

APPENDIX 16-C

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

Introduction

For each radionuclide, Table 1 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. Table 2 provides concentration limits for airborne and liquid effluents released to the general environment. Table 3 provides concentration limits for discharges to sanitary sewerage.

Note:

The values in Tables 1, 2, and 3 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 1 "Occupational Values"

Note that the columns in Table 1 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 Sv (5 rem), stochastic ALI, or (2) a committed dose equivalent 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 dose equivalent to the whole body of 0.05 Sv (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 section 16.2. 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 five 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 four 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 Sv (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_n) that contribute to the committed dose equivalent to the organ receiving the highest dose does not exceed unity, that is, Σ (intake (in μCi) of each radionuclide/ ALI_n) ≤ 1.0 . If there is an external deep dose equivalent contribution of H_a , then this sum must be less than $1 - (H_a/50)$, 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:

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

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

The DAC values relate to one of two 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 section 16.6(b). 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 2 "Effluent Concentrations"

The columns in Table 2 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 section 16.7(b). The concentration values given in Columns 1 and 2 of Table 2 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 0.50 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 2. For this reason, the DAC and airborne effluent limits are not always proportional as they were in Appendix 16-A, Table 4 of the revision of Part 16 effective December 30, 1992.

The air concentration values listed in Table 2, 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 , 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 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 1, 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 3 "Releases to Sewers"

The monthly average concentrations for release to sanitary sewerage are applicable to the provisions in section 16.8. 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 dose equivalent of 0.5 rem.

LIST OF ELEMENTS

Name	Symbol	Atomic Number	Name	Symbol	Atomic Number
Actinium	Ac	89	Mercury	Hg	80
Aluminum	Al	13	Molybdenum	Mo	42
Americium	Am	95	Neodymium	Nd	60
Antimony	Sb	51	Neptunium	Np	93
Argon	Ar	18	Nickel	Ni	28
Arsenic	As	33	Niobium	Nb	41
Astatine	At	85	Osmium	Os	76
Barium	Ba	56	Palladium	Pd	46
Berkelium	Bk	97	Phosphorus	P	15
Beryllium	Be	4	Platinum	Pt	78
Bismuth	Bi	83	Plutonium	Pu	94
Bromine	Br	35	Polonium	Po	84
Cadmium	Cd	48	Potassium	K	19
Calcium	Ca	20	Praseodymium	Pr	59
Californium	Cf	9	Promethium	Pm	61
Carbon	C	6	Protactinium	Pa	91
Cerium	Ce	58	Radium	Ra	88
Cesium	Cs	55	Radon	Rn	86
Chlorine	Cl	17	Rhenium	Re	75
Chromium	Cr	24	Rhodium	Rh	45
Cobalt	Co	27	Rubidium	Rb	37
Copper	Cu	29	Ruthenium	Ru	44
Curium	Cm	96	Samarium	Sm	62
Dysprosium	Dy	66	Scandium	Sc	21
Einsteinium	Es	99	Selenium	Se	34
Erbium	Er	68	Silicon	Si	14
Europium	Eu	63	Silver	Ag	47
Fermium	Fm	100	Sodium	Na	11
Fluorine	F	9	Strontium	Sr	38
Francium	Fr	87	Sulfur	S	16
Gadolinium	Gd	64	Tantalum	Ta	73
Gallium	Ga	31	Technetium	Tc	43
Germanium	Ge	32	Tellurium	Te	52
Gold	Au	79	Terbium	Tb	65
Hafnium	Hf	72	Thallium	Tl	81
Holmium	Ho	67	Thorium	Th	90
Hydrogen	H	1	Thulium	Tm	69
Indium	In	49	Tin	Sn	50
Iodine	I	53	Titanium	Ti	22
Iridium	Ir	77	Tungsten	W	74
Iron	Fe	26	Uranium	U	92
Krypton	Kr	36	Vanadium	V	23
Lanthanum	La	57	Xenon	Xe	54

Lead	Pb	82		Ytterbium	Yb	70
Lutetium	Lu	71		Yttrium	Y	39
Magnesium	Mg	12		Zinc	Zn	30
Manganese	Mn		25	Zirconium	Zr	40
Mendelevium	Md	101				

		Table 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Releases Sewers		
to		Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average		
Atomic Radionuclide Class		Oral Ingestion ALI	Inhalation		Air	Water			
Concentration No.		(μCi)	(μCi)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)		
1	Hydrogen-3	Water, DAC includes skin absorption	8E+4	8E+4	2E-5	1E-7	1E-3	1E-2	
	HTO.	Gas (HT or T ₂) Submersion ¹ : Use above values as HT and T ₂ oxidize in air and in the body to							
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 ²	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 ²	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	-	-	
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	-	-	

		Table 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Releases Sewers	
to		Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average	
Atomic Radionuclide Class		Oral Ingestion ALI	Inhalation		Air	Water		
Concentration No.		(μCi)	(μCi)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	
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	-	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	-	-
17	Chlorine-38 ²	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 ²	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 ¹	-	-	1E+0	6E-3	-	-
18	Argon-39	Submersion ¹	-	-	2E-4	8E-7	-	-
18	Argon-41	Submersion ¹	-	-	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 ²	D, all compounds	2E+4	7E+4	3E-5	9E-8	-	-
		St wall (4E+4)	-	-	-	5E-4	5E-3	-
19	Potassium-45 ²	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)	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

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

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
						Concentrations		Sewers
Atomic Radionuclide Class Concentration No.			Col. 1 Oral Ingestion ALI	Col. 2 <u>Inhalation</u> ALI	Col. 3 DAC	Col. 1 Air	Col. 2 Water	Monthly Average
			(μCi)	(μCi)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)
25	Manganese-52	D, see ^{51}Mn W, see ^{51}Mn	7E+2 -	1E+3 9E+2	5E-7 4E-7	2E-9 1E-9	1E-5 -	1E-4 -
25	Manganese-53	D, see ^{51}Mn W, see ^{51}Mn	5E+4 -	1E+4 Bone surf (2E+4) 1E+4	5E-6 - 5E-6	- 3E-8 2E-8	7E-4 - -	7E-3 - -
25	Manganese-54	D, see ^{51}Mn W, see ^{51}Mn	2E+3 -	9E+2 8E+2	4E-7 3E-7	1E-9 1E-9	3E-5 -	3E-4 -
25	Manganese-56	D, see ^{51}Mn W, see ^{51}Mn	5E+3 -	2E+4 2E+4	6E-6 9E-6	2E-8 3E-8	7E-5 -	7E-4 -
26	Iron-52	D, all compounds except those given for W W, oxides, hydroxides, and halides	9E+2 -	3E+3 2E+3	1E-6 1E-6	4E-9 3E-9	1E-5 -	1E-4 -
26	Iron-55	D, see ^{52}Fe W, see ^{52}Fe	9E+3 -	2E+3 4E+3	8E-7 2E-6	3E-9 6E-9	1E-4 -	1E-3 -
26	Iron-59	D, see ^{52}Fe W, see ^{52}Fe	8E+2 -	3E+2 5E+2	1E-7 2E-7	5E-10 7E-10	1E-5 -	1E-4 -
26	Iron-60	D, see ^{52}Fe W, see ^{52}Fe	3E+1 -	6E+0 2E+1	3E-9 8E-9	9E-12 3E-11	4E-7 -	4E-6 -
27	Cobalt-55	W, all compounds except those given for Y Y, oxides, hydroxides, halides, and nitrates	1E+3 -	3E+3 3E+3	1E-6 1E-6	4E-9 4E-9	2E-5 -	2E-4 -
27	Cobalt-56	W, see ^{55}Co Y, see ^{55}Co	5E+2 4E+2	3E+2 2E+2	1E-7 8E-8	4E-10 3E-10	6E-6 -	6E-5 -
27	Cobalt-57	W, see ^{55}Co Y, see ^{55}Co	8E+3 4E+3	3E+3 7E+2	1E-6 3E-7	4E-9 9E-10	6E-5 -	6E-4 -
27	Cobalt-58m	W, see ^{55}Co Y, see ^{55}Co	6E+4 -	9E+4 6E+4	4E-5 3E-5	1E-7 9E-8	8E-4 -	8E-3 -
27	Cobalt-58	W, see ^{55}Co Y, see ^{55}Co	2E+3 1E+3	1E+3 7E+2	5E-7 3E-7	2E-9 1E-9	2E-5 -	2E-4 -
27	Cobalt-60m ²	W, see ^{55}Co Y, see ^{55}Co	1E+6 St wall (1E+6) -	4E+6 - 3E+6	2E-3 - 1E-3	6E-6 - 4E-6	- 2E-2 -	- 2E-1 -
27	Cobalt-60	W, see ^{55}Co Y, see ^{55}Co	5E+2 2E+2	2E+2 3E+1	7E-8 1E-8	2E-10 5E-11	3E-6 -	3E-5 -
27	Cobalt-61 ²	W, see ^{55}Co Y, see ^{55}Co	2E+4 2E+4	6E+4 6E+4	3E-5 2E-5	9E-8 8E-8	3E-4 -	3E-3 -
27	Cobalt-62m ²	W, see ^{55}Co Y, see ^{55}Co	4E+4 St wall (5E+4) -	2E+5 - 2E+5	7E-5 - 6E-5	2E-7 - 2E-7	- 7E-4 -	- 7E-3 -
28	Nickel-56	D, all compounds except those given for W W, oxides, hydroxides, and carbides Vapor	1E+3 - -	2E+3 1E+3 1E+3	8E-7 5E-7 5E-7	3E-9 2E-9 2E-9	2E-5 - -	2E-4 - -

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases	
						Concentrations		Sewers	
Atomic Radionuclide Class Concentration No.			Col. 1 Oral Ingestion ALI	Col. 2 Inhalation		Col. 1 Air	Col. 2 Water	Monthly Average	
			(μCi)	ALI	DAC	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)		($\mu\text{Ci}/\text{ml}$)
28	Nickel-57	D, see ⁵⁶ Ni W, see ⁵⁶ Ni Vapor	2E+3 - -	5E+3 3E+3 6E+3	2E-6 1E-6 3E-6	7E-9 4E-9 9E-9	2E-5 - -	2E-4 - -	
28	Nickel-59	D, see ⁵⁶ Ni W, see ⁵⁶ Ni Vapor	2E+4 - -	4E+3 7E+3 2E+3	2E-6 3E-6 8E-7	5E-9 1E-8 3E-9	3E-4 - -	3E-3 - -	
28	Nickel-63	D, see ⁵⁶ Ni W, see ⁵⁶ Ni Vapor	9E+3 - -	2E+3 3E+3 8E+2	7E-7 1E-6 3E-7	2E-9 4E-9 1E-9	1E-4 - -	1E-3 - -	
28	Nickel-65	D, see ⁵⁶ Ni W, see ⁵⁶ Ni Vapor	8E+3 - -	2E+4 3E+4 2E+4	1E-5 1E-5 7E-6	3E-8 4E-8 2E-8	1E-4 - -	1E-3 - -	
28	Nickel-66	D, see ⁵⁶ Ni W, see ⁵⁶ Ni Vapor	4E+2 LLI wall (5E+2) - -	2E+3 - 6E+2 3E+3	7E-7 - 3E-7 1E-6	2E-9 - 9E-10 4E-9	- 6E-6 -	- 6E-5 -	
29	Copper-60 ²	D, all compounds except those given for W and Y St wall (3E+4) W, sulfides, halides, and nitrates Y, oxides and hydroxides	- - -	3E+4 - 1E+5 -	9E+4 - 5E-5 1E+5	4E-5 - 2E-7 4E-5	1E-7 4E-4 1E-7	- 4E-3 -	
29	Copper-61	D, see ⁶⁰ Cu W, see ⁶⁰ Cu Y, see ⁶⁰ Cu	1E+4 - -	3E+4 4E+4 4E+4	1E-5 2E-5 1E-5	4E-8 6E-8 5E-8	2E-4 - -	2E-3 - -	
29	Copper-64	D, see ⁶⁰ Cu W, see ⁶⁰ Cu Y, see ⁶⁰ Cu	1E+4 - -	3E+4 2E+4 2E+4	1E-5 1E-5 9E-6	4E-8 3E-8 3E-8	2E-4 - -	2E-3 - -	
29	Copper-67	D, see ⁶⁰ Cu W, see ⁶⁰ Cu Y, see ⁶⁰ Cu	5E+3 - -	8E+3 5E+3 5E+3	3E-6 2E-6 2E-6	1E-8 7E-9 6E-9	6E-5 - -	6E-4 - -	
30	Zinc-62	Y, all compounds	1E+3	3E+3	1E-6	4E-9	2E-5	2E-4	
30	Zinc-63 ²	Y, all compounds St wall (3E+4)	2E+4 - -	7E+4 - -	3E-5 - -	9E-8 - -	- 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 ²	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 ²	D, all compounds except those given for W St wall (6E+4) W, oxides, hydroxides, carbides, halides, and nitrates	5E+4 - -	2E+5 - 2E+5	7E-5 - 8E-5	2E-7 - 3E-7	- 9E-4 -	- 9E-3 -	
31	Gallium-66	D, see ⁶⁵ Ga W, see ⁶⁵ Ga	1E+3 -	4E+3 3E+3	1E-6 1E-6	5E-9 4E-9	1E-5 -	1E-4 -	

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
						Concentrations		Sewers
Atomic Radionuclide Class Concentration No.			Col. 1 Oral Ingestion ALI	Col. 2 <u>Inhalation</u> ALI	Col. 3 DAC	Col. 1 Air	Col. 2 Water	Monthly Average ($\mu\text{Ci/ml}$)
			(μCi)	(μCi)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	
31	Gallium-67	D, see ^{65}Ga W, see ^{65}Ga	7E+3 -	1E+4 1E+4	6E-6 4E-6	2E-8 1E-8	1E-4 -	1E-3 -
31	Gallium-68 ²	D, see ^{65}Ga W, see ^{65}Ga	2E+4 -	4E+4 5E+4	2E-5 2E-5	6E-8 7E-8	2E-4 -	2E-3 -
31	Gallium-70 ²	D, see ^{65}Ga W, see ^{65}Ga	5E+4 St wall (7E+4) -	2E+5 - 2E+5	7E-5 - 8E-5	2E-7 - 3E-7	- 1E-3 -	- 1E-2 -
31	Gallium-72	D, see ^{65}Ga W, see ^{65}Ga	1E+3 -	4E+3 3E+3	1E-6 1E-6	5E-9 4E-9	2E-5 -	2E-4 -
31	Gallium-73	D, see ^{65}Ga W, see ^{65}Ga	5E+3 -	2E+4 2E+4	6E-6 6E-6	2E-8 2E-8	7E-5 -	7E-4 -
32	Germanium-66	D, all compounds except those given for W W, oxides, sulfides, and halides	2E+4 -	3E+4 2E+4	1E-5 8E-6	4E-8 3E-8	3E-4 -	3E-3 -
32	Germanium-67 ²	D, see ^{66}Ge W, see ^{66}Ge	3E+4 St wall (4E+4) -	9E+4 - 1E+5	4E-5 - 4E-5	1E-7 - 1E-7	- 6E-4 -	- 6E-3 -
32	Germanium-68	D, see ^{66}Ge W, see ^{66}Ge	5E+3 -	4E+3 1E+2	2E-6 4E-8	5E-9 1E-10	6E-5 -	6E-4 -
32	Germanium-69	D, see ^{66}Ge W, see ^{66}Ge	1E+4 -	2E+4 8E+3	6E-6 3E-6	2E-8 1E-8	2E-4 -	2E-3 -
32	Germanium-71	D, see ^{66}Ge W, see ^{66}Ge	5E+5 -	4E+5 4E+4	2E-4 2E-5	6E-7 6E-8	7E-3 -	7E-2 -
32	Germanium-75 ²	D, see ^{66}Ge W, see ^{66}Ge	4E+4 St wall (7E+4) -	8E+4 - 8E+4	3E-5 - 4E-5	1E-7 - 1E-7	- 9E-4 -	- 9E-3 -
32	Germanium-77	D, see ^{66}Ge W, see ^{66}Ge	9E+3 -	1E+4 6E+3	4E-6 2E-6	1E-8 8E-9	1E-4 -	1E-3 -
32	Germanium-78 ²	D, see ^{66}Ge W, see ^{66}Ge	2E+4 St wall (2E+4) -	2E+4 - 2E+4	9E-6 - 9E-6	3E-8 - 3E-8	- 3E-4 -	- 3E-3 -
33	Arsenic-69 ²	W, all compounds	3E+4 St wall (4E+4)	1E+5 -	5E-5 -	2E-7 -	- 6E-4	- 6E-3
33	Arsenic-70 ²	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
33	Arsenic-77	W, all compounds	4E+3	5E+3	2E-6	7E-9	-	-

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
						Concentrations		Sewers
Atomic Radionuclide Class Concentration No.			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average
			Oral Ingestion ALI (μCi)	Inhalation ALI (μCi)		Air ($\mu\text{Ci}/\text{ml}$)	Water ($\mu\text{Ci}/\text{ml}$)	
			LLI wall (5E+3)	-	-	-	6E-5	6E-4
33	Arsenic-78 ²	W, all compounds	8E+3	2E+4	9E-6	3E-8	1E-4	1E-3
34	Selenium-70 ²	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 ²	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 ²	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 ²	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 ²	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 ²	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 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, Mn, Tc, and Re	-	4E+4	2E-5	6E-8	-	-
35	Bromine-74 ²	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 ²	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 ²	D, see ^{74m} Br	5E+4	2E+5	8E-5	3E-7	-	-

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases	
					Concentrations		Sewers	
Atomic Radionuclide Class Concentration No.		Col. 1 Oral Ingestion ALI	Col. 2 <u>Inhalation</u> ALI	Col. 3 DAC	Col. 1 Air	Col. 2 Water	Monthly Average ($\mu\text{Ci/ml}$)	
		(μCi)	(μCi)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)		
		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 W, see ^{74m} Br	3E+3 -	4E+3 4E+3	2E-6 2E-6	6E-9 5E-9	4E-5 -	4E-4 -
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 ²	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 ²	Submersion ¹	-	-	3E-6	1E-8	-	-
36	Krypton-76	Submersion ¹	-	-	9E-6	4E-8	-	-
36	Krypton-77 ²	Submersion ¹	-	-	4E-6	2E-8	-	-
36	Krypton-79	Submersion ¹	-	-	2E-5	7E-8	-	-
36	Krypton-81	Submersion ¹	-	-	7E-4	3E-6	-	-
36	Krypton-83m ²	Submersion ¹	-	-	1E-2	5E-5	-	-
36	Krypton-85m	Submersion ¹	-	-	2E-5	1E-7	-	-
36	Krypton-85	Submersion ¹	-	-	1E-4	7E-7	-	-
36	Krypton-87 ²	Submersion ¹	-	-	5E-6	2E-8	-	-
36	Krypton-88	Submersion ¹	-	-	2E-6	9E-9	-	-
37	Rubidium-79 ²	D, all compounds	4E+4	1E+5	5E-5	2E-7	-	-
		St wall (6E+4)	-	-	-	8E-4	8E-3	
37	Rubidium-81m ²	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 ²	D, all compounds	2E+4	6E+4	3E-5	9E-8	-	-
		St wall (3E+4)	-	-	-	4E-4	4E-3	
37	Rubidium-89 ²	D, all compounds	4E+4	1E+5	6E-5	2E-7	-	-
		St wall (6E+4)	-	-	-	9E-4	9E-3	
38	Strontium-80 ²	D, all soluble compounds except SrTiO ₃ Y, all insoluble com- pounds and SrTiO ₃	4E+3 -	1E+4 1E+4	5E-6 5E-6	2E-8 2E-8	6E-5 -	6E-4 -

to		Table 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Releases Sewers
		Col. 1 Oral Ingestion ALI (μCi)	Col. 2 <u>Inhalation</u> ALI (μCi)	Col. 3 DAC ($\mu\text{Ci/ml}$)	Col. 1 Air ($\mu\text{Ci/ml}$)	Col. 2 Water ($\mu\text{Ci/ml}$)	Monthly Average ($\mu\text{Ci/ml}$)
Atomic Radionuclide Class Concentration No.							
38	Strontium-81 ² D, see ⁸⁰ Sr Y, see ⁸⁰ Sr	3E+4	8E+4	3E-5	1E-7	3E-4	3E-3
		2E+4	8E+4	3E-5	1E-7	-	-
38	Strontium-82 D, see ⁸⁰ Sr LLI wall (2E+2) Y, see ⁸⁰ Sr	3E+2	4E+2	2E-7	6E-10	-	-
		2E+2	9E+1	4E-8	1E-10	3E-6	3E-5
38	Strontium-83 D, see ⁸⁰ Sr Y, see ⁸⁰ Sr	3E+3	7E+3	3E-6	1E-8	3E-5	3E-4
		2E+3	4E+3	1E-6	5E-9	-	-
38	Strontium-85m ² D, see ⁸⁰ Sr Y, see ⁸⁰ Sr	2E+5	6E+5	3E-4	9E-7	3E-3	3E-2
		-	8E+5	4E-4	1E-6	-	-
38	Strontium-85 D, see ⁸⁰ Sr Y, see ⁸⁰ Sr	3E+3	3E+3	1E-6	4E-9	4E-5	4E-4
		-	2E+3	6E-7	2E-9	-	-
38	Strontium-87m D, see ⁸⁰ Sr Y, see ⁸⁰ Sr	5E+4	1E+5	5E-5	2E-7	6E-4	6E-3
		4E+4	2E+5	6E-5	2E-7	-	-
38	Strontium-89 D, see ⁸⁰ Sr LLI wall (6E+2) Y, see ⁸⁰ Sr	6E+2	8E+2	4E-7	1E-9	-	-
		5E+2	1E+2	6E-8	2E-10	8E-6	8E-5
38	Strontium-90 D, see ⁸⁰ Sr Bone surf (4E+1) Y, see ⁸⁰ Sr	3E+1	2E+1	8E-9	-	-	-
		-	4E+0	2E-9	3E-11 6E-12	5E-7	5E-6
38	Strontium-91 D, see ⁸⁰ Sr Y, see ⁸⁰ Sr	2E+3	6E+3	2E-6	8E-9	2E-5	2E-4
		-	4E+3	1E-6	5E-9	-	-
38	Strontium-92 D, see ⁸⁰ Sr Y, see ⁸⁰ Sr	3E+3	9E+3	4E-6	1E-8	4E-5	4E-4
		-	7E+3	3E-6	9E-9	-	-
39	Yttrium-86m ² W, all compounds except those given for Y Y, oxides and hydroxides	2E+4	6E+4	2E-5	8E-8	3E-4	3E-3
		-	-	5E+4	2E-5	8E-8	-
39	Yttrium-86 W, see ^{86m} Y Y, see ^{86m} Y	1E+3	3E+3	1E-6	5E-9	2E-5	2E-4
		-	3E+3	1E-6	5E-9	-	-
39	Yttrium-87 W, see ^{86m} Y Y, see ^{86m} Y	2E+3	3E+3	1E-6	5E-9	3E-5	3E-4
		-	3E+3	1E-6	5E-9	-	-
39	Yttrium-88 W, see ^{86m} Y Y, see ^{86m} Y	1E+3	3E+2	1E-7	3E-10	1E-5	1E-4
		-	2E+2	1E-7	3E-10	-	-

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases	
						Concentrations		Sewers	
Atomic Radionuclide Class Concentration No.			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average	
			Oral Ingestion ALI (μCi)	Inhalation		Air	Water		
				ALI (μCi)	DAC ($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	
39	Yttrium-90m	W, see ^{86m}Y Y, see ^{86m}Y	8E+3 -	1E+4 1E+4	5E-6 5E-6	2E-8 2E-8	1E-4 -	1E-3 -	
39	Yttrium-90	W, see ^{86m}Y Y, see ^{86m}Y	4E+2 LLI wall (5E+2) -	7E+2 - 6E+2	3E-7 - 3E-7	9E-10 - 9E-10	- 7E-6 -	- 7E-5 -	
39	Yttrium-91m ²	W, see ^{86m}Y Y, see ^{86m}Y	1E+5 -	2E+5 2E+5	1E-4 7E-5	3E-7 2E-7	2E-3 -	2E-2 -	
39	Yttrium-91	W, see ^{86m}Y Y, see ^{86m}Y	5E+2 LLI wall (6E+2) -	2E+2 - 1E+2	7E-8 - 5E-8	2E-10 - 2E-10	- 8E-6 -	- 8E-5 -	
39	Yttrium-92	W, see ^{86m}Y Y, see ^{86m}Y	3E+3 -	9E+3 8E+3	4E-6 3E-6	1E-8 1E-8	4E-5 -	4E-4 -	
39	Yttrium-93	W, see ^{86m}Y Y, see ^{86m}Y	1E+3 -	3E+3 2E+3	1E-6 1E-6	4E-9 3E-9	2E-5 -	2E-4 -	
39	Yttrium-94 ²	W, see ^{86m}Y Y, see ^{86m}Y	2E+4 St wall (3E+4) -	8E+4 - 8E+4	3E-5 - 3E-5	1E-7 - 1E-7	- 4E-4 -	- 4E-3 -	
39	Yttrium-95 ²	W, see ^{86m}Y Y, see ^{86m}Y	4E+4 St wall (5E+4) -	2E+5 - 1E+5	6E-5 - 6E-5	2E-7 - 2E-7	- 7E-4 -	- 7E-3 -	
40	Zirconium-86	D, all compounds except those given for W and Y W, oxides, hydroxides, halides, and nitrates Y, carbide	- -	1E+3 3E+3 2E+3	4E+3 1E-6 1E-6	2E-6 4E-9 3E-9	6E-9 - -	2E-5 - -	2E-4
40	Zirconium-88	D, see ^{86}Zr W, see ^{86}Zr Y, see ^{86}Zr	4E+3 - -	2E+2 5E+2 3E+2	9E-8 2E-7 1E-7	3E-10 7E-10 4E-10	5E-5 - -	5E-4 - -	
40	Zirconium-89	D, see ^{86}Zr W, see ^{86}Zr Y, see ^{86}Zr	2E+3 - -	4E+3 2E+3 2E+3	1E-6 1E-6 1E-6	5E-9 3E-9 3E-9	2E-5 - -	2E-4 - -	
40	Zirconium-93	D, see ^{86}Zr W, see ^{86}Zr Y, see ^{86}Zr	1E+3 Bone surf (3E+3) - - -	6E+0 Bone surf (2E+1) 2E+1 Bone surf (6E+1) 6E+1 Bone surf (7E+1)	3E-9 - 1E-8 - 2E-8 -	- 2E-11 - 9E-11 - 9E-11	- 4E-5 - - -	- 4E-4 - - -	
40	Zirconium-95	D, see ^{86}Zr W, see ^{86}Zr Y, see ^{86}Zr	1E+3 - -	1E+2 Bone surf (3E+2) 4E+2 3E+2	5E-8 - 2E-7 1E-7	- 4E-10 5E-10 4E-10	2E-5 - - -	2E-4 - - -	
40	Zirconium-97	D, see ^{86}Zr W, see ^{86}Zr Y, see ^{86}Zr	6E+2 - -	2E+3 1E+3 1E+3	8E-7 6E-7 5E-7	3E-9 2E-9 2E-9	9E-6 - -	9E-5 - -	
41	Niobium-88 ²	W, all compounds except							

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
					Concentrations		Sewers
Atomic Radionuclide Class Concentration No.		Col. 1 Oral Ingestion ALI	Col. 2 <u>Inhalation</u> ALI	Col. 3 DAC	Col. 1 Air	Col. 2 Water	Monthly Average ($\mu\text{Ci/ml}$)
		(μCi)	(μCi)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	
	those given for Y	5E+4 St wall (7E+4)	2E+5	9E-5	3E-7	-	-
	Y, oxides and hydroxides	-	-	2E+5	9E-5	1E-3 3E-7	1E-2 -
41	Niobium-89 ² (66 min)	W, see ⁸⁸ Nb Y, see ⁸⁸ Nb	1E+4 4E+4	2E-5 2E-5	6E-8 5E-8	1E-4 -	1E-3 -
41	Niobium-89 (122 min)	W, see ⁸⁸ Nb Y, see ⁸⁸ Nb	5E+3 -	2E+4 2E+4	8E-6 6E-6	3E-8 2E-8	7E-5 -
41	Niobium-90	W, see ⁸⁸ Nb Y, see ⁸⁸ Nb	1E+3 -	3E+3 2E+3	1E-6 1E-6	4E-9 3E-9	1E-5 -
41	Niobium-93m	W, see ⁸⁸ Nb Y, see ⁸⁸ Nb	9E+3 LLI wall (1E+4) -	2E+3 -	8E-7 -	3E-9 -	- 2E-4 2E-3 -
41	Niobium-94	W, see ⁸⁸ Nb Y, see ⁸⁸ Nb	9E+2 -	2E+2 2E+1	8E-8 6E-9	3E-10 2E-11	1E-5 -
41	Niobium-95m	W, see ⁸⁸ Nb Y, see ⁸⁸ Nb	2E+3 LLI wall (2E+3) -	3E+3 -	1E-6 -	4E-9 -	- 3E-5 3E-4 -
41	Niobium-95	W, see ⁸⁸ Nb Y, see ⁸⁸ Nb	2E+3 -	1E+3 1E+3	5E-7 5E-7	2E-9 2E-9	3E-5 -
41	Niobium-96	W, see ⁸⁸ Nb Y, see ⁸⁸ Nb	1E+3 -	3E+3 2E+3	1E-6 1E-6	4E-9 3E-9	2E-5 -
41	Niobium-97 ²	W, see ⁸⁸ Nb Y, see ⁸⁸ Nb	2E+4 -	8E+4 7E+4	3E-5 3E-5	1E-7 1E-7	3E-4 -
41	Niobium-98 ²	W, see ⁸⁸ Nb Y, see ⁸⁸ Nb	1E+4 -	5E+4 5E+4	2E-5 2E-5	8E-8 7E-8	2E-4 -
42	Molybdenum-90	D, all compounds except those given for Y Y, oxides, hydroxides, and MoS ₂	4E+3 2E+3	7E+3 5E+3	3E-6 2E-6	1E-8 6E-9	3E-5 -
42	Molybdenum-93m	D, see ⁹⁰ Mo Y, see ⁹⁰ Mo	9E+3 4E+3	2E+4 1E+4	7E-6 6E-6	2E-8 2E-8	6E-5 -
42	Molybdenum-93	D, see ⁹⁰ Mo Y, see ⁹⁰ Mo	4E+3 2E+4	5E+3 2E+2	2E-6 8E-8	8E-9 2E-10	5E-5 -
42	Molybdenum-99	D, see ⁹⁰ Mo Y, see ⁹⁰ Mo	2E+3 LLI wall (1E+3) 1E+3	3E+3 -	1E-6 -	4E-9 -	- 2E-5 2E-4 -
42	Molybdenum-101 ²	D, see ⁹⁰ Mo Y, see ⁹⁰ Mo	D, see ⁹⁰ Mo St wall (5E+4) -	4E+4 -	1E+5 -	6E-5 -	2E-7 7E-4 7E-3 -
43	Technetium-93m ²	D, all compounds except those given for W W, oxides, hydroxides, halides, and nitrates	7E+4 -	2E+5 3E+5	6E-5 1E-4	2E-7 4E-7	1E-3 -
43	Technetium-93	D, see ^{93m} Tc W, see ^{93m} Tc	3E+4 -	7E+4 1E+5	3E-5 4E-5	1E-7 1E-7	4E-4 -

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases	
					Concentrations		Sewers	
Atomic Radionuclide Class Concentration No.		Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average	
		Oral Ingestion ALI (μCi)	Inhalation ALI (μCi)		Air ($\mu\text{Ci}/\text{ml}$)	Water ($\mu\text{Ci}/\text{ml}$)		
43	Technetium-94m ² W, see ^{93m} Tc	D, see ^{93m} Tc -	2E+4 6E+4	4E+4 2E-5	2E-5 8E-8	6E-8 -	3E-4 -	3E-3
43	Technetium-94 D, see ^{93m} Tc W, see ^{93m} Tc	9E+3 -	2E+4 2E+4	8E-6 1E-5	3E-8 3E-8	1E-4 -	1E-3 -	
43	Technetium-95m D, see ^{93m} Tc W, see ^{93m} Tc	4E+3 -	5E+3 2E+3	2E-6 8E-7	8E-9 3E-9	5E-5 -	5E-4 -	
43	Technetium-95 D, see ^{93m} Tc W, see ^{93m} Tc	1E+4 -	2E+4 2E+4	9E-6 8E-6	3E-8 3E-8	1E-4 -	1E-3 -	
43	Technetium-96m ² W, see ^{93m} Tc	D, see ^{93m} Tc -	2E+5 2E+5	3E+5 1E-4	1E-4 3E-7	4E-7 -	2E-3 -	2E-2
43	Technetium-96 D, see ^{93m} Tc W, see ^{93m} Tc	2E+3 -	3E+3 2E+3	1E-6 9E-7	5E-9 3E-9	3E-5 -	3E-4 -	
43	Technetium-97m D, see ^{93m} Tc W, see ^{93m} Tc	5E+3 -	7E+3 St wall (7E+3) 1E+3	3E-6 -	- 1E-8 2E-9	6E-5 -	6E-4 -	
43	Technetium-97 D, see ^{93m} Tc W, see ^{93m} Tc	4E+4 -	5E+4 6E+3	2E-5 2E-6	7E-8 8E-9	5E-4 -	5E-3 -	
43	Technetium-98 D, see ^{93m} Tc W, see ^{93m} Tc	1E+3 -	2E+3 3E+2	7E-7 1E-7	2E-9 4E-10	1E-5 -	1E-4 -	
43	Technetium-99m D, see ^{93m} Tc W, see ^{93m} Tc	8E+4 -	2E+5 2E+5	6E-5 1E-4	2E-7 3E-7	1E-3 -	1E-2 -	
43	Technetium-99 D, see ^{93m} Tc W, see ^{93m} Tc	4E+3 -	5E+3 St wall (6E+3) 7E+2	2E-6 -	- 8E-9 9E-10	6E-5 -	6E-4 -	
43	Technetium-101 ² W, see ^{93m} Tc	D, see ^{93m} Tc St wall (1E+5) -	9E+4 -	3E+5 -	1E-4 -	5E-7 2E-3	- 2E-2	-
43	Technetium-104 ² W, see ^{93m} Tc	D, see ^{93m} Tc St wall (3E+4) -	2E+4 -	7E+4 -	3E-5 -	1E-7 4E-4	- 4E-3	-
44	Ruthenium-94 ² W, halides Y, oxides and hydroxides	D, all compounds except those given for W and Y -	2E+4 6E+4 -	4E+4 3E-5 6E+4	2E-5 9E-8 2E-5	6E-8 -	2E-4 -	2E-3 -
44	Ruthenium-97 D, see ⁹⁴ Ru W, see ⁹⁴ Ru Y, see ⁹⁴ Ru	8E+3 -	2E+4 1E+4 1E+4	8E-6 5E-6 5E-6	3E-8 2E-8 2E-8	1E-4 -	1E-3 -	
44	Ruthenium-103 D, see ⁹⁴ Ru W, see ⁹⁴ Ru Y, see ⁹⁴ Ru	2E+3 -	2E+3 1E+3 6E+2	7E-7 4E-7 3E-7	2E-9 1E-9 9E-10	3E-5 -	3E-4 -	
44	Ruthenium-105 D, see ⁹⁴ Ru W, see ⁹⁴ Ru Y, see ⁹⁴ Ru	5E+3 -	1E+4 1E+4	6E-6 6E-6 5E-6	2E-8 2E-8 2E-8	7E-5 -	7E-4 -	
44	Ruthenium-106 D, see ⁹⁴ Ru LLI wall (2E+2)	2E+2 -	9E+1 -	4E-8 -	1E-10 -	- 3E-6	- 3E-5	

		Table 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Releases Sewers	
to		Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average	
Atomic Radionuclide Class		Oral Ingestion ALI	Inhalation		Air	Water		
Concentration No.		(μCi)	(μCi)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	
	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 $^{99\text{m}}\text{Rh}$	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4
	W, see $^{99\text{m}}\text{Rh}$	-	2E+3	9E-7	3E-9	-	-	
	Y, see $^{99\text{m}}\text{Rh}$	-	2E+3	8E-7	3E-9	-	-	
45	Rhodium-100	D, see $^{99\text{m}}\text{Rh}$	2E+3	5E+3	2E-6	7E-9	2E-5	2E-4
	W, see $^{99\text{m}}\text{Rh}$	-	4E+3	2E-6	6E-9	-	-	
	Y, see $^{99\text{m}}\text{Rh}$	-	4E+3	2E-6	5E-9	-	-	
45	Rhodium-101m	D, see $^{99\text{m}}\text{Rh}$	6E+3	1E+4	5E-6	2E-8	8E-5	8E-4
	W, see $^{99\text{m}}\text{Rh}$	-	8E+3	4E-6	1E-8	-	-	
	Y, see $^{99\text{m}}\text{Rh}$	-	8E+3	3E-6	1E-8	-	-	
45	Rhodium-101	D, see $^{99\text{m}}\text{Rh}$	2E+3	5E+2	2E-7	7E-10	3E-5	3E-4
	W, see $^{99\text{m}}\text{Rh}$	-	8E+2	3E-7	1E-9	-	-	
	Y, see $^{99\text{m}}\text{Rh}$	-	2E+2	6E-8	2E-10	-	-	
45	Rhodium-102m	D, see $^{99\text{m}}\text{Rh}$	1E+3 LLI wall (1E+3)	5E+2	2E-7	7E-10	-	-
	W, see $^{99\text{m}}\text{Rh}$	-	4E+2	2E-7	5E-10	2E-5	2E-4	-
	Y, see $^{99\text{m}}\text{Rh}$	-	1E+2	5E-8	2E-10	-	-	
45	Rhodium-102	D, see $^{99\text{m}}\text{Rh}$	6E+2	9E+1	4E-8	1E-10	8E-6	8E-5
	W, see $^{99\text{m}}\text{Rh}$	-	2E+2	7E-8	2E-10	-	-	
	Y, see $^{99\text{m}}\text{Rh}$	-	6E+1	2E-8	8E-11	-	-	
45	Rhodium-103m ²	D, see $^{99\text{m}}\text{Rh}$	4E+5	1E+6	5E-4	2E-6	6E-3	6E-2
	W, see $^{99\text{m}}\text{Rh}$	-	1E+6	5E-4	2E-6	-	-	
	Y, see $^{99\text{m}}\text{Rh}$	-	1E+6	5E-4	2E-6	-	-	
45	Rhodium-105	D, see $^{99\text{m}}\text{Rh}$	4E+3 LLI wall (4E+3)	1E+4	5E-6	2E-8	-	-
	W, see $^{99\text{m}}\text{Rh}$	-	6E+3	3E-6	9E-9	5E-5	5E-4	-
	Y, see $^{99\text{m}}\text{Rh}$	-	6E+3	2E-6	8E-9	-	-	
45	Rhodium-106m	D, see $^{99\text{m}}\text{Rh}$	8E+3	3E+4	1E-5	4E-8	1E-4	1E-3
	W, see $^{99\text{m}}\text{Rh}$	-	4E+4	2E-5	5E-8	-	-	
	Y, see $^{99\text{m}}\text{Rh}$	-	4E+4	1E-5	5E-8	-	-	
45	Rhodium-107 ²	D, see $^{99\text{m}}\text{Rh}$	7E+4 St wall (9E+4)	2E+5	1E-4	3E-7	-	-
	W, see $^{99\text{m}}\text{Rh}$	-	3E+5	1E-4	4E-7	1E-3	1E-2	-
	Y, see $^{99\text{m}}\text{Rh}$	-	3E+5	1E-4	3E-7	-	-	
46	Palladium-100	D, all compounds except those given for W and Y	-	1E+3	1E+3	6E-7	2E-9	2E-5
	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 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Releases Sewers	
to		Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average	
Atomic Radionuclide Class		Oral Ingestion ALI	Inhalation		Air	Water		
Concentration No.		(μCi)	ALI (μCi)	DAC ($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	
46	Palladium-103	D, see ^{100}Pd	6E+3 LLI wall (7E+3)	6E+3	3E-6	9E-9	-	-
		W, see ^{100}Pd	-	4E+3	2E-6	6E-9	1E-4	1E-3
		Y, see ^{100}Pd	-	4E+3	1E-6	5E-9	-	-
46	Palladium-107	D, see ^{100}Pd	3E+4 LLI wall (4E+4)	2E+4 Kidneys (2E+4)	9E-6	-	-	-
		W, see ^{100}Pd	-	7E+3	3E-6	3E-8	5E-4	5E-3
		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 ²	D, all compounds except those given for W and Y	St wall (6E+4)	5E+4	2E+5	8E-5	2E-7	-
		W, nitrates and sulfides	-	-	-	-	9E-4	9E-3
		Y, oxides and hydroxides	-	2E+5	2E+5	9E-5	3E-7	-
			-	2E+5	2E+5	8E-5	3E-7	-
47	Silver-103 ²	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 ²	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 ²	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 ²	D, see ^{102}Ag	6E+4 St. wall (6E+4)	2E+5	8E-5	3E-7	-	-
		W, see ^{102}Ag	-	2E+5	9E-5	3E-7	9E-4	9E-3
		Y, see ^{102}Ag	-	2E+5	8E-5	3E-7	-	-
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 LLI wall (1E+3)	2E+3 Liver (2E+3)	6E-7	-	-	-
		W, see ^{102}Ag	-	9E+2	4E-7	2E-9	2E-5	2E-4
		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 ²	D, see ^{102}Ag	3E+4	9E+4	4E-5	1E-7	-	-

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases		
					Concentrations		Sewers		
Atomic Radionuclide Class Concentration No.		Col. 1 Oral Ingestion ALI	Col. 2 <u>Inhalation</u> ALI		Col. 3 DAC	Col. 1 Air	Col. 2 Water	Monthly Average	
		(μCi)	(μCi)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	
		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 ²	D, all compounds except those given for W and Y	2E+4	7E+4	3E-5	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	-	-	-	
	W, see ¹⁰⁴ Cd	Kidneys (4E+2)	-	Kidneys (5E+1)	-	7E-11	6E-6	6E-5	
	Y, see ¹⁰⁴ Cd	-	-	Kidneys (1E+2)	1E+2	5E-8	-	-	
		-	-	Kidneys (1E+2)	-	2E-10	-	-	
		-	-	1E+2	5E-8	2E-10	-	-	
48	Cadmium-113m	D, see ¹⁰⁴ Cd	2E+1	2E+0	1E-9	-	-	-	
	W, see ¹⁰⁴ Cd	Kidneys (4E+1)	-	Kidneys (4E+0)	-	5E-12	5E-7	5E-6	
	Y, see ¹⁰⁴ Cd	-	-	Kidneys (1E+1)	-	2E-11	-	-	
		-	-	1E+1	5E-9	2E-11	-	-	
48	Cadmium-113	D, see ¹⁰⁴ Cd	2E+1	2E+0	9E-10	-	-	-	
	W, see ¹⁰⁴ Cd	Kidneys (3E+1)	-	Kidneys (3E+0)	-	5E-12	4E-7	4E-6	
	Y, see ¹⁰⁴ Cd	-	-	Kidneys (1E+1)	-	2E-11	-	-	
		-	-	1E+1	6E-9	2E-11	-	-	
48	Cadmium-115m	D, see ¹⁰⁴ Cd	3E+2	5E+1	2E-8	-	4E-6	4E-5	
	W, see ¹⁰⁴ Cd	-	-	Kidneys (8E+1)	-	1E-10	-	-	
	Y, see ¹⁰⁴ Cd	-	-	1E+2	5E-8	2E-10	-	-	
		-	-	1E+2	6E-8	2E-10	-	-	
48	Cadmium-115	D, see ¹⁰⁴ Cd	9E+2	1E+3	6E-7	2E-9	-	-	
	W, see ¹⁰⁴ Cd	LLI wall (1E+3)	-	-	-	-	1E-5	1E-4	
	Y, see ¹⁰⁴ Cd	-	1E+3	5E-7	2E-9	2E-9	-	-	
		-	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 ² (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	-	-	

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
						Concentrations		Sewers
Atomic Radionuclide Class Concentration No.			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average
			Oral Ingestion ALI (μCi)	Inhalation ALI DAC (μCi) ($\mu\text{Ci}/\text{ml}$)		Air ($\mu\text{Ci}/\text{ml}$)	Water ($\mu\text{Ci}/\text{ml}$)	
49	Indium-111	D, see ¹⁰⁹ In W, see ¹⁰⁹ In	4E+3 -	6E+3 6E+3	3E-6 3E-6	9E-9 9E-9	6E-5 -	6E-4 -
49	Indium-112 ²	D, see ¹⁰⁹ In W, see ¹⁰⁹ In	2E+5 -	6E+5 7E+5	3E-4 3E-4	9E-7 1E-6	2E-3 -	2E-2 -
49	Indium-113m ²	D, see ¹⁰⁹ In W, see ¹⁰⁹ In	5E+4 -	1E+5 2E+5	6E-5 8E-5	2E-7 3E-7	7E-4 -	7E-3 -
49	Indium-114m	D, see ¹⁰⁹ In W, see ¹⁰⁹ In	3E+2 LLI wall (4E+2) -	6E+1 - 1E+2	3E-8 - 4E-8	9E-11 - 1E-10	- 5E-6 -	- 5E-5 -
49	Indium-115m	D, see ¹⁰⁹ In W, see ¹⁰⁹ In	1E+4 -	4E+4 5E+4	2E-5 2E-5	6E-8 7E-8	2E-4 -	2E-3 -
49	Indium-115	D, see ¹⁰⁹ In W, see ¹⁰⁹ In	4E+1 -	1E+0 5E+0	6E-10 2E-9	2E-12 8E-12	5E-7 -	5E-6 -
49	Indium-116m ²	D, see ¹⁰⁹ In W, see ¹⁰⁹ In	2E+4 -	8E+4 1E+5	3E-5 5E-5	1E-7 2E-7	3E-4 -	3E-3 -
49	Indium-117m ²	D, see ¹⁰⁹ In W, see ¹⁰⁹ In	1E+4 -	3E+4 4E+4	1E-5 2E-5	5E-8 6E-8	2E-4 -	2E-3 -
49	Indium-117 ²	D, see ¹⁰⁹ In W, see ¹⁰⁹ In	6E+4 -	2E+5 2E+5	7E-5 9E-5	2E-7 3E-7	8E-4 -	8E-3 -
49	Indium-119m ²	D, see ¹⁰⁹ In W, see ¹⁰⁹ In	4E+4 St wall (5E+4) -	1E+5 - 1E+5	5E-5 - 6E-5	2E-7 - 2E-7	- 7E-4 -	- 7E-3 -
50	Tin-110	D, all compounds except those given for W W, sulfides, oxides, hydroxides, halides, nitrates, and stannic phosphate	4E+3 -	1E+4 1E+4	5E-6 5E-6	2E-8 2E-8	5E-5 -	5E-4 -
50	Tin-111 ²	D, see ¹¹⁰ Sn W, see ¹¹⁰ Sn	7E+4 -	2E+5 3E+5	9E-5 1E-4	3E-7 4E-7	1E-3 -	1E-2 -
50	Tin-113	D, see ¹¹⁰ Sn W, see ¹¹⁰ Sn	2E+3 LLI wall (2E+3) -	1E+3 - 5E+2	5E-7 - 2E-7	2E-9 - 8E-10	- 3E-5 -	- 3E-4 -
50	Tin-117m	D, see ¹¹⁰ Sn W, see ¹¹⁰ Sn	2E+3 LLI wall (2E+3) -	1E+3 Bone surf (2E+3) 1E+3	5E-7 - 6E-7	- 3E-9 2E-9	- 3E-5 -	- 3E-4 -
50	Tin-119m	D, see ¹¹⁰ Sn W, see ¹¹⁰ Sn	3E+3 LLI wall (4E+3) -	2E+3 - 1E+3	1E-6 - 4E-7	3E-9 - 1E-9	- 6E-5 -	- 6E-4 -
50	Tin-121m	D, see ¹¹⁰ Sn W, see ¹¹⁰ Sn	3E+3 LLI wall (4E+3) -	9E+2 - 5E+2	4E-7 - 2E-7	1E-9 - 8E-10	- 5E-5 -	- 5E-4 -
50	Tin-121	D, see ¹¹⁰ Sn	6E+3 LLI wall (6E+3)	2E+4 -	6E-6 -	2E-8 -	- 8E-5	- 8E-4

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases	
		Col. 1 Oral Ingestion ALI (μCi)	Col. 2 <u>Inhalation</u> ALI (μCi)		Col. 3 DAC ($\mu\text{Ci/ml}$)	Concentrations		Sewers
Atomic Radionuclide Class Concentration No.					Col. 1 Air ($\mu\text{Ci/ml}$)	Col. 2 Water ($\mu\text{Ci/ml}$)	Monthly Average ($\mu\text{Ci/ml}$)	
50	Tin-123m ²	W, see ¹¹⁰ Sn	-	1E+4	5E-6	2E-8	-	-
		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 ²	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 ²	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 ²	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 ²	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	-	-
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 ² (16 min)	D, see ¹¹⁵ Sb	1E+5	4E+5	2E-4	6E-7	-	-
			St wall (2E+5)	-	-	-	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	2E+3	1E-6	3E-9	-	-
			LLI wall (8E+2)	-	-	-	1E-5	1E-4
		W, see ¹¹⁵ Sb	7E+2	1E+3	4E-7	2E-9	-	-
51	Antimony-124m ²	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	-	-

to			Table 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Releases
			Col. 1 Oral Ingestion ALI (μCi)	Col. 2 <u>Inhalation</u> ALI (μCi)	Col. 3 DAC ($\mu\text{Ci/ml}$)	Col. 1 Air ($\mu\text{Ci/ml}$)	Col. 2 Water ($\mu\text{Ci/ml}$)	Monthly Average ($\mu\text{Ci/ml}$)
Atomic Radionuclide Class Concentration No.								
51	Antimony-124	D, see ¹¹⁵ Sb W, see ¹¹⁵ Sb	6E+2 5E+2	9E+2 2E+2	4E-7 1E-7	1E-9 3E-10	7E-6 -	7E-5 -
51	Antimony-125	D, see ¹¹⁵ Sb W, see ¹¹⁵ Sb	2E+3 -	2E+3 5E+2	1E-6 2E-7	3E-9 7E-10	3E-5 -	3E-4 -
51	Antimony-126m ²	D, see ¹¹⁵ Sb W, see ¹¹⁵ Sb	5E+4 St wall (7E+4) -	2E+5 -	8E-5 -	3E-7 -	- 9E-4 -	- 9E-3 -
51	Antimony-126	D, see ¹¹⁵ Sb W, see ¹¹⁵ Sb	6E+2 5E+2	1E+3 5E+2	5E-7 2E-7	2E-9 7E-10	7E-6 -	7E-5 -
51	Antimony-127	D, see ¹¹⁵ Sb W, see ¹¹⁵ Sb	8E+2 LLI wall (8E+2) 7E+2	2E+3 -	9E-7 -	3E-9 -	- 1E-5 -	- 1E-4 -
51	Antimony-128 ² (10.4 min)	D, see ¹¹⁵ Sb W, see ¹¹⁵ Sb	8E+4 St wall (1E+5) -	4E+5 -	2E-4 -	5E-7 -	- 1E-3 -	- 1E-2 -
51	Antimony-128 (9.01 h)	D, see ¹¹⁵ Sb W, see ¹¹⁵ Sb	1E+3 -	4E+3 3E+3	2E-6 1E-6	6E-9 5E-9	2E-5 -	2E-4 -
51	Antimony-129	D, see ¹¹⁵ Sb W, see ¹¹⁵ Sb	3E+3 -	9E+3 9E+3	4E-6 4E-6	1E-8 1E-8	4E-5 -	4E-4 -
51	Antimony-130 ²	D, see ¹¹⁵ Sb W, see ¹¹⁵ Sb	2E+4 -	6E+4 8E+4	3E-5 3E-5	9E-8 1E-7	3E-4 -	3E-3 -
51	Antimony-131 ²	D, see ¹¹⁵ Sb W, see ¹¹⁵ Sb	1E+4 Thyroid (2E+4) -	2E+4 Thyroid (4E+4) 2E+4 Thyroid (4E+4) -	1E-5 -	- 6E-8 -	- 2E-4 -	- 2E-3 -
52	Tellurium-116	D, all compounds except those given for W W, oxides, hydroxides, and nitrates	8E+3 -	2E+4 3E+4	9E-6 1E-5	3E-8 4E-8	1E-4 -	1E-3 -
52	Tellurium-121m	D, see ¹¹⁶ Te W, see ¹¹⁶ Te	5E+2 Bone surf (7E+2) -	2E+2 Bone surf (4E+2) 4E+2	8E-8 -	- 5E-10 6E-10	- 1E-5 -	- 1E-4 -
52	Tellurium-121	D, see ¹¹⁶ Te W, see ¹¹⁶ Te	3E+3 -	4E+3 3E+3	2E-6 1E-6	6E-9 4E-9	4E-5 -	4E-4 -
52	Tellurium-123m	D, see ¹¹⁶ Te W, see ¹¹⁶ Te	6E+2 Bone surf (1E+3) -	2E+2 Bone surf (5E+2) 5E+2	9E-8 -	- 8E-10 8E-10	- 1E-5 -	- 1E-4 -
52	Tellurium-123	D, see ¹¹⁶ Te W, see ¹¹⁶ Te	5E+2 Bone surf (1E+3) -	2E+2 Bone surf (5E+2) 4E+2 Bone surf (1E+3) -	8E-8 -	- 7E-10 -	- 2E-5 -	- 2E-4 -

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
					Concentrations		Sewers
Atomic Radionuclide Class Concentration No.		Col. 1 Oral Ingestion ALI	Col. 2 <u>Inhalation</u> ALI	Col. 3 DAC	Col. 1 Air	Col. 2 Water	Monthly Average ($\mu\text{Ci/ml}$)
		(μCi)	(μCi)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	
52	Tellurium-125m D, see ¹¹⁶ Te	1E+3 Bone surf (1E+3)	4E+2 Bone surf (1E+3)	2E-7 -	- 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 Bone surf	1E-7	-	9E-6	9E-5
	W, see ¹¹⁶ Te	-	(4E+2) 3E+2	- 1E-7	6E-10 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 ² 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	-	-
52	Tellurium-131m D, see ¹¹⁶ Te	3E+2 Thyroid (6E+2)	4E+2 Thyroid (1E+3)	2E-7	-	-	-
	W, see ¹¹⁶ Te	-	4E+2 Thyroid (9E+2)	2E-7	2E-9 -	8E-6 -	8E-5 -
		-			1E-9	-	-
52	Tellurium-131 ² D, see ¹¹⁶ Te	3E+3 Thyroid (6E+3)	5E+3 Thyroid (1E+4)	2E-6	-	-	-
	W, see ¹¹⁶ Te	-	5E+3 Thyroid (1E+4)	2E-6	2E-8 -	8E-5 -	8E-4 -
		-			2E-8	-	-
52	Tellurium-132 D, see ¹¹⁶ Te	2E+2 Thyroid (7E+2)	2E+2 Thyroid (8E+2)	9E-8	-	-	-
	W, see ¹¹⁶ Te	-	2E+2 Thyroid (6E+2)	9E-8	1E-9 -	9E-6 -	9E-5 -
		-			9E-10	-	-
52	Tellurium-133m ²	D, see ¹¹⁶ Te	3E+3 Thyroid (6E+3)	5E+3	2E-6	-	-
	W, see ¹¹⁶ Te	-	5E+3 Thyroid (1E+4)	2E-6	2E-8 -	9E-5 -	9E-4 -
		-			2E-8	-	-
52	Tellurium-133 ² D, see ¹¹⁶ Te	1E+4 Thyroid (3E+4)	2E+4 Thyroid (6E+4)	9E-6	-	-	-
	W, see ¹¹⁶ Te	-	2E+4 Thyroid (6E+4)	9E-6	8E-8 -	4E-4 -	4E-3 -
		-			8E-8	-	-
52	Tellurium-134 ² D, see ¹¹⁶ Te	2E+4 Thyroid (2E+4)	2E+4 Thyroid (5E+4)	1E-5	-	-	-
	W, see ¹¹⁶ Te	-	2E+4 Thyroid (5E+4)	1E-5	7E-8 -	3E-4 -	3E-3 -
		-			7E-8	-	-
53	Iodine-120m ² D, all compounds	1E+4 Thyroid (1E+4)	2E+4	9E-6	3E-8	-	-
						2E-4	2E-3

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
						Concentrations		Sewers
Atomic Radionuclide Class Concentration No.			Col. 1 Oral Ingestion ALI	Inhalation		Col. 1 Air	Col. 2 Water	Monthly Average ($\mu\text{Ci/ml}$)
			(μCi)	ALI	DAC	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	
53	Iodine-120 ²	D, all compounds	4E+3 Thyroid (8E+3)	9E+3 Thyroid (1E+4)	4E-6 -	- 2E-8	- 1E-4	- 1E-3
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 ²	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 ²	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 ²	D, all compounds	2E+4 Thyroid (3E+4)	5E+4 -	2E-5 -	6E-8 -	- 4E-4	- 4E-3
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 ²	Submersion ¹	-	-	1E-5	4E-8	-	-
54	Xenon-121 ²	Submersion ¹	-	-	2E-6	1E-8	-	-
54	Xenon-122	Submersion ¹	-	-	7E-5	3E-7	-	-
54	Xenon-123	Submersion ¹	-	-	6E-6	3E-8	-	-
54	Xenon-125	Submersion ¹	-	-	2E-5	7E-8	-	-

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
						Concentrations		Sewers
Atomic Radionuclide Class Concentration No.			Col. 1 Oral Ingestion ALI	Col. 2 <u>Inhalation</u> ALI	Col. 3 DAC	Col. 1 Air	Col. 2 Water	Monthly Average ($\mu\text{Ci}/\text{ml}$)
			(μCi)	(μCi)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	
54	Xenon-127	Submersion ¹	-	-	1E-5	6E-8	-	-
54	Xenon-129m	Submersion ¹	-	-	2E-4	9E-7	-	-
54	Xenon-131m	Submersion ¹	-	-	4E-4	2E-6	-	-
54	Xenon-133m	Submersion ¹	-	-	1E-4	6E-7	-	-
54	Xenon-133	Submersion ¹	-	-	1E-4	5E-7	-	-
54	Xenon-135m ²	Submersion ¹	-	-	9E-6	4E-8	-	-
54	Xenon-135	Submersion ¹	-	-	1E-5	7E-8	-	-
54	Xenon-138 ²	Submersion ¹	-	-	4E-6	2E-8	-	-
55	Cesium-125 ²	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 ²	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
55	Cesium-135m ²	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 ²	D, all compounds	2E+4 St wall (3E+4)	6E+4	2E-5	8E-8	-	-
				-	-	-	4E-4	4E-3
56	Barium-126 ²	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 ²	D, all compounds	4E+5 St wall (5E+5)	1E+6	6E-4	2E-6	-	-
				-	-	-	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 LLI wall (3E+3)	9E+3	4E-6	1E-8	-	-
				-	-	-	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

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
						Concentrations		Sewers
Atomic Radionuclide Class Concentration No.			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average
			Oral Ingestion ALI (μCi)	Inhalation ALI (μCi)		Air ($\mu\text{Ci/ml}$)	Water ($\mu\text{Ci/ml}$)	
					DAC ($\mu\text{Ci/ml}$)			
56	Barium-139 ²	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 ²	D, all compounds	2E+4	7E+4	3E-5	1E-7	3E-4	3E-3
56	Barium-142 ²	D, all compounds	5E+4	1E+5	6E-5	2E-7	7E-4	7E-3
57	Lanthanum-131 ²	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	-	-
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 ²	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 ²	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

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases	
		Col. 1	Col. 2	Col. 3	Concentrations		Sewers	
Atomic Radionuclide Class Concentration No.		Col. 1	Inhalation		Col. 1	Col. 2	Monthly Average	
		Oral Ingestion ALI (μCi)	ALI (μCi)	DAC ($\mu\text{Ci/ml}$)	Air ($\mu\text{Ci/ml}$)	Water ($\mu\text{Ci/ml}$)		($\mu\text{Ci/ml}$)
58	Cerium-143	Y, see ¹³⁴ Ce	-	6E+2	2E-7	8E-10	-	-
		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 ²	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 ²	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 ²	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 ²	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 ²	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	-	-
60	Neodymium-136 ²	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	-	-

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases	
					Concentrations		Sewers	
Atomic Radionuclide Class Concentration No.		Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average	
		Oral Ingestion ALI (μCi)	Inhalation ALI (μCi)		DAC ($\mu\text{Ci/ml}$)	Air ($\mu\text{Ci/ml}$)		
60	Neodymium-139 ²	W, see ¹³⁶ Nd Y, see ¹³⁶ Nd	9E+4 -	3E+5 3E+5	1E-4 1E-4	5E-7 4E-7	1E-3 -	1E-2 -
60	Neodymium-141	W, see ¹³⁶ Nd Y, see ¹³⁶ Nd	2E+5 -	7E+5 6E+5	3E-4 3E-4	1E-6 9E-7	2E-3 -	2E-2 -
60	Neodymium-147	W, see ¹³⁶ Nd Y, see ¹³⁶ Nd	1E+3 LLI wall (1E+3) -	9E+2 - 8E+2	4E-7 - 4E-7	1E-9 - 1E-9	- 2E-5 -	- 2E-4 -
60	Neodymium-149 ²	W, see ¹³⁶ Nd Y, see ¹³⁶ Nd	1E+4 -	3E+4 2E+4	1E-5 1E-5	4E-8 3E-8	1E-4 -	1E-3 -
60	Neodymium-151 ²	W, see ¹³⁶ Nd Y, see ¹³⁶ Nd	7E+4 -	2E+5 2E+5	8E-5 8E-5	3E-7 3E-7	9E-4 -	9E-3 -
61	Promethium-141 ²	W, all compounds except those given for Y Y, oxides, hydroxides, carbides, and fluorides	5E+4 St wall (6E+4) -	2E+5 - 2E+5	8E-5 - 2E+5	3E-7 - 7E-5	- 8E-4 2E-7	- 8E-3 -
61	Promethium-143	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	5E+3 -	6E+2 7E+2	2E-7 3E-7	8E-10 1E-9	7E-5 -	7E-4 -
61	Promethium-144	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	1E+3 -	1E+2 1E+2	5E-8 5E-8	2E-10 2E-10	2E-5 -	2E-4 -
61	Promethium-145	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	1E+4 - -	2E+2 Bone surf (2E+2) 2E+2	7E-8 - 8E-8	- 3E-10 3E-10	1E-4 - -	1E-3 - -
61	Promethium-146	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	2E+3 -	5E+1 4E+1	2E-8 2E-8	7E-11 6E-11	2E-5 -	2E-4 -
61	Promethium-147	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	4E+3 LLI wall (5E+3) -	1E+2 Bone surf (2E+2) 1E+2	5E-8 - 6E-8	- 3E-10 2E-10	- 7E-5 -	- 7E-4 -
61	Promethium-148m	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	7E+2 -	3E+2 3E+2	3E+2 1E-7	1E-7 5E-10	4E-10 -	1E-5 -
61	Promethium-148	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	4E+2 LLI wall (5E+2) -	5E+2 - 5E+2	2E-7 - 2E-7	8E-10 - 7E-10	- 7E-6 -	- 7E-5 -
61	Promethium-149	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	1E+3 LLI wall (1E+3) -	2E+3 - 2E+3	8E-7 - 8E-7	3E-9 - 2E-9	- 2E-5 -	- 2E-4 -
61	Promethium-150	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	5E+3 -	2E+4 2E+4	8E-6 7E-6	3E-8 2E-8	7E-5 -	7E-4 -
61	Promethium-151	W, see ¹⁴¹ Pm Y, see ¹⁴¹ Pm	2E+3 -	4E+3 3E+3	1E-6 1E-6	5E-9 4E-9	2E-5 -	2E-4 -
62	Samarium-141m ²	W, all compounds	3E+4	1E+5	4E-5	1E-7	4E-4	4E-3
62	Samarium-141 ²	W, all compounds	5E+4 St wall (6E+4) -	2E+5 - -	8E-5 - -	2E-7 - -	- 8E-4 -	- 8E-3 -
62	Samarium-142 ²	W, all compounds	8E+3	3E+4	1E-5	4E-8	1E-4	1E-3

to			Table 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Releases Sewers
			Col. 1 Oral Ingestion ALI (μCi)	Col. 2 <u>Inhalation</u> ALI (μCi)	Col. 3 DAC ($\mu\text{Ci/ml}$)	Col. 1 Air ($\mu\text{Ci/ml}$)	Col. 2 Water ($\mu\text{Ci/ml}$)	Monthly Average ($\mu\text{Ci/ml}$)
Atomic Radionuclide Class Concentration No.								
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 Bone surf (3E+1)	4E-2 Bone surf (6E-2)	1E-11 -	- 9E-14	- 3E-7	- 3E-6
62	Samarium-147	W, all compounds	2E+1 Bone surf (3E+1)	4E-2 Bone surf (7E-2)	2E-11 -	- 1E-13	- 4E-7	- 4E-6
62	Samarium-151	W, all compounds	1E+4 LLI wall (1E+4)	1E+2 Bone surf (2E+2)	4E-8 -	- 2E-10	- 2E-4	- 2E-3
62	Samarium-153	W, all compounds	2E+3 LLI wall (2E+3)	3E+3 -	1E-6 -	4E-9 -	- 3E-5	- 3E-4
62	Samarium-155 ²	W, all compounds	6E+4 St wall (8E+4)	2E+5 -	9E-5 -	3E-7 -	- 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 Bone surf (1E+2)	4E-8 -	- 2E-10	5E-5 -	5E-4 -
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 ²	W, all compounds	2E+4	6E+4	2E-5	8E-8	3E-4	3E-3
64	Gadolinium-145 ²	D, all compounds except those given for W	5E+4 St wall (5E+4)	2E+5 -	6E-5 -	2E-7 -	- 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	-	-

Atomic Radionuclide Class Concentration No.		Table 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Releases
		Col. 1 Oral Ingestion ALI (μCi)	Inhalation		Col. 1 Air ($\mu\text{Ci}/\text{ml}$)	Col. 2 Water ($\mu\text{Ci}/\text{ml}$)	Sewers Monthly Average ($\mu\text{Ci}/\text{ml}$)
			Col. 2 ALI (μCi)	Col. 3 DAC ($\mu\text{Ci}/\text{ml}$)			
64	Gadolinium-148 D, see ^{145}Gd	1E+1 Bone surf (2E+1)	8E-3 Bone surf (2E-2)	3E-12	-	-	-
	W, see ^{145}Gd	-	3E-2 Bone surf (6E-2)	1E-11	2E-14	3E-7	3E-6
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-5	9E-4
	W, see ^{145}Gd	-	1E+3	5E-7	9E-10	-	-
64	Gadolinium-152 D, see ^{145}Gd	2E+1 Bone surf (3E+1)	1E-2 Bone surf (2E-2)	4E-12	-	-	-
	W, see ^{145}Gd	-	4E-2 Bone surf (8E-2)	2E-11	3E-14	4E-7	4E-6
64	Gadolinium-153 D, see ^{145}Gd	5E+3	1E+2 Bone surf (2E+2)	6E-8	-	6E-5	6E-4
	W, see ^{145}Gd	-	6E+2	2E-7	3E-10 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 ² 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
65	Terbium-157 W, all compounds	5E+4 LLI wall (5E+4)	3E+2 Bone surf (6E+2)	1E-7	-	-	-
					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 LLI wall (2E+3)	2E+3	7E-7	2E-9	-	-
						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

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
					Concentrations		Sewers
Atomic Radionuclide Class Concentration No.		Col. 1 Oral Ingestion ALI	Inhalation		Col. 1 Air	Col. 2 Water	Monthly Average ($\mu\text{Ci}/\text{ml}$)
		(μCi)	ALI	DAC	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	
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 LLI wall (8E+2)	7E+2	3E-7	1E-9	- 1E-5	- 1E-4
67	Holmium-155 ² W, all compounds	4E+4	2E+5	6E-5	2E-7	6E-4	6E-3
67	Holmium-157 ² W, all compounds	3E+5	1E+6	6E-4	2E-6	4E-3	4E-2
67	Holmium-159 ² 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 ² W, all compounds	5E+4	3E+5	1E-4	4E-7	7E-4	7E-3
67	Holmium-162 ² W, all compounds	5E+5 St wall (8E+5)	2E+6	1E-3	3E-6	- 1E-2	- 1E-1
67	Holmium-164m ² W, all compounds	1E+5	3E+5	1E-4	4E-7	1E-3	1E-2
67	Holmium-164 ² W, all compounds	2E+5 St wall (2E+5)	6E+5	3E-4	9E-7	- 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 LLI wall (9E+2)	2E+3	7E-7	2E-9	- 1E-5	- 1E-4
67	Holmium-167 W, all compounds	2E+4	6E+4	2E-5	8E-8	2E-4	2E-3
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 LLI wall (4E+3)	3E+3	1E-6	4E-9	- 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 LLI wall (1E+3)	1E+3	6E-7	2E-9	- 2E-5	- 2E-4
69	Thulium-162 ² W, all compounds	7E+4 St wall (7E+4)	3E+5	1E-4	4E-7	- 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 LLI wall (2E+3)	2E+3	8E-7	3E-9	- 3E-5	- 3E-4
69	Thulium-170 W, all compounds	8E+2 LLI wall (1E+3)	2E+2	9E-8	3E-10	- 1E-5	- 1E-4
69	Thulium-171 W, all compounds	1E+4 LLI wall (1E+4)	3E+2 Bone surf (6E+2)	1E-7	- 8E-10	- 2E-4	- 2E-3

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
						Concentrations		Sewers
Atomic Radionuclide Class Concentration No.			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average
			Oral Ingestion ALI (μCi)	<u>Inhalation</u> ALI (μCi)	DAC ($\mu\text{Ci/ml}$)	Air ($\mu\text{Ci/ml}$)	Water ($\mu\text{Ci/ml}$)	
69	Thulium-172	W, all compounds	7E+2 LLI wall (8E+2)	1E+3 -	5E-7 -	2E-9 -	- 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 ²	W, all compounds	7E+4 St wall (9E+4)	3E+5 -	1E-4 -	4E-7 -	- 1E-3	- 1E-2
70	Ytterbium-162 ²	W, all compounds except those given for Y Y, oxides, hydroxides, and fluorides	7E+4 -	3E+5 3E+5	1E-4 1E-4	4E-7 4E-7	1E-3 -	1E-2 -
70	Ytterbium-166	W, see ¹⁶² Yb Y, see ¹⁶² Yb	1E+3 -	2E+3 2E+3	8E-7 8E-7	3E-9 3E-9	2E-5 -	2E-4 -
70	Ytterbium-167 ²	W, see ¹⁶² Yb Y, see ¹⁶² Yb	3E+5 -	8E+5 7E+5	3E-4 3E-4	1E-6 1E-6	4E-3 -	4E-2 -
70	Ytterbium-169	W, see ¹⁶² Yb Y, see ¹⁶² Yb	2E+3 -	8E+2 7E+2	4E-7 3E-7	1E-9 1E-9	2E-5 -	2E-4 -
70	Ytterbium-175	W, see ¹⁶² Yb Y, see ¹⁶² Yb	3E+3 LLI wall (3E+3) -	4E+3 - 3E+3	1E-6 - 1E-6	5E-9 - 5E-9	- 4E-5 -	- 4E-4 -
70	Ytterbium-177 ²	W, see ¹⁶² Yb Y, see ¹⁶² Yb	2E+4 -	5E+4 5E+4	2E-5 2E-5	7E-8 6E-8	2E-4 -	2E-3 -
70	Ytterbium-178 ²	W, see ¹⁶² Yb Y, see ¹⁶² Yb	1E+4 -	4E+4 4E+4	2E-5 2E-5	6E-8 5E-8	2E-4 -	2E-3 -
71	Lutetium-169	W, all compounds except those given for Y Y, oxides, hydroxides, and fluorides	3E+3 -	4E+3 4E+3	2E-6 2E-6	6E-9 6E-9	3E-5 -	3E-4 -
71	Lutetium-170	W, see ¹⁶⁹ Lu Y, see ¹⁶⁹ Lu	1E+3 -	2E+3 2E+3	9E-7 8E-7	3E-9 3E-9	2E-5 -	2E-4 -
71	Lutetium-171	W, see ¹⁶⁹ Lu Y, see ¹⁶⁹ Lu	2E+3 -	2E+3 2E+3	8E-7 8E-7	3E-9 3E-9	3E-5 -	3E-4 -
71	Lutetium-172	W, see ¹⁶⁹ Lu Y, see ¹⁶⁹ Lu	1E+3 -	1E+3 1E+3	5E-7 5E-7	2E-9 2E-9	1E-5 -	1E-4 -
71	Lutetium-173	W, see ¹⁶⁹ Lu Y, see ¹⁶⁹ Lu	5E+3 -	3E+2 Bone surf (5E+2) 3E+2	1E-7 - 1E-7	- 6E-10 4E-10	7E-5 - -	7E-4 - -
71	Lutetium-174m	W, see ¹⁶⁹ Lu Y, see ¹⁶⁹ Lu	2E+3 LLI wall (3E+3) -	2E+2 Bone surf (3E+2) 2E+2	1E-7 - 9E-8	- 5E-10 3E-10	- 4E-5 -	- 4E-4 -
71	Lutetium-174	W, see ¹⁶⁹ Lu Y, see ¹⁶⁹ Lu	5E+3 -	1E+2 Bone surf (2E+2) 2E+2	5E-8 - 6E-8	- 3E-10 2E-10	7E-5 - -	7E-4 - -
71	Lutetium-176m	W, see ¹⁶⁹ Lu Y, see ¹⁶⁹ Lu	8E+3 -	3E+4 2E+4	1E-5 9E-6	3E-8 3E-8	1E-4 -	1E-3 -
71	Lutetium-176	W, see ¹⁶⁹ Lu	7E+2	5E+0 Bone surf	2E-9	-	1E-5	1E-4

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases		
		Col. 1 Oral Ingestion ALI (μCi)	Inhalation		Concentrations		Sewers		
Atomic Radionuclide Class Concentration No.	Col. 2 ALI (μCi)		Col. 3	Col. 1	Col. 2	Monthly Average ($\mu\text{Ci}/\text{ml}$)			
		Col. 3 DAC ($\mu\text{Ci}/\text{ml}$)	Air ($\mu\text{Ci}/\text{ml}$)	Water ($\mu\text{Ci}/\text{ml}$)					
	Y, see ^{169}Lu	-	(1E+1)	-	2E-11	-	-		
	W, see ^{169}Lu	7E+2	8E+0	3E-9	1E-11	-	-		
71	Lutetium-177m		1E+2	5E-8	-	1E-5	1E-4		
	Y, see ^{169}Lu	-	Bone surf (1E+2)	-	2E-10	-	-		
	W, see ^{169}Lu	-	8E+1	3E-8	1E-10	-	-		
71	Lutetium-177		2E+3	9E-7	3E-9	-	-		
	Y, see ^{169}Lu	-	LLI wall (3E+3)	-	-	4E-5	4E-4		
	W, see ^{169}Lu	-	2E+3	9E-7	3E-9	-	-		
71	Lutetium-178m ²		5E+4	8E-5	3E-7	-	-		
	Y, see ^{169}Lu	-	St. wall (6E+4)	-	-	8E-4	8E-3		
	W, see ^{169}Lu	-	2E+5	7E-5	2E-7	-	-		
71	Lutetium-178 ²		4E+4	5E-5	2E-7	-	-		
	Y, see ^{169}Lu	-	St wall (4E+4)	-	-	6E-4	6E-3		
	W, see ^{169}Lu	-	1E+5	5E-5	2E-7	-	-		
71	Lutetium-179		6E+3	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
	W, see ^{170}Hf	-	Bone surf (2E+1)	-	3E-11	-	-	-	
	W, see ^{170}Hf	-	4E+1	2E-8	-	-	-	-	
	W, see ^{170}Hf	-	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
	W, see ^{170}Hf	-	Bone surf (1E+3)	-	1E-9	-	-	-	
	W, see ^{170}Hf	-	1E+3	5E-7	2E-9	-	-	-	
72	Hafnium-177m ²		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	-	-	-	
72	Hafnium-178m		D, see ^{170}Hf	3E+2	1E+0	5E-10	-	3E-6	3E-5
	W, see ^{170}Hf	-	Bone surf (2E+0)	-	3E-12	-	-	-	
	W, see ^{170}Hf	-	5E+0	2E-9	-	-	-	-	
	W, see ^{170}Hf	-	Bone surf (9E+0)	-	1E-11	-	-	-	
72	Hafnium-179m		D, see ^{170}Hf	1E+3	3E+2	1E-7	-	1E-5	1E-4
	W, see ^{170}Hf	-	Bone surf (6E+2)	-	8E-10	-	-	-	
	W, see ^{170}Hf	-	6E+2	3E-7	8E-10	-	-	-	

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Sewers
Atomic Radionuclide Class Concentration No.			Oral Ingestion ALI	Inhalation		Air	Water	Monthly Average
			(μCi)	ALI	DAC	(μCi/ml)	(μCi/ml)	(μCi/ml)
72	Hafnium-180m	D, see ¹⁷⁰ Hf W, see ¹⁷⁰ Hf	7E+3 -	2E+4 3E+4	9E-6 1E-5	3E-8 4E-8	1E-4 -	1E-3 -
72	Hafnium-181	D, see ¹⁷⁰ Hf W, see ¹⁷⁰ Hf	1E+3 -	2E+2 Bone surf (4E+2) 4E+2	7E-8 - 2E-7	- 6E-10 6E-10	2E-5 -	2E-4 -
72	Hafnium-182m ²	D, see ¹⁷⁰ Hf W, see ¹⁷⁰ Hf	4E+4 -	9E+4 1E+5	4E-5 6E-5	1E-7 2E-7	5E-4 -	5E-3 -
72	Hafnium-182	D, see ¹⁷⁰ Hf W, see ¹⁷⁰ Hf	2E+2 Bone surf (4E+2) -	8E-1 Bone surf (2E+0) 3E+0 Bone surf (7E+0)	3E-10 - 1E-9 -	- 2E-12 -	- 5E-6 -	- 5E-5 -
72	Hafnium-183 ²	D, see ¹⁷⁰ Hf W, see ¹⁷⁰ Hf	2E+4 -	5E+4 6E+4	2E-5 2E-5	6E-8 8E-8	3E-4 -	3E-3 -
72	Hafnium-184	D, see ¹⁷⁰ Hf W, see ¹⁷⁰ Hf	2E+3 -	8E+3 6E+3	3E-6 3E-6	1E-8 9E-9	3E-5 -	3E-4 -
73	Tantalum-172 ²	W, all compounds except those given for Y Y, elemental Ta, oxides, hydroxides, halides, carbides, nitrates, and nitrides	4E+4 -	1E+5 1E+5	5E-5 4E-5	2E-7 1E-7	5E-4 -	5E-3 -
73	Tantalum-173	W, see ¹⁷² Ta Y, see ¹⁷² Ta	7E+3 -	2E+4 2E+4	8E-6 7E-6	3E-8 2E-8	9E-5 -	9E-4 -
73	Tantalum-174 ²	W, see ¹⁷² Ta Y, see ¹⁷² Ta	3E+4 -	1E+5 9E+4	4E-5 4E-5	1E-7 1E-7	4E-4 -	4E-3 -
73	Tantalum-175	W, see ¹⁷² Ta Y, see ¹⁷² Ta	6E+3 -	2E+4 1E+4	7E-6 6E-6	2E-8 2E-8	8E-5 -	8E-4 -
73	Tantalum-176	W, see ¹⁷² Ta Y, see ¹⁷² Ta	4E+3 -	1E+4 1E+4	5E-6 5E-6	2E-8 2E-8	5E-5 -	5E-4 -
73	Tantalum-177	W, see ¹⁷² Ta Y, see ¹⁷² Ta	1E+4 -	2E+4 2E+4	8E-6 7E-6	3E-8 2E-8	2E-4 -	2E-3 -
73	Tantalum-178	W, see ¹⁷² Ta Y, see ¹⁷² Ta	2E+4 -	9E+4 7E+4	4E-5 3E-5	1E-7 1E-7	2E-4 -	2E-3 -
73	Tantalum-179	W, see ¹⁷² Ta Y, see ¹⁷² Ta	2E+4 -	5E+3 9E+2	2E-6 4E-7	8E-9 1E-9	3E-4 -	3E-3 -
73	Tantalum-180m	W, see ¹⁷² Ta Y, see ¹⁷² Ta	2E+4 -	7E+4 6E+4	3E-5 2E-5	9E-8 8E-8	3E-4 -	3E-3 -
73	Tantalum-180	W, see ¹⁷² Ta Y, see ¹⁷² Ta	1E+3 -	4E+2 2E+1	2E-7 1E-8	6E-10 3E-11	2E-5 -	2E-4 -
73	Tantalum-182m ²	W, see ¹⁷² Ta Y, see ¹⁷² Ta	2E+5 St wall (2E+5) -	5E+5 - 4E+5	2E-4 - 2E-4	8E-7 - 6E-7	- 3E-3 -	- 3E-2 -
73	Tantalum-182	W, see ¹⁷² Ta Y, see ¹⁷² Ta	8E+2 -	3E+2 1E+2	1E-7 6E-8	5E-10 2E-10	1E-5 -	1E-4 -

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Sewers
Atomic Radionuclide Class Concentration No.			Oral Ingestion ALI	Inhalation		Air	Water	Monthly Average
			(μCi)	ALI	DAC	(μCi/ml)	(μCi/ml)	(μCi/ml)
73	Tantalum-183	W, see ¹⁷² Ta	9E+2 LLI wall (1E+3)	1E+3	5E-7	2E-9	-	-
		Y, see ¹⁷² Ta	-	1E+3	4E-7	1E-9	2E-5	2E-4
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 ²	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 ²	W, see ¹⁷² Ta	5E+4 St wall (7E+4)	2E+5	1E-4	3E-7	-	-
		Y, see ¹⁷² Ta	-	2E+5	9E-5	3E-7	1E-3	1E-2
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
74	Tungsten-179 ²	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 LLI wall (3E+3)	7E+3	3E-6	9E-9	-	-
			-	-	-	-	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 LLI wall (5E+2)	1E+3	5E-7	2E-9	-	-
			-	-	-	-	7E-6	7E-5
75	Rhenium-177 ²	D, all compounds except those given for W	9E+4 St wall (1E+5)	3E+5	1E-4	4E-7	-	-
		W, oxides, hydroxides, and nitrates	-	4E+5	1E-4	5E-7	-	-
75	Rhenium-178 ²	D, see ¹⁷⁷ Re	7E+4 St wall (1E+5)	3E+5	1E-4	4E-7	-	-
		W, see ¹⁷⁷ Re	-	3E+5	1E-4	4E-7	1E-3	1E-2
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 St wall (2E+3)	2E+3 St wall (2E+3)	7E-7	-	-	-
		W, see ¹⁷⁷ Re	-	2E+2	6E-8	3E-9	2E-5	2E-4
75	Rhenium-186	D, see ¹⁷⁷ Re	2E+3	3E+3	1E-6	4E-9	3E-5	3E-4

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases		
					Concentrations		Sewers		
Atomic Radionuclide Class Concentration No.		Col. 1 Oral Ingestion ALI	Inhalation		Col. 1 Air	Col. 2 Water	Monthly Average ($\mu\text{Ci/ml}$)		
		(μCi)	Col. 2 ALI (μCi)	Col. 3 DAC ($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)			
	W, see ¹⁷⁷ Re	-	2E+3	7E-7	2E-9	-	-		
75	Rhenium-187	D, see ¹⁷⁷ Re	6E+5	8E+5 St wall (9E+5)	4E-4	-	8E-3	8E-2	
	W, see ¹⁷⁷ Re	-	1E+5	-	1E-6 1E-7	-	-	-	
75	Rhenium-188m ²	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 ²	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 ²	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	-	-	-	
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 ²	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	-	-	-	

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases	
				Concentrations		Sewers		
Atomic Radionuclide Class Concentration No.		Col. 1 Oral Ingestion ALI	Inhalation		Col. 1 Air	Col. 2 Water	Monthly Average ($\mu\text{Ci/ml}$)	
		(μCi)	ALI (μCi)	DAC ($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)		
	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 ²	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	-	-
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

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases	
					Concentrations		Sewers	
Atomic Radionuclide Class Concentration No.		Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average	
		Oral Ingestion ALI (μCi)	<u>Inhalation</u> ALI (μCi)	DAC ($\mu\text{Ci}/\text{ml}$)	Air ($\mu\text{Ci}/\text{ml}$)	Water ($\mu\text{Ci}/\text{ml}$)		
78	Platinum-193m	D, all compounds LLI wall (3E+4)	6E+3 -	3E-6 -	8E-9 -	- 4E-5	-	4E-4
78	Platinum-193	D, all compounds LLI wall (5E+4)	4E+4 -	2E+4 -	1E-5 -	3E-8 -	-	6E-3
78	Platinum-195m	D, all compounds LLI wall (2E+3)	2E+3 -	4E+3 -	2E-6 -	6E-9 -	-	3E-4
78	Platinum-197m ²	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 ²	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
79	Gold-193	D, all compounds except those given for W and Y W, halides and nitrates - Y, oxides and hydroxides	- 9E+3 2E+4 -	- 3E+4 9E-6 2E+4	- 1E-5 3E-8 8E-6	- 4E-8 - 3E-8	- 1E-4 -	1E-3 -
79	Gold-194	D, see ¹⁹³ Au W, see ¹⁹³ Au Y, see ¹⁹³ Au	3E+3 - -	8E+3 5E+3 5E+3	3E-6 2E-6 2E-6	1E-8 8E-9 7E-9	4E-5 -	4E-4 -
79	Gold-195	D, see ¹⁹³ Au W, see ¹⁹³ Au Y, see ¹⁹³ Au	5E+3 - -	1E+4 1E+3 4E+2	5E-6 6E-7 2E-7	2E-8 2E-9 6E-10	7E-5 -	7E-4 -
79	Gold-198m	D, see ¹⁹³ Au W, see ¹⁹³ Au Y, see ¹⁹³ Au	1E+3 - -	3E+3 1E+3 1E+3	1E-6 5E-7 5E-7	4E-9 2E-9 2E-9	1E-5 -	1E-4 -
79	Gold-198	D, see ¹⁹³ Au W, see ¹⁹³ Au Y, see ¹⁹³ Au	1E+3 - -	4E+3 2E+3 2E+3	2E-6 8E-7 7E-7	5E-9 3E-9 2E-9	2E-5 -	2E-4 -
79	Gold-199	D, see ¹⁹³ Au W, see ¹⁹³ Au Y, see ¹⁹³ Au	3E+3 - -	9E+3 4E+3 4E+3	4E-6 2E-6 2E-6	1E-8 6E-9 5E-9	- 4E-5 -	- 4E-4 -
79	Gold-200m	D, see ¹⁹³ Au W, see ¹⁹³ Au Y, see ¹⁹³ Au	1E+3 - -	4E+3 3E+3 2E+4	1E-6 1E-6 1E-6	5E-9 4E-9 3E-9	2E-5 -	2E-4 -
79	Gold-200 ²	D, see ¹⁹³ Au W, see ¹⁹³ Au Y, see ¹⁹³ Au	3E+4 - -	6E+4 8E+4 7E+4	3E-5 3E-5 3E-5	9E-8 1E-7 1E-7	4E-4 -	4E-3 -
79	Gold-201 ²	D, see ¹⁹³ Au W, see ¹⁹³ Au Y, see ¹⁹³ Au	7E+4 - -	2E+5 2E+5 2E+5	9E-5 1E-4 9E-5	3E-7 3E-7 3E-7	- 1E-3 -	- 1E-2 -
80	Mercury-193m	Vapor Organic D D, sulfates W, oxides, hydroxides, halides, nitrates, and sulfides	- 4E+3 3E+3 -	8E+3 1E+4 9E+3 8E+3	4E-6 5E-6 4E-6 3E-6	1E-8 2E-8 1E-8 1E-8	- 6E-5 4E-5 -	- 6E-4 4E-4 -
80	Mercury-193	Vapor	-	3E+4	1E-5	4E-8	-	-

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
					Concentrations		Sewers
Atomic Radionuclide Class Concentration No.		Col. 1 Oral Ingestion ALI	Col. 2 Inhalation		Col. 1 Air	Col. 2 Water	Monthly Average ($\mu\text{Ci/ml}$)
		(μCi)	ALI	DAC	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	
	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 ²						
	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 ²						
	D, all compounds	5E+4	2E+5	6E-5	2E-7	-	-
	St wall	(7E+4)	-	-	-	1E-3	1E-2
81	Thallium-194 ²						
	D, all compounds	3E+5	6E+5	2E-4	8E-7	-	-
	St wall	(3E+5)	-	-	-	4E-3	4E-2
81	Thallium-195 ²						
	D, all compounds	6E+4	1E+5	5E-5	2E-7	9E-4	9E-3
81	Thallium-197						
	D, all compounds	7E+4	1E+5	5E-5	2E-7	1E-3	1E-2
81	Thallium-198m ²						
	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 ²						
	D, all compounds	6E+4	2E+5	8E-5	3E-7	8E-4	8E-3

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
						Concentrations		Sewers
Atomic Radionuclide Class Concentration No.			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average
			Oral Ingestion ALI (μCi)	Inhalation		Air	Water	
				ALI (μCi)	DAC ($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)
82	Lead-198	D, all compounds	3E+4	6E+4	3E-5	9E-8	4E-4	4E-3
82	Lead-199 ²	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 ²	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 ²	D, all compounds	9E+3	8E+2	3E-7	1E-9	1E-4	1E-3
83	Bismuth-200 ²	D, nitrates W, all other compounds	3E+4 -	8E+4 1E+5	4E-5 4E-5	1E-7 1E-7	4E-4 -	4E-3 -
83	Bismuth-201 ²	D, see ²⁰⁰ Bi W, see ²⁰⁰ Bi	1E+4 -	3E+4 4E+4	1E-5 2E-5	4E-8 5E-8	2E-4 -	2E-3 -
83	Bismuth-202 ²	D, see ²⁰⁰ Bi W, see ²⁰⁰ Bi	1E+4 -	4E+4 8E+4	2E-5 3E-5	6E-8 1E-7	2E-4 -	2E-3 -
83	Bismuth-203	D, see ²⁰⁰ Bi W, see ²⁰⁰ Bi	2E+3 -	7E+3 6E+3	3E-6 3E-6	9E-9 9E-9	3E-5 -	3E-4 -
83	Bismuth-205	D, see ²⁰⁰ Bi W, see ²⁰⁰ Bi	1E+3 -	3E+3 1E+3	1E-6 5E-7	3E-9 2E-9	2E-5 -	2E-4 -
83	Bismuth-206	D, see ²⁰⁰ Bi W, see ²⁰⁰ Bi	6E+2 -	1E+3 9E+2	6E-7 4E-7	2E-9 1E-9	9E-6 -	9E-5 -
83	Bismuth-207	D, see ²⁰⁰ Bi W, see ²⁰⁰ Bi	1E+3 -	2E+3 4E+2	7E-7 1E-7	2E-9 5E-10	1E-5 -	1E-4 -
83	Bismuth-210m	D, see ²⁰⁰ Bi W, see ²⁰⁰ Bi	4E+1 Kidneys (6E+1) -	5E+0 Kidneys (6E+0) 7E-1	2E-9 - 3E-10	- 9E-12 9E-13	- 8E-7 -	- 8E-6 -
83	Bismuth-210	D, see ²⁰⁰ Bi W, see ²⁰⁰ Bi	8E+2 -	2E+2 Kidneys (4E+2) 3E+1	1E-7 - 1E-8	- 5E-10 4E-11	1E-5 -	1E-4 -
83	Bismuth-212 ²	D, see ²⁰⁰ Bi W, see ²⁰⁰ Bi	5E+3 -	2E+2 3E+2	1E-7 1E-7	3E-10 4E-10	7E-5 -	7E-4 -

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases	
					Concentrations		Sewers	
Atomic Radionuclide Class Concentration No.		Col. 1 Oral Ingestion ALI	Col. 2 <u>Inhalation</u> ALI	Col. 3 DAC	Col. 1 Air	Col. 2 Water	Monthly Average ($\mu\text{Ci/ml}$)	
		(μCi)	(μCi)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)		
83	Bismuth-213 ²	D, see ²⁰⁰ Bi W, see ²⁰⁰ Bi	7E+3 -	3E+2 4E+2	1E-7 1E-7	4E-10 5E-10	1E-4 -	1E-3 -
83	Bismuth-214 ²	D, see ²⁰⁰ Bi W, see ²⁰⁰ Bi	2E+4 St wall (2E+4) -	8E+2 - 9E-2	3E-7 - 4E-7	1E-9 - 1E-9	- 3E-4 -	- 3E-3 -
84	Polonium-203 ²	D, all compounds except those given for W W, oxides, hydroxides, and nitrates	3E+4 -	6E+4 9E+4	3E-5 4E-5	9E-8 1E-7	3E-4 -	3E-3 -
84	Polonium-205 ²	D, see ²⁰³ Po W, see ²⁰³ Po	2E+4 -	4E+4 7E+4	2E-5 3E-5	5E-8 1E-7	3E-4 -	3E-3 -
84	Polonium-207	D, see ²⁰³ Po W, see ²⁰³ Po	8E+3 -	3E+4 3E+4	1E-5 1E-5	3E-8 4E-8	1E-4 -	1E-3 -
84	Polonium-210	D, see ²⁰³ Po W, see ²⁰³ Po	3E+0 -	6E-1 6E-1	3E-10 3E-10	9E-13 9E-13	4E-8 -	4E-7 -
85	Astatine-207 ²	D, halides W	6E+3 -	3E+3 2E+3	1E-6 9E-7	4E-9 3E-9	8E-5 -	8E-4 -
85	Astatine-211	D, halides W	1E+2 -	8E+1 5E+1	3E-8 2E-8	1E-10 8E-11	2E-6 -	2E-5 -
86	Radon-220	With daughters removed With daughters present	- -	2E+4 2E+1 (or 12 WLM)	7E-6 9E-9	2E-8 3E-11 (or 1.0 WL)	- -	- -
86	Radon-222	With daughters removed With daughters present	- -	1E+4 1E+2 (or 4 WLM)	4E-6 3E-8 (or 0.33 WL)	1E-8 1E-10	- -	- -
87	Francium-222 ²	D, all compounds	2E+3	5E+2	2E-7	6E-10	3E-5	3E-4
87	Francium-223 ²	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 ²	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

		Table 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Releases Sewers	
to		Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average	
Atomic Radionuclide Class		Oral Ingestion ALI	Inhalation		Air	Water		
Concentration No.		(μCi)	(μCi)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	
89	Actinium-224	D, all compounds except those given for W and Y	LLI wall (2E+3)	Bone surf (4E+1)	-	1E-8	-	-
		W, halides and nitrates	-	5E+1	2E-8	5E-11	3E-5	3E-4
		Y, oxides and hydroxides	-	-	5E+1	7E-11	-	-
					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	-	-	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	-	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 ²	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	-	-
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	-	-

to			Table 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Releases Sewers
			Col. 1 Oral Ingestion ALI (μCi)	Col. 2 <u>Inhalation</u> ALI (μCi)	Col. 3 DAC ($\mu\text{Ci}/\text{ml}$)	Col. 1 Air ($\mu\text{Ci}/\text{ml}$)	Col. 2 Water ($\mu\text{Ci}/\text{ml}$)	Monthly Average ($\mu\text{Ci}/\text{ml}$)
Atomic Radionuclide Class Concentration No.								
90	Thorium-232	W, see ^{226}Th	7E-1 Bone surf (2E+0)	1E-3 Bone surf (3E-3)	5E-13 -	-	-	-
		Y, see ^{226}Th	-	3E-3 Bone surf (4E-3)	1E-12 -	4E-15 -	3E-8 -	3E-7 -
90	Thorium-234	W, see ^{226}Th	3E+2 LLI wall (4E+2)	2E+2 -	8E-8 -	3E-10 -	-	-
		Y, see ^{226}Th	-	2E+2	6E-8	2E-10	5E-6	5E-5
91	Protactinium-227 ²	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 Bone surf (2E+1)	5E-9 -	-	2E-5	2E-4
		Y, see ^{227}Pa	-	1E+1	5E-9	3E-11 2E-11	-	-
91	Protactinium-230	W, see ^{227}Pa	6E+2 Bone surf (9E+2)	5E+0 -	2E-9 -	7E-12 -	-	-
		Y, see ^{227}Pa	-	4E+0	1E-9	5E-12	1E-5	1E-4
91	Protactinium-231	W, see ^{227}Pa	2E-1 Bone surf (5E-1)	2E-3 Bone surf (4E-3)	6E-13 -	-	-	-
		Y, see ^{227}Pa	-	4E-3 Bone surf (6E-3)	2E-12 -	6E-15 -	6E-9	6E-8
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 -	-	-
		Y, see ^{227}Pa	-	6E+2	2E-7	8E-10	2E-5	2E-4
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 , $\text{UO}_2(\text{NO}_3)_2$	4E+0 Bone surf (6E+0)	4E-1 Bone surf (6E-1)	2E-10 -	-	-	-
		W, UO_3 , UF_4 , UCl_4	-	4E-1	1E-10	8E-13 5E-13	8E-8	8E-7
		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 -	-	-
		W, see ^{230}U	-	6E+3	2E-6	8E-9	6E-5	6E-4
		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 -	-	-	-
		W, see ^{230}U	-	4E-1	2E-10	6E-13 5E-13	6E-8	6E-7
		Y, see ^{230}U	-	8E-3	3E-12	1E-14	-	-

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
						Concentrations		Sewers
Atomic Radionuclide Class Concentration No.			Col. 1 Oral Ingestion ALI	Inhalation		Col. 1 Air	Col. 2 Water	Monthly Average ($\mu\text{Ci/ml}$)
			(μCi)	ALI	DAC	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	
92 Uranium-233	D, see ^{230}U		1E+1 Bone surf (2E+1)	1E+0 Bone surf (2E+0)	5E-10	-	-	-
		W, see ^{230}U	-	7E-1	3E-10	3E-12	3E-7	3E-6
		Y, see ^{230}U	-	4E-2	2E-11	5E-14	-	-
92 Uranium-234 ³	D, see ^{230}U		1E+1 Bone surf (2E+1)	1E+0 Bone surf (2E+0)	5E-10	-	-	-
		W, see ^{230}U	-	7E-1	3E-10	3E-12	3E-7	3E-6
		Y, see ^{230}U	-	4E-2	2E-11	5E-14	-	-
92 Uranium-235 ³	D, see ^{230}U		1E+1 Bone surf (2E+1)	1E+0 Bone surf (2E+0)	6E-10	-	-	-
		W, see ^{230}U	-	8E-1	3E-10	3E-12	3E-7	3E-6
		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	-	-	-
		W, see ^{230}U	-	8E-1	3E-10	3E-12	3E-7	3E-6
		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	-	-
		W, see ^{230}U	-	2E+3	7E-7	2E-9	3E-5	3E-4
		Y, see ^{230}U	-	2E+3	6E-7	2E-9	-	-
92 Uranium-238 ³	D, see ^{230}U		1E+1 Bone surf (2E+1)	1E+0 Bone surf (2E+0)	6E-10	-	-	-
		W, see ^{230}U	-	8E-1	3E-10	3E-12	3E-7	3E-6
		Y, see ^{230}U	-	4E-2	2E-11	6E-14	-	-
92 Uranium-239 ²	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 ³	D, see ^{230}U		1E+1 Bone surf (2E+1)	1E+0 Bone surf (2E+0)	5E-10	-	-	-
		W, see ^{230}U	-	8E-1	3E-10	3E-12	3E-7	3E-6
		Y, see ^{230}U	-	5E-2	2E-11	9E-13	-	-
93 Neptunium-232 ²	W, all compounds		1E+5	2E+3 Bone surf (5E+2)	7E-7	-	2E-3	2E-2
93 Neptunium-233 ²	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
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-7

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
		Col. 1 Oral Ingestion ALI (μCi)	Inhalation		Concentrations		Sewers
Atomic Radionuclide Class Concentration No.	Col. 2 ALI (μCi)		Col. 3	Col. 1	Col. 2	Monthly Average ($\mu\text{Ci}/\text{ml}$)	
		DAC ($\mu\text{Ci}/\text{ml}$)	Air ($\mu\text{Ci}/\text{ml}$)	Water ($\mu\text{Ci}/\text{ml}$)			
93	Neptunium-236 W, all compounds (22.5 h)	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 ² W, all compounds	2E+4	8E+4	3E-5	1E-7	3E-4	3E-3
94	Plutonium-234 W, all compounds except PuO ₂ Y, PuO ₂	8E+3 -	2E+2 2E+2	9E-8 8E-8	3E-10 3E-10	1E-4 -	1E-3 -
94	Plutonium-235 ² W, see ²³⁴ Pu Y, see ²³⁴ Pu	9E+5 -	3E+6 3E+6	1E-3 1E-3	4E-6 3E-6	1E-2 -	1E-1 -
94	Plutonium-236 W, see ²³⁴ Pu Y, see ²³⁴ Pu	2E+0 Bone surf (4E+0) -	2E-2 Bone surf (4E-2) 4E-2	8E-12 -	- 5E-14 6E-14	- 6E-8 -	- 6E-7 -
94	Plutonium-237 W, see ²³⁴ Pu Y, see ²³⁴ Pu	1E+4 -	3E+3 3E+3	1E-6 1E-6	5E-9 4E-9	2E-4 -	2E-3 -
94	Plutonium-238 W, see ²³⁴ Pu Y, see ²³⁴ Pu	9E-1 Bone surf (2E+0) -	7E-3 Bone surf (1E-2) 2E-2	3E-12 -	- 2E-14 2E-14	- 2E-8 -	- 2E-7 -
94	Plutonium-239 W, see ²³⁴ Pu Y, see ²³⁴ Pu	8E-1 Bone surf (1E+0) -	6E-3 Bone surf (1E-2) 2E-2 Bone surf (2E-2)	3E-12 -	- 2E-14 -	- 2E-8 -	- 2E-7 -
94	Plutonium-240 W, see ²³⁴ Pu Y, see ²³⁴ Pu	8E-1 Bone surf (1E+0) -	6E-3 Bone surf (1E-2) 2E-2 Bone surf (2E-2)	3E-12 -	- 2E-14 -	- 2E-8 -	- 2E-7 -
94	Plutonium-241 W, see ²³⁴ Pu Y, see ²³⁴ Pu	4E+1 Bone surf (7E+1) -	3E-1 Bone surf (6E-1) 8E-1 Bone surf (1E+0)	1E-10 -	- 8E-13 -	- 1E-6 -	- 1E-5 -
94	Plutonium-242 W, see ²³⁴ Pu Y, see ²³⁴ Pu	8E-1 Bone surf (1E+0) -	7E-3 Bone surf (1E-2) 2E-2 Bone surf (2E-2)	3E-12 -	- 2E-14 -	- 2E-8 -	- 2E-7 -

		Table 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Releases Sewers	
to		Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average	
Atomic Radionuclide Class Concentration No.		Oral Ingestion ALI	Inhalation		Air	Water		
		(μ Ci)	ALI (μ Ci)	DAC (μ Ci/ml)	(μ Ci/ml)	(μ Ci/ml)	(μ Ci/ml)	(μ Ci/ml)
94	Plutonium-243	W, see ²³⁴ Pu Y, see ²³⁴ Pu	2E+4 -	4E+4 4E+4	2E-5 2E-5	5E-8 5E-8	2E-4 -	2E-3 -
94	Plutonium-244	W, see ²³⁴ Pu Y, see ²³⁴ Pu	8E-1 Bone surf (2E+0) - -	7E-3 Bone surf (1E-2) 2E-2 Bone surf (2E-2)	3E-12 - 7E-12 -	- 2E-14 - 2E-14	- 2E-8 - -	- 2E-7 - -
94	Plutonium-245	W, see ²³⁴ Pu Y, see ²³⁴ Pu	2E+3 -	5E+3 4E+3	2E-6 2E-6	6E-9 6E-9	3E-5 -	3E-4 -
94	Plutonium-246	W, see ²³⁴ Pu Y, see ²³⁴ Pu	4E+2 LLI wall (4E+2) -	3E+2 - 3E+2	1E-7 - 1E-7	4E-10 - 4E-10	- 6E-6 -	- 6E-5 -
95	Americium-237 ²	W, all compounds	8E+4	3E+5	1E-4	4E-7	1E-3	1E-2
95	Americium-238 ²	W, all compounds	4E+4 -	3E+3 Bone surf (6E+3)	1E-6 -	- 9E-9	5E-4 -	5E-3 -
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
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 ²	W, all compounds	St wall (8E+4)	Bone surf (7E+3)	6E+4 -	4E+3 1E-8	2E-6 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 ²	W, all compounds	St wall (6E+4)	-	5E+4 -	2E+5 -	8E-5 8E-4	3E-7 8E-3
95	Americium-246 ²	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

to			Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases	
						Concentrations		Sewers	
Atomic Radionuclide Class Concentration No.			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	Monthly Average	
			Oral Ingestion ALI (μCi)	Inhalation		Air	Water		
				ALI (μCi)	DAC ($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	
96	Curium-241	W, all compounds	1E+3	3E+1 Bone surf (4E+1)	1E-8	-	2E-5	2E-4	
			-			5E-11	-	-	
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	
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 ²	W, all compounds	5E+4	2E+4 Bone surf (3E+4)	7E-6	-	7E-4	7E-3	
			-			4E-8	-	-	
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-4	1E-3	
			-			1E-9	-	-	
98	Californium-244 ²	W, all compounds except those given for Y	3E+4 St wall (3E+4)	6E+2	2E-7	8E-10	-	-	
		Y, oxides and hydroxides	-	-	6E+2	2E-7	4E-4 8E-10	4E-3 -	
98	Californium-246	W, see ²⁴⁴ Cf	4E+2	9E+0	9E+0	4E-9	1E-11	5E-6	
	Y, see ²⁴⁴ Cf		-	9E+0	4E-9	1E-11	-	-	

to		Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases	
					Concentrations		Sewers	
Atomic Radionuclide Class Concentration No.		Col. 1 Oral Ingestion ALI	Inhalation		Col. 1 Air	Col. 2 Water	Monthly Average	
		(μCi)	ALI (μCi)	DAC ($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)	($\mu\text{Ci}/\text{ml}$)
98	Californium-248	W, see ²⁴⁴ Cf	8E+0	6E-2	3E-11	-	-	-
		Bone surf	Bone surf					
		(2E+1)	(1E-1)	-	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	4E-3	2E-12	-	-	-
		Bone surf	Bone surf					
		(1E+0)	(9E-3)	-	1E-14	2E-8	2E-7	
	Y, see ²⁴⁴ Cf	-	1E-2	4E-12	-	-	-	
			Bone surf					
			(1E-2)	-	2E-14	-	-	
98	Californium-250	W, see ²⁴⁴ Cf	1E+0	9E-3	4E-12	-	-	-
		Bone surf	Bone surf					
		(2E+0)	(2E-2)	-	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	4E-3	2E-12	-	-	-
		Bone surf	Bone surf					
		(1E+0)	(9E-3)	-	1E-14	2E-8	2E-7	
	Y, see ²⁴⁴ Cf	-	1E-2	4E-12	-	-	-	
			Bone surf					
			(1E-2)	-	2E-14	-	-	
98	Californium-252	W, see ²⁴⁴ Cf	2E+0	2E-2	8E-12	-	-	-
		Bone surf	Bone surf					
		(5E+0)	(4E-2)	-	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	2E+0	8E-10	3E-12	-	-
		Bone surf						
		(4E+2)	-	-	-	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	2E-7	-	6E-4
		Bone surf						
		-	(1E+3)	-	2E-9	-	-	
99	Einsteinium-251	W, all compounds		7E+3	9E+2	4E-7	-	1E-4
		Bone surf						
		-	(1E+3)	-	2E-9	-	-	
99	Einsteinium-253	W, all compounds		2E+2	1E+0	6E-10	2E-12	2E-6
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	Bone surf					
		(2E+1)	(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	Bone surf					
		(4E+1)	(2E-1)	-	3E-13	5E-7	5E-6	
101	Mendelevium-257	W, all compounds		7E+3	8E+1	4E-8	-	1E-4

to	Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases	
				Concentrations		Sewers	
	Col. 1 Oral Ingestion ALI	Col. 2 <u>Inhalation</u> ALI	Col. 3 DAC	Col. 1 Air	Col. 2 Water	Monthly Average	
Atomic Radionuclide Class Concentration No.	(μCi)	(μCi)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)
	-	Bone surf (9E+1)	-	1E-10	-	-	-
101 Mendeleevium-258	W, all compounds Bone surf (5E+1)	Bone surf (3E-1)	3E+1 -	2E-1 5E-13	1E-10 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 ¹	-	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:

¹"Submersion" means that values given are for submersion in a hemispherical semi-infinite cloud of airborne material.

²These 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 $\mu\text{Ci/ml}$ 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 § 16.6(c)).

³For soluble mixtures of U-238, U-234, and U-235 in air, chemical toxicity may be the limiting factor (see § 16.6(a)(5)). 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) $\mu\text{Ci-hr/ml}$, 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:

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

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

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

to	Table 1 Occupational Values			Table 2 Effluent		Table 3 Releases
	Col. 1 Oral Ingestion ALI	Inhalation		Col. 1 Air	Col. 2 Water	Sewers Monthly Average
		Col. 2 ALI	Col. 3 DAC			
Radionuclide Concentration (μCi)	(μCi)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	($\mu\text{Ci/ml}$)	
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	-	-	-
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: $6\text{E-}11$ μCi of gross alpha activity from uranium-238, uranium-234, thorium-230, and radium-226 per milliliter of air; $3\text{E-}11$ 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 16-C 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:

$$\frac{C_A}{\text{DAC}_A} + \frac{C_B}{\text{DAC}_B} + \frac{C_C}{\text{DAC}_C} \leq 1$$