Concentration, curies per cubic meter**		
	Col. 1	**Col. 2**	**Col. 3**
Total of all nuclides with less than 5 year half-life	700	([1])	([1])
H-3	40	([1])	([1])
Co-60	700	([1])	([1])
Ni-63	3.5	70	700
Ni-63 in activated metal	35	700	7000
Sr-90	0.04	150	7000
Cs-137	1	44	4600

[1] There are no limits established for these radionuclides in Class B or C wastes. Practical considerations such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes shall be Class B unless the concentrations of other nuclides in Table 2 determine the waste to the Class C independent of these nuclides.

(5) Classification determined by both long- and short-lived radionuclides. If radioactive waste contains a mixture of radionuclides, some of which are listed in Table 1, and some of which are listed in Table 2, classification shall be determined as follows:

(i) If the concentration of a nuclide listed in Table 1 does not exceed 0.1 times the value listed in Table 1, the class shall be that determined by the concentration of nuclides listed in Table 2.

(ii) If the concentration of a nuclide listed in Table 1 exceeds 0.1 times the value listed in Table 1 but does not exceed the value in Table 1, the waste shall be Class C, provided the concentration of nuclides listed in Table 2 does not exceed the value shown in Column 3 of Table 2.

(6) Classification of wastes with radionuclides other than those listed in Tables 1 and 2. If radioactive waste does not contain any nuclides listed in either Table 1 or 2, it is Class A.

(7) The sum of the fractions rule for mixtures of radionuclides. For determining classification for waste that contains a mixture of radionuclides, it is necessary to determine the sum of fractions by dividing each nuclide's concentration by the appropriate limit and adding the resulting values. The appropriate limits must all be taken from the same column of the same table. The sum of the fractions for the column must be less than 1.0 if the waste class is to be determined by that column. Example: A waste contains Sr-90 in a concentration of 50 Ci/m^3. and Cs-137 in a concentration of 22 Ci/m^3. Since the concentrations both exceed the values in Column 1, Table 2, they must be compared to Column 2 values. For Sr-90 fraction 50/150=0.33; for Cs-137 fraction, 22/44=0.5; the sum of the fractions=0.83. Since the sum is less than 1.0, the waste is Class B.

(8) *Determination of concentrations in wastes*. The concentration of a radionuclide may be determined by indirect methods such as use of scaling factors which relate the inferred concentration of one radionuclide to another that is measured, or radionuclide material accountability, if there is reasonable assurance that the indirect methods can be correlated with actual measurements. The concentration of a radionuclide may be averaged over the volume of the waste, or weight of the waste if the units are expressed as nanocuries per gram.

V. Waste characteristics.

(a) The following requirements are minimum requirements for all classes of waste and are intended to facilitate handling at the disposal site and provide protection of health and safety of personnel at the disposal site.

(1) Waste must not be packaged for disposal in cardboard or fiberboard boxes.

(2) Liquid waste must be solidified or packaged in sufficient absorbent material to absorb twice the volume of the liquid.

(3) Solid waste containing liquid shall contain as little free standing and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1% of the volume.

(4) Waste must not be readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures, or of explosive reaction with water.

(5) Waste must not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste. This does not apply to radioactive gaseous waste packaged in accordance with paragraph (a)(7) of this section.

(6) Waste must not be pyrophoric. Pyrophoric materials contained in waste shall be treated, prepared, and packaged to be nonflammable.

(7) Waste in a gaseous form must be packaged at a pressure that does not exceed 1.5 atmospheres at 20ºC. Total activity must not exceed 100 curies per container.

(8) Waste containing hazardous, biological, pathogenic, or infectious material must be treated to reduce to the maximum extent practicable the potential hazard from the non-radiological materials.

(b) The requirements in this section are intended to provide stability of the waste. Stability is intended to ensure that the waste does not structurally degrade and affect overall stability of the site through slumping, collapse, or other failure of the disposal unit and thereby lead to water infiltration. Stability is also a factor in limiting exposure to an inadvertent intruder, since it provides a recognizable and nondispersible waste.

(1) Waste must have structural stability. A structurally stable waste form will generally maintain its physical dimensions and its form, under the expected disposal conditions such as weight of overburden and compaction equipment, the presence of moisture, and microbial activity, and internal factors such as radiation effects and chemical changes. Structural stability can be provided by the waste form itself, processing the waste to a stable form, or placing the waste in a disposal container or structure that provides stability after disposal.

(2) Notwithstanding the provisions in V(a)(2) and (3), liquid wastes, or wastes containing liquid, must be converted into a form that contains as little free standing and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1% of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5% of the volume of the waste for waste processed to a stable form.

(3) Void spaces within the waste and between the waste and its package must be reduced to the extent practicable.

VI. Labeling.

Each package of waste must be clearly labeled to identify whether it is Class A waste, Class B waste, or Class C waste, in accordance with section IV of this appendix.

PART D

Attachment to **APPENDIX G**

CLASSIFICATION AND CHARACTERISTICS OF LOW-LEVEL RADIOACTIVE WASTE

Section I. - Classification of Radioactive Waste for Land Disposal.

(a) Considerations. Determination of the classification of radioactive waste involves two considerations. First, consideration must be given to the concentration of long-lived radionuclides (and their shorter-lived precursors) whose potential hazard will persist long after such precautions as institutional controls, improved waste form, and deeper disposal have ceased to be effective. These precautions delay the time when long-lived radionuclides could cause exposures. In addition, the magnitude of the potential dose is limited by the concentration and availability of the radionuclide at the time of exposure. Second, consideration must be given to the concentration of shorter-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are effective.

(b) Classes of waste.

(1) Class A waste is waste that is usually segregated from other waste classes at the disposal site. The physical form and characteristics of Class A waste must meet the minimum requirements set forth in Section II.(a). If Class A waste also meets the stability requirements set forth in Section II.(b), it is not necessary to segregate the waste for disposal.

(2) Class B waste is waste that must meet more rigorous requirements on waste form to ensure stability after disposal. The physical form and characteristics of Class B waste must meet both the minimum and stability requirements set forth in Section II.

(3) Class C waste is waste that not only must meet more rigorous requirements on waste form to ensure stability but also requires additional measures at the disposal facility to protect against inadvertent intrusion. The physical form and characteristics of Class C waste must meet both the minimum and stability requirements set forth in Section II.

(c) Classification determined by long-lived radionuclides. If the radioactive waste contains only radionuclides listed in Table IV, classification shall be determined as follows:

(1) If the concentration does not exceed 0.1 times the value in Table IV, the waste is Class A.

(2) If the concentration exceeds 0.1 times the value in Table IV, but does not exceed the value in Table IV, the waste is Class C.

(3) If the concentration exceeds the value in Table IV, the waste is not generally acceptable for land disposal.

(4) For wastes containing mixtures of radionuclides listed in Table IV, the total concentration shall be determined by the sum of fractions rule described in Section I.(g).

TABLE IV

Radionuclide	Concentration Curie/Cubic Meter[a/]	Concentration Nanocurie/Gram[b/]
C-14	8	
C-14 in activated metal	80	
Ni-59 in activated metal	220	
Nb-94 in activated metal	0.2	
Tc-99	3	
I-129	0.08	
Alpha emitting transuranic radionuclides with half-life greater than five years		100
Pu-241		3,500
Cm-242		20,000
Ra-226		100

[a/] *To convert the Ci/m^3 values to gigabecquerel (GBq) per cubic meter, multiply the Ci/m^3 value by 37.*

[b/] *To convert the nCi/g values to becquerel (Bq) per gram, multiply the nCi/g value by 37.*

(d) Classification determined by short-lived radionuclides. If the waste does not contain any of the radionuclides listed in Table IV, classification shall be determined based on the concentrations shown in Table V. However, as specified in Section I.(f), if radioactive waste does not contain any nuclides listed in either Table IV or V, it is Class A.

(1) If the concentration does not exceed the value in Column 1, the waste is Class A.

(2) If the concentration exceeds the value in Column 1 but does not exceed the value in Column 2, the waste is Class B.

(3) If the concentration exceeds the value in Column 2 but does not exceed the value in Column 3, the waste is Class C.

(4) If the concentration exceeds the value in Column 3, the waste is not generally acceptable for near-surface disposal.

(5) For wastes containing mixtures of the radionuclides listed in Table V, the total concentration shall be determined by the sum of fractions rule described in Section I.(g).

TABLE V

Radionuclide	Concentration Curie/Cubic Meter[a/]		
	Column 1	Column 2	Column 3
Total of all radio-nuclides with less than 5-year half-life	700	*	*
H-3	40	*	*
Co-60	700	*	*
Ni-63	3.5	70	700
Ni-63 in activated metal	35	700	7000
Sr-90	0.04	150	7000
Cs-137	1	44	4600

[a/] *AGENCY NOTE: To convert the Ci/m^3 value to gigabecquerel (GBq) per cubic meter, multiply the Ci/m^3 value by 37. There are no limits established for these radionuclides in Class B or C wastes. Practical considerations such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes shall be Class B unless the concentrations of other radionuclides in Table V determine the waste to be Class C independent of these radionuclides.*

(e) Classification determined by both long- and short-lived radionuclides. If the radioactive waste contains a mixture of radionuclides, some of which are listed in Table IV and some of which are listed in Table V, classification shall be determined as follows:

(1) If the concentration of a radionuclide listed in Table IV is less than 0.1 times the value listed in Table IV, the class shall be that determined by the concentration of radionuclides listed in Table V.

(2) If the concentration of a radionuclide listed in Table IV exceeds 0.1 times the value listed in Table IV, but does not exceed the value in Table IV, the waste shall be Class C, provided the concentration of radionuclides listed in Table V does not exceed the value shown in Column 3 of Table V.

(f) Classification of wastes with radionuclides other than those listed in Tables IV and V. If the waste does not contain any radionuclides listed in either Table IV or V, it is Class A.

(g) The sum of the fractions rule for mixtures of radionuclides. For determining classification for waste that contains a mixture of radionuclides, it is necessary to determine the sum of fractions by dividing each radionuclide's concentration by the appropriate limit and adding the resulting values. The appropriate limits must all be taken from the same column of the

same table. The sum of the fractions for the column must be less than 1.0 if the waste class is to be determined by that column. Example: A waste contains Sr-90 in a concentration of 1.85 TBq/m^3 (50 Ci/m^3) and Cs-137 in a concentration of 814 GBq/m^3 (22 Ci/m^3). Since the concentrations both exceed the values in Column 1, Table V, they must be compared to Column 2 values. For Sr-90 fraction, 50/150 = 0.33., for Cs-137 fraction, 22/44 = 0.5; the sum of the fractions = 0.83. Since the sum is less than 1.0, the waste is Class B.

(h) Determination of concentrations in wastes. The concentration of a radionuclide may be determined by indirect methods such as use of scaling factors which relate the inferred concentration of one radionuclide to another that is measured, or radionuclide material accountability, if there is reasonable assurance that the indirect methods can be correlated with actual measurements. The concentration of a radionuclide may be averaged over the volume of the waste, or weight of the waste if the units are expressed as becquerel (nanocurie) per gram.

Section II. - Radioactive Waste Characteristics.

(a) The following are minimum requirements for all classes of waste and are intended to facilitate handling and provide protection of health and safety of personnel at the disposal site.

(1) Wastes shall be packaged in conformance with the conditions of the license issued to the site operator to which the waste will be shipped. Where the conditions of the site license are more restrictive than the provisions of Part D, the site license conditions shall govern.

(2) Wastes shall not be packaged for disposal in cardboard or fiberboard boxes.

(3) Liquid waste shall be packaged in sufficient absorbent material to absorb twice the volume of the liquid.

(4) Solid waste containing liquid shall contain as little free-standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1 percent of the volume.

(5) Waste shall not be readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures, or of explosive reaction with water.

(6) Waste shall not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste. This does not apply to radioactive gaseous waste packaged in accordance with Section II.(a)(8).

(7) Waste must not be pyrophoric. Pyrophoric materials contained in wastes shall be treated, prepared, and packaged to be nonflammable.[****/]

[****/] *See. A.4 of these regulations for definition of pyrophoric material.*

(8) Wastes in a gaseous form shall be packaged at an absolute pressure that does not exceed 1.5 atmospheres at 20°C. Total activity shall not exceed 3.7 TBq (100 Ci) per container.

(9) Wastes containing hazardous, biological, pathogenic, or infectious material shall be treated to reduce to the maximum extent practicable the potential hazard from the non-radiological materials.

(b) The following requirements are intended to provide stability of the waste. Stability is intended to ensure that the waste does not degrade and affect overall stability of the site through slumping, collapse, or other failure of the disposal unit and thereby lead to water infiltration. Stability is also a factor in limiting exposure to an inadvertent intruder, since it provides a recognizable and nondispersible waste.

(1) Waste shall have structural stability. A structurally stable waste form will generally maintain its physical dimensions and its form, under the expected disposal conditions such as weight of overburden and compaction equipment, the presence of moisture, and microbial activity, and internal factors such as radiation effects and chemical changes. Structural stability can be provided by the waste form itself, processing the waste to a stable form, or placing the waste in a disposal container or structure that provides stability after disposal.

(2) Notwithstanding the provisions in Section II.(a)(3) and (4), liquid wastes, or wastes containing liquid, shall be converted into a form that contains as little free-standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1 percent of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5 percent of the volume of the waste for waste processed to a stable form.

(3) Void spaces within the waste and between the waste and its package shall be reduced to the extent practicable.

Section III. - Labeling.

Each package of waste shall be clearly labeled to identify whether it is Class A, Class B, or Class C waste, in accordance with Section I.