

APPENDIX B TO PART 20—ANNUAL LIMITS ON INTAKE (ALIs) AND DERIVED AIR CONCENTRATIONS (DACs) OF RADIONUCLIDES FOR OCCUPATIONAL EXPOSURE; EFFLUENT CONCENTRATIONS; CONCENTRATIONS FOR RELEASE TO SEWERAGE

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  $\mu\text{m}$  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 of less than 10 days for D, for W from 10 to 100 days, and for Y greater than 100 days. The class (D, W, or Y) given in the column headed "Class" applies only to the inhalation ALIs and DACs given in table 1, columns 2 and 3. Table 2 provides concentration limits for airborne and liquid effluents released to the general environment. Table 3 provides concentration limits for discharges to sanitary sewer systems.

NOTATION

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  $6 \times 10^{-2}$  or 0.06, 6E+2 represents  $6 \times 10^2$  or 600, and 6E+0 represents  $6 \times 10^0$  or 6.

TABLE 1 "OCCUPATIONAL"

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 a given radionuclide by "Reference Man" which would result in either (1) a committed effective dose equivalent of 5 rems (stochastic ALI) or (2) a committed dose equivalent of 50 rems 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 5 rems. 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 §20.1003. 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 parts 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 extremities (hands and forearms, feet and lower legs), 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 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 to that organ (not the effective dose). For the case where there is no external dose contribution, this would be demonstrated if the sum of the fractions of the nonstochastic ALIs ( $ALI_{ns}$ ) that contribute to the committed dose equivalent to the organ receiving the highest dose does not exceed unity (*i.e.*,  $\Sigma$  (intake (in  $\mu\text{Ci}$ ) of each radionuclide/ $ALI_{ns}$ )  $< 1.0$ ). If there is an external deep dose equivalent contribution of  $H_d$  then this sum must be less than  $1 - (H_d/50)$  instead of being  $< 1.0$ .

The derived air concentration (DAC) values are derived limits intended to control chronic occupational exposures. The relationship between the DAC and the ALI is given by:  $DAC = ALI(\text{in } \mu\text{Ci}) / (2000 \text{ hours per working year} \times 60 \text{ minutes/hour} \times 2 \times 10^4 \text{ ml per minute}) = [ALI/2.4 \times 10^9] \mu\text{Ci/ml}$ , where  $2 \times 10^4 \text{ ml}$  is the volume of air breathed per minute at work by "Reference Man" under working conditions of "light work."

The DAC values relate to one of two modes of exposure: either external submersion or the internal committed dose equivalents resulting from inhalation of radioactive materials. Derived air concentrations 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 relate to exposure to the single radionuclide named, but also include contributions from the in-growth of any daughter radionuclide produced in the body by the 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 value 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 radiation (see §20.1202). When an individual is exposed to radioactive materials which fall under several of the translocation classifications (*i.e.*, Class D, Class W, or Class Y) of the same radionuclide, 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 radioisotopes. For this reason, values are given for Class D, W, and Y compounds, even for very short-lived radionuclides.

TABLE 2

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 §20.1302. 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 0.05 rem (50 millirem or 0.5 millisieverts).

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 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 was the case in appendix B to §§20.1–20.601.

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  $2.4 \times 10^9$  ml, relating the inhalation ALI to the DAC, as explained above, and then divided by a factor of 300. The factor of 300 includes the following components: a factor of 50 to relate the 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 (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  $7.3 \times 10^7$ . The factor of  $7.3 \times 10^7$  (ml) includes the following components: the factors of 50 and 2 described above and a factor of  $7.3 \times 10^5$  (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 sewerage) 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 either from knowledge of the radionuclide composition of the source or from actual measurements.

TABLE 3 "SEWER DISPOSAL"

The monthly average concentrations for release to sanitary sewers are applicable to the provisions in §20.2003. The concentration values were derived by taking the most restrictive occupational stochastic oral ingestion ALI and dividing by  $7.3 \times 10^6$  (ml). The factor of  $7.3 \times 10^6$  (ml) is composed of a factor of  $7.3 \times 10^5$  (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.

Pt. 20, App. B

10 CFR Ch. I (1–1–12 Edition)

LIST OF ELEMENTS

| Name              | Atomic |     |
|-------------------|--------|-----|
|                   | Symbol | No. |
| Actinium .....    | Ac     | 89  |
| Aluminum .....    | Al     | 13  |
| Americium .....   | Am     | 95  |
| Antimony .....    | Sb     | 51  |
| Argon .....       | Ar     | 18  |
| Arsenic .....     | As     | 33  |
| Astatine .....    | At     | 85  |
| Barium .....      | Ba     | 56  |
| Berkelium .....   | Bk     | 97  |
| Beryllium .....   | Be     | 4   |
| Bismuth .....     | Bi     | 83  |
| Bromine .....     | Br     | 35  |
| Cadmium .....     | Cd     | 48  |
| Calcium .....     | Ca     | 20  |
| Californium ..... | Cf     | 98  |
| Carbon .....      | C      | 6   |
| Cerium .....      | Ce     | 58  |
| Cesium .....      | Cs     | 55  |
| Chlorine .....    | Cl     | 17  |
| Chromium .....    | Cr     | 24  |
| Cobalt .....      | Co     | 27  |
| Copper .....      | Cu     | 29  |
| Curium .....      | Cm     | 96  |
| Dysprosium .....  | Dy     | 66  |
| Einsteinium ..... | Es     | 99  |
| Erbium .....      | Er     | 68  |
| Europium .....    | Eu     | 63  |
| Fermium .....     | Fm     | 100 |
| Fluorine .....    | F      | 9   |
| Francium .....    | Fr     | 87  |
| Gadolinium .....  | Gd     | 64  |
| Gallium .....     | Ga     | 31  |
| Germanium .....   | Ge     | 32  |
| Gold .....        | Au     | 79  |
| Hafnium .....     | Hf     | 72  |
| Holmium .....     | Ho     | 67  |
| Hydrogen .....    | H      | 1   |
| Indium .....      | In     | 49  |
| Iodine .....      | I      | 53  |
| Iridium .....     | Ir     | 77  |
| Iron .....        | Fe     | 26  |
| Krypton .....     | Kr     | 36  |
| Lanthanum .....   | La     | 57  |
| Lead .....        | Pb     | 82  |
| Lutetium .....    | Lu     | 71  |
| Magnesium .....   | Mg     | 12  |
| Manganese .....   | Mn     | 25  |
| Mendelevium ..... | Md     | 101 |
| Mercury .....     | Hg     | 80  |

LIST OF ELEMENTS—Continued

| Name               | Atomic |     |
|--------------------|--------|-----|
|                    | Symbol | No. |
| Molybdenum .....   | Mo     | 42  |
| Neodymium .....    | Nd     | 60  |
| Neptunium .....    | Np     | 93  |
| Nickel .....       | Ni     | 28  |
| Niobium .....      | Nb     | 41  |
| Nitrogen .....     | N      | 7   |
| Osmium .....       | Os     | 76  |
| Oxygen .....       | O      | 8   |
| Palladium .....    | Pd     | 46  |
| Phosphorus .....   | P      | 15  |
| Platinum .....     | Pt     | 78  |
| Plutonium .....    | Pu     | 94  |
| Polonium .....     | Po     | 84  |
| Potassium .....    | K      | 19  |
| Praseodymium ..... | Pr     | 59  |
| Promethium .....   | Pm     | 61  |
| Protactinium ..... | Pa     | 91  |
| Radium .....       | Ra     | 88  |
| Radon .....        | Rn     | 86  |
| Rhenium .....      | Re     | 75  |
| Rhodium .....      | Rh     | 45  |
| Rubidium .....     | Rb     | 37  |
| Ruthenium .....    | Ru     | 44  |
| Samarium .....     | Sm     | 62  |
| Scandium .....     | Sc     | 21  |
| Selenium .....     | Se     | 34  |
| Silicon .....      | Si     | 14  |
| Silver .....       | Ag     | 47  |
| Sodium .....       | Na     | 11  |
| Strontium .....    | Sr     | 38  |
| Sulfur .....       | S      | 16  |
| Tantalum .....     | Ta     | 73  |
| Technetium .....   | Tc     | 43  |
| Tellurium .....    | Te     | 52  |
| Terbium .....      | Tb     | 65  |
| Thallium .....     | Tl     | 81  |
| Thorium .....      | Th     | 90  |
| Thulium .....      | Tm     | 69  |
| Tin .....          | Sn     | 50  |
| Titanium .....     | Ti     | 22  |
| Tungsten .....     | W      | 74  |
| Uranium .....      | U      | 92  |
| Vanadium .....     | V      | 23  |
| Xenon .....        | Xe     | 54  |
| Ytterbium .....    | Yb     | 70  |
| Yttrium .....      | Y      | 39  |
| Zinc .....         | Zn     | 30  |
| Zirconium .....    | Zr     | 40  |

| Atomic No.                                                                                                                            | Radionuclide           | Class                                        | Table 1<br>Occupational Values |                    |            | Table 2<br>Effluent<br>Concentration |        | Table 3<br>Releases to<br>Sewers    |
|---------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------------------------------|--------------------------------|--------------------|------------|--------------------------------------|--------|-------------------------------------|
|                                                                                                                                       |                        |                                              | Col. 1                         | Col. 2             | Col. 3     | Col. 1                               | Col. 2 |                                     |
|                                                                                                                                       |                        |                                              | Oral                           |                    | Inhalation | Air                                  | Water  | Monthly<br>Average<br>Concentration |
|                                                                                                                                       |                        |                                              | ALI<br>( $\mu$ Ci)             | ALI<br>( $\mu$ Ci) |            |                                      |        |                                     |
| 1                                                                                                                                     | Hydrogen-3             | Water, DAC<br>includes skin absorption       | 8E+4                           | 8E+4               | 2E-5       | 1E-7                                 | 1E-3   | 1E-2                                |
| Gas (HT or T <sub>2</sub> ) Submersion <sup>1</sup> : Use above values as HT and T <sub>2</sub> oxidize in air and in the body to HTO |                        |                                              |                                |                    |            |                                      |        |                                     |
| 4                                                                                                                                     | Beryllium-7            | W, all compounds<br>except those given for Y | 4E+4                           | 2E+4               | 9E-6       | 3E-8                                 | 6E-4   | 6E-3                                |
|                                                                                                                                       |                        | Y, oxides, halides, and<br>nitrates          | -                              | 2E+4               | 8E-6       | 3E-8                                 | -      | -                                   |
| 4                                                                                                                                     | Beryllium-10           | W, see 7Be                                   | 1E+3                           | 2E+2               | 6E-8       | 2E-10                                | -      | -                                   |
|                                                                                                                                       |                        | LLI wall                                     | (1E+3)                         | -                  | -          | -                                    | 2E-5   | 2E-4                                |
|                                                                                                                                       |                        | Y, see 7Be                                   | -                              | 1E+1               | 6E-9       | 2E-11                                | -      | -                                   |
| 6                                                                                                                                     | Carbon-11 <sup>2</sup> | 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                                |

|            |                          |                                                                                                                                                                                                               | Table 1                                             |                      |                       | Table 2                |                         | Table 3                                               |
|------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|----------------------|-----------------------|------------------------|-------------------------|-------------------------------------------------------|
|            |                          |                                                                                                                                                                                                               | Occupational Values                                 |                      |                       | Effluent               |                         | Releases to                                           |
|            |                          |                                                                                                                                                                                                               |                                                     |                      |                       | Concentration          |                         | Sewers                                                |
| Atomic No. | Radionuclide             | Class                                                                                                                                                                                                         | Col. 1                                              | Col. 2               | Col. 3                | Col. 1                 | Col.2                   | Monthly<br>Average<br>Concentration<br>( $\mu$ Ci/ml) |
|            |                          |                                                                                                                                                                                                               | Oral                                                |                      |                       |                        |                         |                                                       |
|            |                          |                                                                                                                                                                                                               | Ingestion                                           | Inhalation           |                       |                        |                         |                                                       |
|            |                          |                                                                                                                                                                                                               | ALI<br>( $\mu$ Ci)                                  | ALI<br>( $\mu$ Ci)   | DAC<br>( $\mu$ Ci/ml) | Air<br>( $\mu$ Ci/ml)  | Water<br>( $\mu$ Ci/ml) |                                                       |
| 7          | Nitrogen-13 <sup>2</sup> | Submersion <sup>1</sup>                                                                                                                                                                                       | -                                                   | 4E-6                 | 2E-8                  | -                      | -                       | -                                                     |
| 8          | Oxygen-15 <sup>2</sup>   | Submersion <sup>1</sup>                                                                                                                                                                                       | -                                                   | 4E-6                 | 2E-8                  | -                      | -                       | -                                                     |
| 9          | Fluorine-18 <sup>2</sup> | D, fluorides of H, Li, Na,<br>K, Rb, Cs, and Fr                                                                                                                                                               | 5e+4<br>St wall<br>(5E+4)                           | 7E+4                 | 3E-5                  | 1E-7                   | -                       | -                                                     |
|            |                          | W, fluorides of Be, Mg<br>Ca, Sr, Ba, Ra, Al, Ga,<br>In, Ti, As, Sb, Bi, Fe,<br>Ru, Os, Co, Ni, Pd, Pt,<br>Cu, Ag, Au, Zn, Cd, Hg,<br>Sc, Y, Ti, Zr, V, Nb, Ta,<br>Nm, Tc, and Re<br>y, LANTHANUM<br>FLUORIDE | -<br><br>-<br><br><br><br><br><br><br><br><br><br>- | -<br><br>9e+4        | -<br><br>4e-5         | -<br><br>1e-7          | -<br><br>7E-4           | -<br><br>7E3                                          |
| 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<br>except those given for<br>W<br><br>W, oxides, hydroxides,<br>carbides, halides, and<br>nitrates                                                                                           | 7E+2<br><br><br>-                                   | 2E+3<br><br><br>1E+3 | 7E-7<br><br><br>5E-7  | 2E-9<br><br><br>2E-9   | 9E-6<br><br><br>-       | 9E-5<br><br><br>-                                     |
| 13         | Aluminum-26              | D, all compounds<br>except those given for<br>W<br><br>W, oxides, hydroxides,<br>carbides, halides, and<br>nitrates                                                                                           | 4E+2<br><br><br>-                                   | 6E+1<br><br><br>9E+1 | 3E-8<br><br><br>4E-8  | 9E-11<br><br><br>1E-10 | 6E-6<br><br><br>-       | 6E-5<br><br><br>-                                     |

| Atomic No. | Radionuclide  | Class                                                                                                                                                                                                            | Table 1<br>Occupational Values                        |                                     |                                               | Table 2<br>Effluent Concentrations            |                                                 | Table 3<br>Releases to Sewers                                 |
|------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------|
|            |               |                                                                                                                                                                                                                  | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                               | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |               |                                                                                                                                                                                                                  |                                                       | Col. 2<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{ml}$ ) |                                               |                                                 |                                                               |
| 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 $^{31}\text{Si}$                                                                                                                                                                                          | 2E+3<br>LLI wall<br>(3E+3)                            | 2E+2                                | 1E-7                                          | 3E-10                                         | -                                               | -                                                             |
|            |               | W, see $^{31}\text{Si}$                                                                                                                                                                                          | -                                                     | 1E+2                                | 5E-8                                          | 2E-10                                         | 4E-5                                            | 4E-4                                                          |
|            |               | Y, see $^{31}\text{Si}$                                                                                                                                                                                          | -                                                     | 5E+0                                | 2E-9                                          | 7E-12                                         | -                                               | -                                                             |
| 15         | Phosphorus-32 | D, all compounds except phosphates given for W                                                                                                                                                                   | 6E+2                                                  | 9E+2                                | 4E-7                                          | 1E-9                                          | 9E-6                                            | 9E-5                                                          |
|            |               | W, phosphates of $\text{Zn}^{2+}$ , $\text{S}^{3+}$ , $\text{Mg}^{2+}$ , $\text{Fe}^{3+}$ , $\text{Bi}^{3+}$ , and lanthanides                                                                                   | -                                                     | 4E+2                                | 2E-7                                          | 5E-10                                         | -                                               | -                                                             |
| 15         | Phosphorus-33 | D, see $^{32}\text{P}$                                                                                                                                                                                           | 6E+3                                                  | 8E+3                                | 4E-6                                          | 1E-8                                          | 8E-5                                            | 8E-4                                                          |
|            |               | W, see $^{32}\text{P}$                                                                                                                                                                                           | -                                                     | 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<br>LLI wall<br>(8E+3)                            | 2E+4                                | 7E-6                                          | 2E-8                                          | -                                               | -                                                             |
|            |               | W, elemental sulfur, sulfides of Sr, Ba, Ge, Sn, Pb, As, Sb, Bi, Cu, Ag, Au, Zn, Cd, Mg, W, and Mo. Sulfates of Ca, Sr, Ba, Ra, As, Sb, and Bi                                                                   | 6E+3                                                  | -                                   | -                                             | -                                             | 1E-4                                            | 1E-3                                                          |
| 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, Mg, Sc, Y, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Mn, Tc, and Re | -                                                     | 2E+2                                | 1E-7                                          | 3E-10                                         | -                                               | -                                                             |

| Atomic No. | Radionuclide              | Class                                                  | Table 1<br>Occupational Values                        |                                     |                                               | Table 2<br>Effluent Concentrations            |                                                 | Table 3<br>Releases to Sewers                                 |
|------------|---------------------------|--------------------------------------------------------|-------------------------------------------------------|-------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------|
|            |                           |                                                        | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                               | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                           |                                                        |                                                       | Col. 2<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{ml}$ ) |                                               |                                                 |                                                               |
|            |                           |                                                        |                                                       |                                     |                                               |                                               |                                                 |                                                               |
| 17         | Chlorine-38 <sup>2</sup>  | D, see <sup>36</sup> Cl                                | 2E+4<br>St. wall<br>(3E+4)                            | 4E+4                                | 2E-5                                          | 6E-8                                          | -                                               | -                                                             |
|            |                           | W, see <sup>36</sup> Cl                                | -                                                     | 5E+4                                | 2E-5                                          | 6E-8                                          | 3E-4                                            | 3E-3                                                          |
| 17         | Chlorine-39 <sup>2</sup>  | D, see <sup>36</sup> Cl                                | 2E+4<br>St. wall<br>(4E+4)                            | 5E+4                                | 2E-5                                          | 7E-8                                          | -                                               | -                                                             |
|            |                           | W, see <sup>36</sup> Cl                                | -                                                     | 6E+4                                | 2E-5                                          | 8E-8                                          | 5E-4                                            | 5E-3                                                          |
| 18         | Argon-37                  | Submersion <sup>1</sup>                                | -                                                     | -                                   | 1E+0                                          | 6E-3                                          | -                                               | -                                                             |
| 18         | Argon-39                  | Submersion <sup>1</sup>                                | -                                                     | -                                   | 2E-4                                          | 8E-7                                          | -                                               | -                                                             |
| 18         | Argon-41                  | Submersion <sup>1</sup>                                | -                                                     | -                                   | 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 <sup>2</sup> | D, all compounds                                       | 2E+4<br>St. wall<br>(4E+4)                            | 7E+4                                | 3E-5                                          | 9E-8                                          | -                                               | -                                                             |
|            |                           |                                                        | -                                                     | -                                   | -                                             | 5E-4                                          | 5E-3                                            |                                                               |
| 19         | Potassium-45 <sup>2</sup> | D, all compounds                                       | 3E+4<br>St. wall<br>(5E+4)                            | 1E+5                                | 5E-5                                          | 2E-7                                          | -                                               | -                                                             |
|            |                           |                                                        | -                                                     | -                                   | -                                             | 7E-4                                          | 7E-3                                            |                                                               |
| 20         | Calcium-41                | W, all compounds                                       | 3E+3<br>Bone surf<br>(4E+3)                           | 4E+3<br>Bone surf<br>(4E+3)         | 2E-6                                          | -                                             | -                                               | -                                                             |
|            |                           |                                                        | -                                                     | -                                   | -                                             | 5E-9                                          | 6E-5                                            | 6E-4                                                          |
| 20         | Calcium-45                | W, all compounds                                       | 2E+3                                                  | 8E+2                                | 4E-7                                          | 1E-9                                          | 2E-5                                            | 2E-4                                                          |
| 20         | Calcium-47                | W, all compounds                                       | 8E+2                                                  | 9E+2                                | 4E-7                                          | 1E-9                                          | 1E-5                                            | 1E-4                                                          |
| 21         | Scandium-43               | Y, all compounds                                       | 7E+3                                                  | 2E+4                                | 9E-6                                          | 3E-8                                          | 1E-4                                            | 1E-3                                                          |
| 21         | Scandium-44m              | Y, all compounds                                       | 5E+2                                                  | 7E+2                                | 3E-7                                          | 1E-9                                          | 7E-6                                            | 7E-5                                                          |
| 21         | Scandium-44               | Y, all compounds                                       | 4E+3                                                  | 1E+4                                | 5E-6                                          | 2E-8                                          | 5E-5                                            | 5E-4                                                          |
| 21         | Scandium-46               | Y, all compounds                                       | 9E+2                                                  | 2E+2                                | 1E-7                                          | 3E-10                                         | 1E-5                                            | 1E-4                                                          |
| 21         | Scandium-47               | Y, all compounds                                       | 2E+3<br>LLI wall<br>(3E+3)                            | 3E+3                                | 1E-6                                          | 4E-9                                          | -                                               | -                                                             |
|            |                           |                                                        | -                                                     | -                                   | -                                             | 4E-5                                          | 4E-4                                            |                                                               |
| 21         | Scandium-48               | Y, all compounds                                       | 8E+2                                                  | 1E+3                                | 6E-7                                          | 2E-9                                          | 1E-5                                            | 1E-4                                                          |
| 21         | Scandium-49 <sup>2</sup>  | Y, all compounds                                       | 2E+4                                                  | 5E+4                                | 2E-5                                          | 8E-8                                          | 3E-4                                            | 3E-3                                                          |
| 22         | Titanium-44               | D, all compounds except those given for W and Y        | 3E+2                                                  | 1E+1                                | 5E-9                                          | 2E-11                                         | 4E-6                                            | 4E-5                                                          |
|            |                           | W, oxides, hydroxides, carbides, halides, and nitrates | -                                                     | 3E+1                                | 1E-8                                          | 4E-11                                         | -                                               | -                                                             |
|            |                           | Y, SrTiO <sub>3</sub>                                  | -                                                     | 6E+0                                | 2E-9                                          | 8E-12                                         | -                                               | -                                                             |

| Atomic No. | Radionuclide              | Class                                                                         | Table 1<br>Occupational Values                        |                                     |                                               | Table 2<br>Effluent Concentrations            |                                                 | Table 3<br>Releases to Sewers                                 |
|------------|---------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------|-------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------|
|            |                           |                                                                               | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                               | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                           |                                                                               |                                                       | Col. 2<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{ml}$ ) |                                               |                                                 |                                                               |
| 22         | Titanium-45               | D, see $^{44}\text{Ti}$<br>W, see $^{44}\text{Ti}$<br>Y, see $^{44}\text{Ti}$ | 9E+3<br>-<br>-                                        | 3E+4<br>4E+4<br>3E+4                | 1E-5<br>1E-5<br>1E-5                          | 3E-8<br>5E-8<br>4E-8                          | 1E-4<br>-<br>-                                  | 1E-3<br>-<br>-                                                |
| 23         | Vanadium-47 <sup>2</sup>  | D, all compounds except those given for W                                     | 3E+4<br>St. wall<br>(3E+4)                            | 8E+4<br>-<br>-                      | 3E-5<br>-<br>-                                | 1E-7<br>-<br>-                                | -<br>4E-4<br>-                                  | -<br>4E-3<br>-                                                |
|            |                           | W, oxides, hydroxides, carbides, and halides                                  | -                                                     | 1E+5                                | 4E-5                                          | 1E-7                                          | -                                               | -                                                             |
| 23         | Vanadium-48               | D, see $^{47}\text{V}$<br>W, see $^{47}\text{V}$                              | 6E+2<br>-                                             | 1E+3<br>6E+2                        | 5E-7<br>3E-7                                  | 2E-9<br>9E-10                                 | 9E-6<br>-                                       | 9E-5<br>-                                                     |
| 23         | Vanadium-49               | D, see $^{47}\text{V}$<br>W, see $^{47}\text{V}$                              | 7E+4<br>LLI wall<br>(9E+4)<br>-                       | 3E+4<br>Bone surf<br>(3E+4)<br>2E+4 | 1E-5<br>-<br>8E-6                             | -<br>5E-8<br>2E-8                             | -<br>1E-3<br>-                                  | -<br>1E-2<br>-                                                |
| 24         | Chromium-48               | D, all compounds except those given for W and Y                               | 6E+3                                                  | 1E+4                                | 5E-6                                          | 2E-8                                          | 8E-5                                            | 8E-4                                                          |
|            |                           | W, halides and nitrates                                                       | -                                                     | 7E+3                                | 3E-6                                          | 1E-8                                          | -                                               | -                                                             |
|            |                           | Y, oxides and hydroxides                                                      | -                                                     | 7E+3                                | 3E-6                                          | 1E-8                                          | -                                               | -                                                             |
| 24         | Chromium-49 <sup>2</sup>  | D, see $^{48}\text{Cr}$<br>W, see $^{48}\text{Cr}$<br>Y, see $^{48}\text{Cr}$ | 3E+4<br>-<br>-                                        | 8E+4<br>1E+5<br>9E+4                | 4E-5<br>4E-5<br>4E-5                          | 1E-7<br>1E-7<br>1E-7                          | 4E-4<br>-<br>-                                  | 4E-3<br>-<br>-                                                |
| 24         | Chromium-51               | D, see $^{48}\text{Cr}$<br>W, see $^{48}\text{Cr}$<br>Y, see $^{48}\text{Cr}$ | 4E+4<br>-<br>-                                        | 5E+4<br>2E+4<br>2E+4                | 2E-5<br>1E-5<br>8E-6                          | 6E-8<br>3E-8<br>3E-8                          | 5E-4<br>-<br>-                                  | 5E-3<br>-<br>-                                                |
| 25         | Manganese-51 <sup>2</sup> | D, all compounds except those given for W                                     | 2E+4                                                  | 5E+4                                | 2E-5                                          | 7E-8                                          | 3E-4                                            | 3E-3                                                          |
|            |                           | W, oxides, hydroxides, halides, and nitrates                                  | -                                                     | 6E+4                                | 3E-5                                          | 8E-8                                          | -                                               | -                                                             |
| 25         | Manganese-52 <sup>2</sup> | D, see $^{51}\text{Mn}$<br>W, see $^{51}\text{Mn}$                            | 3E+4<br>St. wall<br>(4E+4)<br>-                       | 9E+4<br>-<br>1E+5                   | 4E-5<br>-<br>4E-5                             | 1E-7<br>-<br>1E-7                             | -<br>5E-4<br>-                                  | -<br>5E-3<br>-                                                |
| 25         | Manganese-52              | D, see $^{51}\text{Mn}$<br>W, see $^{51}\text{Mn}$                            | 7E+2<br>-                                             | 1E+3<br>9E+2                        | 5E-7<br>4E-7                                  | 2E-9<br>1E-9                                  | 1E-5<br>-                                       | 1E-4<br>-                                                     |
| 25         | Manganese-53              | D, see $^{51}\text{Mn}$<br>W, see $^{51}\text{Mn}$                            | 5E+4<br>-                                             | 1E+4<br>Bone surf<br>(2E+4)<br>1E+4 | 5E-6<br>-<br>5E-6                             | -<br>3E-8<br>2E-8                             | 7E-4<br>-<br>-                                  | 7E-3<br>-<br>-                                                |
| 25         | Manganese-54              | D, see $^{51}\text{Mn}$<br>W, see $^{51}\text{Mn}$                            | 2E+3<br>-                                             | 9E+2<br>8E+2                        | 4E-7<br>3E-7                                  | 1E-9<br>1E-9                                  | 3E-5<br>-                                       | 3E-4<br>-                                                     |
| 25         | Manganese-56              | D, see $^{51}\text{Mn}$<br>W, see $^{51}\text{Mn}$                            | 5E+3<br>-                                             | 2E+4<br>2E+4                        | 6E-6<br>9E-6                                  | 2E-8<br>3E-8                                  | 7E-5<br>-                                       | 7E-4<br>-                                                     |



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

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

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

| Atomic No. | Radionuclide             | Class                                             | Table 1<br>Occupational Values                        |                                                   |                                               | Table 2<br>Effluent Concentrations            |                                                 | Table 3<br>Releases to Sewers                                 |
|------------|--------------------------|---------------------------------------------------|-------------------------------------------------------|---------------------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------|
|            |                          |                                                   | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 2<br>Inhalation<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                          |                                                   |                                                       |                                                   |                                               |                                               |                                                 |                                                               |
|            |                          |                                                   |                                                       |                                                   |                                               |                                               |                                                 |                                                               |
| 33         | Arsenic-69 <sup>2</sup>  | W, all compounds                                  | 3E+4<br>St. wall<br>(4E+4)                            | 1E+5                                              | 5E-5                                          | 2E-7                                          | -                                               | -                                                             |
| 33         | Arsenic-70 <sup>2</sup>  | 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<br>LLI wall<br>(5E+3)                            | 5E+3                                              | 2E-6                                          | 7E-9                                          | -                                               | -                                                             |
| 33         | Arsenic-78 <sup>2</sup>  | W, all compounds                                  | 8E+3                                                  | 2E+4                                              | 9E-6                                          | 3E-8                                          | 1E-4                                            | 1E-3                                                          |
| 34         | Selenium-70 <sup>2</sup> | 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-73 <sup>2</sup> | D, see <sup>70</sup> Se                           | 6E+4                                                  | 2E+5                                              | 6E-5                                          | 2E-7                                          | 4E-4                                            | 4E-3                                                          |
|            |                          | W, see <sup>70</sup> Se                           | 3E+4                                                  | 1E+5                                              | 6E-5                                          | 2E-7                                          | -                                               | -                                                             |
| 34         | Selenium-73              | D, see <sup>70</sup> Se                           | 3E+3                                                  | 1E+4                                              | 5E-6                                          | 2E-8                                          | 4E-5                                            | 4E-4                                                          |
|            |                          | W, see <sup>70</sup> Se                           | -                                                     | 2E+4                                              | 7E-6                                          | 2E-8                                          | -                                               | -                                                             |
| 34         | Selenium-75              | D, see <sup>70</sup> Se                           | 5E+2                                                  | 7E+2                                              | 3E-7                                          | 1E-9                                          | 7E-6                                            | 7E-5                                                          |
|            |                          | W, see <sup>70</sup> Se                           | -                                                     | 6E+2                                              | 3E-7                                          | 8E-10                                         | -                                               | -                                                             |
| 34         | Selenium-79              | D, see <sup>70</sup> Se                           | 6E+2                                                  | 8E+2                                              | 3E-7                                          | 1E-9                                          | 8E-6                                            | 8E-5                                                          |
|            |                          | W, see <sup>70</sup> Se                           | -                                                     | 6E+2                                              | 2E-7                                          | 8E-10                                         | -                                               | -                                                             |
| 34         | Selenium-81 <sup>2</sup> | D, see <sup>70</sup> Se                           | 4E+4                                                  | 7E+4                                              | 3E-5                                          | 9E-8                                          | 3E-4                                            | 3E-3                                                          |
|            |                          | W, see <sup>70</sup> Se                           | 2E+4                                                  | 7E+4                                              | 3E-5                                          | 1E-7                                          | -                                               | -                                                             |
| 34         | Selenium-81 <sup>2</sup> | D, see <sup>70</sup> Se                           | 6E+4                                                  | 2E+5                                              | 9E-5                                          | 3E-7                                          | -                                               | -                                                             |
|            |                          | St. wall                                          | (8E+4)                                                | -                                                 | -                                             | -                                             | 1E-3                                            | 1E-2                                                          |
|            |                          | W, see <sup>70</sup> Se                           | -                                                     | 2E+5                                              | 1E-4                                          | 3E-7                                          | -                                               | -                                                             |
| 34         | Selenium-83 <sup>2</sup> | D, see <sup>70</sup> Se                           | 4E+4                                                  | 1E+5                                              | 5E-5                                          | 2E-7                                          | 4E-4                                            | 4E-3                                                          |
|            |                          | W, see <sup>70</sup> Se                           | 3E+4                                                  | 1E+5                                              | 5E-5                                          | 2E-7                                          | -                                               | -                                                             |

| Atomic No. | Radionuclide            | Class                                                                                                                                                                                                | Table 1<br>Occupational Values                        |                                     |                                               | Table 2<br>Effluent Concentrations             |                                                 | Table 3<br>Releases to Sewers                                 |
|------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-------------------------------------|-----------------------------------------------|------------------------------------------------|-------------------------------------------------|---------------------------------------------------------------|
|            |                         |                                                                                                                                                                                                      | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                               | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                         |                                                                                                                                                                                                      |                                                       | Col. 2<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{ml}$ ) |                                                |                                                 |                                                               |
| 35         | Bromine-74 <sup>2</sup> | D, bromides of H, Li, Na, K, Rb, Cs, and Fr                                                                                                                                                          | 1E+4<br>St. wall<br>(2E+4)                            | 4E+4                                | 2E-5                                          | 5E-8                                           | -                                               | -                                                             |
|            |                         | W, bromides of lanthanides, Be, Mg, Ca, Sr, Ba, Ra, Al, Ga, In, Tl, Ge, Sn, Pb, As, Sb, Bi, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, Sc, Y, Ti, Zr, Hf, V, Nb, Ta, Mn, Tc, and Re | -                                                     | 4E+4                                | 2E-5                                          | 6E-8                                           | -                                               | -                                                             |
| 35         | Bromine-74 <sup>2</sup> | D, see <sup>74m</sup> Br                                                                                                                                                                             | 2E+4<br>St. wall<br>(4E+4)                            | 7E+4                                | 3E-5                                          | 1E-7                                           | -                                               | -                                                             |
|            |                         | W, see <sup>74m</sup> Br                                                                                                                                                                             | -                                                     | 8E+4                                | 4E-5                                          | 1E-7                                           | 5E-4                                            | 5E-3                                                          |
| 35         | Bromine-75 <sup>2</sup> | D, see <sup>74m</sup> Br                                                                                                                                                                             | 3E+4<br>St. wall<br>(4E+4)                            | 5E+4                                | 2E-5                                          | 7E-8                                           | -                                               | -                                                             |
|            |                         | W, see <sup>74m</sup> Br                                                                                                                                                                             | -                                                     | 5E+4                                | 2E-5                                          | 7E-8                                           | 5E-4                                            | 5E-3                                                          |
| 35         | Bromine-76              | D, see <sup>74m</sup> Br                                                                                                                                                                             | 4E+3                                                  | 5E+3                                | 2E-6                                          | 7E-9                                           | 5E-5                                            | 5E-4                                                          |
|            |                         | W, see <sup>74m</sup> Br                                                                                                                                                                             | -                                                     | 4E+3                                | 2E-6                                          | 6E-9                                           | -                                               | -                                                             |
| 35         | Bromine-77              | D, see <sup>74m</sup> Br                                                                                                                                                                             | 2E+4                                                  | 2E+4                                | 1E-5                                          | 3E-8                                           | 2E-4                                            | 2E-3                                                          |
|            |                         | W, see <sup>74m</sup> Br                                                                                                                                                                             | -                                                     | 2E+4                                | 8E-6                                          | 3E-8                                           | -                                               | -                                                             |
| 35         | Bromine-80m             | D, see <sup>74m</sup> Br                                                                                                                                                                             | 2E+4                                                  | 2E+4                                | 7E-6                                          | 2E-8                                           | 3E-4                                            | 3E-3                                                          |
|            |                         | W, see <sup>74m</sup> Br                                                                                                                                                                             | -                                                     | 1E+4                                | 6E-6                                          | 2E-8                                           | -                                               | -                                                             |
| 35         | Bromine-80 <sup>2</sup> | D, see <sup>74m</sup> Br                                                                                                                                                                             | 5E+4<br>St. wall<br>(9E+4)                            | 2E+5                                | 8E-5                                          | 3E-7                                           | -                                               | -                                                             |
|            |                         | W, see <sup>74m</sup> Br                                                                                                                                                                             | -                                                     | 2E+5                                | 9E-5                                          | 3E-7                                           | 1E-3                                            | 1E-2                                                          |
| 35         | Bromine-82              | D, see <sup>74m</sup> Br                                                                                                                                                                             | 3E+3                                                  | 4E+3                                | 2E-6                                          | 6E-9                                           | 4E-5                                            | 4E-4                                                          |
|            |                         | W, see <sup>74m</sup> Br                                                                                                                                                                             | -                                                     | 4E+3                                | 2E-6                                          | 5E-9                                           | -                                               | -                                                             |
| 35         | Bromine-83              | D, see <sup>74m</sup> Br                                                                                                                                                                             | 5E+4<br>St. wall<br>(7E+4)                            | 6E+4                                | 3E-5                                          | 9E-8                                           | -                                               | -                                                             |
|            |                         | W, see <sup>74m</sup> Br                                                                                                                                                                             | -                                                     | 6E+4                                | 3E-5                                          | 9E-8                                           | 9E-4                                            | 9E-3                                                          |
| 35         | Bromine-84 <sup>2</sup> | D, see <sup>74m</sup> Br                                                                                                                                                                             | 2E+4<br>St. wall<br>(3E+4)                            | 6E+4                                | 2E-5                                          | 8E-8                                           | -                                               | -                                                             |
|            |                         | W, see <sup>74m</sup> Br                                                                                                                                                                             | -                                                     | 6E+4                                | 3E-5                                          | 9E-8                                           | 4E-4                                            | 4E-3                                                          |
| 36         | Krypton-74 <sup>2</sup> | Submersion <sup>1</sup>                                                                                                                                                                              | -                                                     | -                                   | 3E-6                                          | 1E-8                                           | -                                               | -                                                             |
| 36         | Krypton-76              | Submersion <sup>1</sup>                                                                                                                                                                              | -                                                     | -                                   | 9E-6                                          | 4E-8                                           | -                                               | -                                                             |
| 36         | Krypton-77 <sup>2</sup> | Submersion <sup>1</sup>                                                                                                                                                                              | -                                                     | -                                   | 4E-6                                          | 2E-8                                           | -                                               | -                                                             |
| 36         | Krypton-79              | Submersion <sup>1</sup>                                                                                                                                                                              | -                                                     | -                                   | 2E-5                                          | 7E-8                                           | -                                               | -                                                             |
| 36         | Krypton-81              | Submersion <sup>1</sup>                                                                                                                                                                              | -                                                     | -                                   | 7E-4                                          | 3E-6                                           | -                                               | -                                                             |

| Atomic No. | Radionuclide               | Class                                                                                                   | Table 1<br>Occupational Values                        |                                     |                                               | Table 2<br>Effluent Concentrations            |                                                 | Table 3<br>Releases to Sewers                                 |
|------------|----------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------|
|            |                            |                                                                                                         | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                               | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                            |                                                                                                         |                                                       | Col. 2<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{ml}$ ) |                                               |                                                 |                                                               |
| 36         | Krypton-83m <sup>2</sup>   | Submersion <sup>1</sup>                                                                                 |                                                       |                                     | 1E-2                                          | 5E-5                                          | -                                               | -                                                             |
| 36         | Krypton-85a                | Submersion <sup>1</sup>                                                                                 | -                                                     | -                                   | 2E-5                                          | 1E-7                                          | -                                               | -                                                             |
| 36         | Krypton-85                 | Submersion <sup>1</sup>                                                                                 | -                                                     | -                                   | 1E-4                                          | 7E-7                                          | -                                               | -                                                             |
| 36         | Krypton-87 <sup>2</sup>    | Submersion <sup>1</sup>                                                                                 | -                                                     | -                                   | 5E-6                                          | 2E-8                                          | -                                               | -                                                             |
| 36         | Krypton-88                 | Submersion <sup>1</sup>                                                                                 | -                                                     | -                                   | 2E-6                                          | 9E-9                                          | -                                               | -                                                             |
| 37         | Rubidium-79 <sup>2</sup>   | D, all compounds                                                                                        | 4E+4<br>St. wall<br>(6E+4)                            | 1E+5                                | 5E-5                                          | 2E-7                                          | -                                               | -                                                             |
|            |                            |                                                                                                         | -                                                     | -                                   | -                                             | -                                             | 8E-4                                            | 8E-3                                                          |
| 37         | Rubidium-81m <sup>2</sup>  | D, all compounds                                                                                        | 2E+5<br>St. wall<br>(3E+5)                            | 3E+5                                | 1E-4                                          | 5E-7                                          | -                                               | -                                                             |
|            |                            |                                                                                                         | -                                                     | -                                   | -                                             | -                                             | 4E-3                                            | 4E-2                                                          |
| 37         | Rubidium-81                | D, all compounds                                                                                        | 4E+4                                                  | 5E+4                                | 2E-5                                          | 7E-8                                          | 5E-4                                            | 5E-3                                                          |
| 37         | Rubidium-82a               | 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 <sup>2</sup>   | D, all compounds                                                                                        | 2E+4<br>St. wall<br>(3E+4)                            | 6E+4                                | 3E-5                                          | 9E-8                                          | -                                               | -                                                             |
|            |                            |                                                                                                         | -                                                     | -                                   | -                                             | -                                             | 4E-4                                            | 4E-3                                                          |
| 37         | Rubidium-89 <sup>2</sup>   | D, all compounds                                                                                        | 4E+4<br>St. wall<br>(6E+4)                            | 1E+5                                | 6E-5                                          | 2E-7                                          | -                                               | -                                                             |
|            |                            |                                                                                                         | -                                                     | -                                   | -                                             | -                                             | 9E-4                                            | 9E-3                                                          |
| 38         | Strontium-80 <sup>2</sup>  | D, all soluble compounds except SrTiO <sub>3</sub><br>Y, all insoluble compounds and SrTiO <sub>3</sub> | 4E+3                                                  | 1E+4                                | 5E-6                                          | 2E-8                                          | 6E-5                                            | 6E-4                                                          |
|            |                            |                                                                                                         | -                                                     | 1E+4                                | 5E-6                                          | 2E-8                                          | -                                               | -                                                             |
| 38         | Strontium-81 <sup>2</sup>  | D, see <sup>80</sup> Sr<br>Y, see <sup>80</sup> Sr                                                      | 3E+4<br>2E+4                                          | 8E+4<br>8E+4                        | 3E-5<br>3E-5                                  | 1E-7<br>1E-7                                  | 3E-4<br>-                                       | 3E-3<br>-                                                     |
| 38         | Strontium-82               | D, see <sup>80</sup> Sr<br>Y, see <sup>80</sup> Sr                                                      | 3E+2<br>LLI wall<br>(2E+2)<br>2E+2                    | 4E+2                                | 2E-7                                          | 6E-10                                         | -                                               | -                                                             |
|            |                            |                                                                                                         | -                                                     | 9E+1                                | 4E-8                                          | 1E-10                                         | 3E-6                                            | 3E-5                                                          |
| 38         | Strontium-83               | D, see <sup>80</sup> Sr<br>Y, see <sup>80</sup> Sr                                                      | 3E+3<br>2E+3                                          | 7E+3<br>4E+3                        | 3E-6<br>1E-6                                  | 1E-8<br>5E-9                                  | 3E-5<br>-                                       | 3E-4<br>-                                                     |
| 38         | Strontium-85a <sup>2</sup> | D, see <sup>80</sup> Sr<br>Y, see <sup>80</sup> Sr                                                      | 2E+5<br>-                                             | 6E+5<br>8E+5                        | 3E-4<br>4E-4                                  | 9E-7<br>1E-6                                  | 3E-3<br>-                                       | 3E-2<br>-                                                     |
| 38         | Strontium-85               | D, see <sup>80</sup> Sr<br>Y, see <sup>80</sup> Sr                                                      | 3E+3<br>-                                             | 3E+3<br>2E+3                        | 1E-6<br>6E-7                                  | 4E-9<br>2E-9                                  | 4E-5<br>-                                       | 4E-4<br>-                                                     |
| 38         | Strontium-87a              | D, see <sup>80</sup> Sr<br>Y, see <sup>80</sup> Sr                                                      | 5E+4<br>4E+4                                          | 1E+5<br>2E+5                        | 5E-5<br>6E-5                                  | 2E-7<br>2E-7                                  | 6E-4<br>-                                       | 6E-3<br>-                                                     |

| Atomic No. | Radionuclide            | Class                                     | Table 1<br>Occupational Values                        |                                                 |                                      | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to Sewers                                  |
|------------|-------------------------|-------------------------------------------|-------------------------------------------------------|-------------------------------------------------|--------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|
|            |                         |                                           | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                                      |                                      | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                         |                                           |                                                       | ALI<br>( $\mu\text{Ci}$ )                       | DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                |
| 38         | Strontium-89            | D, see $^{89}\text{Sr}$                   | $6\text{E}+2$                                         | $8\text{E}+2$                                   | $4\text{E}-7$                        | $1\text{E}-9$                                  | -                                                | -                                                              |
|            |                         | Y, see $^{89}\text{Sr}$                   | ( $6\text{E}+2$ )<br>$5\text{E}+2$                    | -                                               | -                                    | -                                              | $8\text{E}-6$                                    | $8\text{E}-5$                                                  |
| 38         | Strontium-90            | D, see $^{90}\text{Sr}$                   | $3\text{E}+1$                                         | $2\text{E}+1$                                   | $8\text{E}-9$                        | -                                              | -                                                | -                                                              |
|            |                         | Y, see $^{90}\text{Sr}$                   | ( $4\text{E}+1$ )<br>Bone surf<br>-                   | ( $2\text{E}+1$ )<br>Bone surf<br>$4\text{E}+0$ | -                                    | $3\text{E}-11$<br>$6\text{E}-12$               | $5\text{E}-7$                                    | $5\text{E}-6$                                                  |
| 38         | Strontium-91            | D, see $^{91}\text{Sr}$                   | $2\text{E}+3$                                         | $6\text{E}+3$                                   | $2\text{E}-6$                        | $8\text{E}-9$                                  | $2\text{E}-5$                                    | $2\text{E}-4$                                                  |
|            |                         | Y, see $^{91}\text{Sr}$                   | -                                                     | $4\text{E}+3$                                   | $1\text{E}-6$                        | $5\text{E}-9$                                  | -                                                | -                                                              |
| 38         | Strontium-92            | D, see $^{92}\text{Sr}$                   | $3\text{E}+3$                                         | $9\text{E}+3$                                   | $4\text{E}-6$                        | $1\text{E}-8$                                  | $4\text{E}-5$                                    | $4\text{E}-4$                                                  |
|            |                         | Y, see $^{92}\text{Sr}$                   | -                                                     | $7\text{E}+3$                                   | $3\text{E}-6$                        | $9\text{E}-9$                                  | -                                                | -                                                              |
| 39         | Yttrium-86 <sup>2</sup> | W, all compounds except those given for Y | $2\text{E}+4$                                         | $6\text{E}+4$                                   | $2\text{E}-5$                        | $8\text{E}-8$                                  | $3\text{E}-4$                                    | $3\text{E}-3$                                                  |
|            |                         | Y, oxides and hydroxides                  | -                                                     | $5\text{E}+4$                                   | $2\text{E}-5$                        | $8\text{E}-8$                                  | -                                                | -                                                              |
| 39         | Yttrium-86              | W, see $^{86}\text{mY}$                   | $1\text{E}+3$                                         | $3\text{E}+3$                                   | $1\text{E}-6$                        | $5\text{E}-9$                                  | $2\text{E}-5$                                    | $2\text{E}-4$                                                  |
|            |                         | Y, see $^{86}\text{mY}$                   | -                                                     | $3\text{E}+3$                                   | $1\text{E}-6$                        | $5\text{E}-9$                                  | -                                                | -                                                              |
| 39         | Yttrium-87              | W, see $^{86}\text{mY}$                   | $2\text{E}+3$                                         | $3\text{E}+3$                                   | $1\text{E}-6$                        | $5\text{E}-9$                                  | $3\text{E}-5$                                    | $3\text{E}-4$                                                  |
|            |                         | Y, see $^{86}\text{mY}$                   | -                                                     | $3\text{E}+3$                                   | $1\text{E}-6$                        | $5\text{E}-9$                                  | -                                                | -                                                              |
| 39         | Yttrium-88              | W, see $^{86}\text{mY}$                   | $1\text{E}+3$                                         | $3\text{E}+2$                                   | $1\text{E}-7$                        | $3\text{E}-10$                                 | $1\text{E}-5$                                    | $1\text{E}-4$                                                  |
|            |                         | Y, see $^{86}\text{mY}$                   | -                                                     | $2\text{E}+2$                                   | $1\text{E}-7$                        | $3\text{E}-10$                                 | -                                                | -                                                              |
| 39         | Yttrium-90m             | W, see $^{86}\text{mY}$                   | $8\text{E}+3$                                         | $1\text{E}+4$                                   | $5\text{E}-6$                        | $2\text{E}-8$                                  | $1\text{E}-4$                                    | $1\text{E}-3$                                                  |
|            |                         | Y, see $^{86}\text{mY}$                   | -                                                     | $1\text{E}+4$                                   | $5\text{E}-6$                        | $2\text{E}-8$                                  | -                                                | -                                                              |
| 39         | Yttrium-90              | W, see $^{86}\text{mY}$                   | $4\text{E}+2$                                         | $7\text{E}+2$                                   | $3\text{E}-7$                        | $9\text{E}-10$                                 | -                                                | -                                                              |
|            |                         | Y, see $^{86}\text{mY}$                   | ( $5\text{E}+2$ )<br>LLI wall                         | -                                               | -                                    | -                                              | $7\text{E}-6$                                    | $7\text{E}-5$                                                  |
| 39         | Yttrium-91 <sup>2</sup> | W, see $^{86}\text{mY}$                   | $1\text{E}+5$                                         | $2\text{E}+5$                                   | $1\text{E}-4$                        | $3\text{E}-7$                                  | $2\text{E}-3$                                    | $2\text{E}-2$                                                  |
|            |                         | Y, see $^{86}\text{mY}$                   | -                                                     | $2\text{E}+5$                                   | $7\text{E}-5$                        | $2\text{E}-7$                                  | -                                                | -                                                              |
| 39         | Yttrium-91              | W, see $^{86}\text{mY}$                   | $5\text{E}+2$                                         | $2\text{E}+2$                                   | $7\text{E}-8$                        | $2\text{E}-10$                                 | -                                                | -                                                              |
|            |                         | Y, see $^{86}\text{mY}$                   | ( $6\text{E}+2$ )<br>LLI wall                         | -                                               | -                                    | -                                              | $8\text{E}-6$                                    | $8\text{E}-5$                                                  |
| 39         | Yttrium-92              | W, see $^{86}\text{mY}$                   | $3\text{E}+3$                                         | $9\text{E}+3$                                   | $4\text{E}-6$                        | $1\text{E}-8$                                  | $4\text{E}-5$                                    | $4\text{E}-4$                                                  |
|            |                         | Y, see $^{86}\text{mY}$                   | -                                                     | $8\text{E}+3$                                   | $3\text{E}-6$                        | $1\text{E}-8$                                  | -                                                | -                                                              |
| 39         | Yttrium-93              | W, see $^{86}\text{mY}$                   | $1\text{E}+3$                                         | $3\text{E}+3$                                   | $1\text{E}-6$                        | $4\text{E}-9$                                  | $2\text{E}-5$                                    | $2\text{E}-4$                                                  |
|            |                         | Y, see $^{86}\text{mY}$                   | -                                                     | $2\text{E}+3$                                   | $1\text{E}-6$                        | $3\text{E}-9$                                  | -                                                | -                                                              |
| 39         | Yttrium-94 <sup>2</sup> | W, see $^{86}\text{mY}$                   | $2\text{E}+4$                                         | $8\text{E}+4$                                   | $3\text{E}-5$                        | $1\text{E}-7$                                  | -                                                | -                                                              |
|            |                         | Y, see $^{86}\text{mY}$                   | ( $3\text{E}+4$ )<br>St. wall                         | -                                               | -                                    | -                                              | $4\text{E}-4$                                    | $4\text{E}-3$                                                  |
| 39         | Yttrium-95 <sup>2</sup> | W, see $^{86}\text{mY}$                   | $4\text{E}+4$                                         | $2\text{E}+5$                                   | $6\text{E}-5$                        | $2\text{E}-7$                                  | -                                                | -                                                              |
|            |                         | Y, see $^{86}\text{mY}$                   | ( $5\text{E}+4$ )<br>St. wall                         | -                                               | -                                    | -                                              | $7\text{E}-4$                                    | $7\text{E}-3$                                                  |

| Atomic No. | Radionuclide                         | Class                                           | Table 1<br>Occupational Values                 |                              |                                 | Table 2<br>Effluent Concentrations |                                   | Table 3<br>Releases to Sewers                   |
|------------|--------------------------------------|-------------------------------------------------|------------------------------------------------|------------------------------|---------------------------------|------------------------------------|-----------------------------------|-------------------------------------------------|
|            |                                      |                                                 | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu$ Ci) | Inhalation                   |                                 | Col. 1<br>Air<br>( $\mu$ Ci/ml)    | Col. 2<br>Water<br>( $\mu$ Ci/ml) | Monthly Average Concentration<br>( $\mu$ Ci/ml) |
|            |                                      |                                                 |                                                | Col. 2<br>ALI<br>( $\mu$ Ci) | Col. 3<br>DAC<br>( $\mu$ Ci/ml) |                                    |                                   |                                                 |
| 40         | Zirconium-86                         | D, all compounds except those given for W and Y | 1E+3                                           | 4E+3                         | 2E-6                            | 6E-9                               | 2E-5                              | 2E-4                                            |
|            |                                      | W, oxides, hydroxides, halides, and nitrates    | -                                              | 3E+3                         | 1E-6                            | 4E-9                               | -                                 | -                                               |
|            |                                      | Y, carbide                                      | -                                              | 2E+3                         | 1E-6                            | 3E-9                               | -                                 | -                                               |
| 40         | Zirconium-88                         | D, see $^{86}\text{Zr}$                         | 4E+3                                           | 2E+2                         | 9E-8                            | 2E-10                              | 5E-5                              | 5E-4                                            |
|            |                                      | W, see $^{86}\text{Zr}$                         | -                                              | 5E+2                         | 2E-7                            | 7E-10                              | -                                 | -                                               |
|            |                                      | Y, see $^{86}\text{Zr}$                         | -                                              | 3E+2                         | 1E-7                            | 4E-10                              | -                                 | -                                               |
| 40         | Zirconium-89                         | D, see $^{86}\text{Zr}$                         | 2E+3                                           | 4E+3                         | 1E-6                            | 5E-9                               | 2E-5                              | 2E-4                                            |
|            |                                      | W, see $^{86}\text{Zr}$                         | -                                              | 2E+3                         | 1E-6                            | 3E-9                               | -                                 | -                                               |
|            |                                      | Y, see $^{86}\text{Zr}$                         | -                                              | 2E+3                         | 1E-6                            | 3E-9                               | -                                 | -                                               |
| 40         | Zirconium-93                         | D, see $^{86}\text{Zr}$                         | 1E+3                                           | 6E+0                         | 3E-9                            | -                                  | -                                 | -                                               |
|            |                                      | Bone surf (3E+3)                                | (3E+3)                                         | Bone surf (2E+1)             | -                               | 2E-11                              | 4E-5                              | 4E-4                                            |
|            |                                      | W, see $^{86}\text{Zr}$                         | -                                              | 2E+1                         | 1E-8                            | -                                  | -                                 | -                                               |
|            |                                      | Y, see $^{86}\text{Zr}$                         | -                                              | Bone surf (6E+1)             | -                               | 9E-11                              | -                                 | -                                               |
|            |                                      |                                                 | -                                              | 6E+1                         | 2E-8                            | -                                  | -                                 | -                                               |
|            |                                      |                                                 | -                                              | Bone surf (7E+1)             | -                               | 9E-11                              | -                                 | -                                               |
| 40         | Zirconium-95                         | D, see $^{86}\text{Zr}$                         | 1E+3                                           | 1E+2                         | 5E-8                            | -                                  | 2E-5                              | 2E-4                                            |
|            |                                      | W, see $^{86}\text{Zr}$                         | -                                              | Bone surf (3E+2)             | -                               | 4E-10                              | -                                 | -                                               |
|            |                                      | Y, see $^{86}\text{Zr}$                         | -                                              | 4E+2                         | 2E-7                            | 5E-10                              | -                                 | -                                               |
|            |                                      |                                                 | -                                              | 3E+2                         | 1E-7                            | 4E-10                              | -                                 | -                                               |
| 40         | Zirconium-97                         | D, see $^{86}\text{Zr}$                         | 6E+2                                           | 2E+3                         | 8E-7                            | 3E-9                               | 9E-6                              | 9E-5                                            |
|            |                                      | W, see $^{86}\text{Zr}$                         | -                                              | 1E+3                         | 6E-7                            | 2E-9                               | -                                 | -                                               |
|            |                                      | Y, see $^{86}\text{Zr}$                         | -                                              | 1E+3                         | 5E-7                            | 2E-9                               | -                                 | -                                               |
| 41         | Niobium-88 <sup>2</sup>              | W, all compounds except those given for Y       | 5E+4                                           | 2E+5                         | 9E-5                            | 3E-7                               | -                                 | -                                               |
|            |                                      | St. wall (7E+4)                                 | (7E+4)                                         | -                            | -                               | -                                  | 1E-3                              | 1E-2                                            |
|            |                                      | Y, oxides and hydroxides                        | -                                              | 2E+5                         | 9E-5                            | 3E-7                               | -                                 | -                                               |
| 41         | Niobium-89m <sup>2</sup><br>(66 min) | W, see $^{88}\text{Nb}$                         | 1E+4                                           | 4E+4                         | 2E-5                            | 6E-8                               | 1E-4                              | 1E-3                                            |
|            |                                      | Y, see $^{88}\text{Nb}$                         | -                                              | 4E+4                         | 2E-5                            | 5E-8                               | -                                 | -                                               |
| 41         | Niobium-89<br>(122 min)              | W, see $^{88}\text{Nb}$                         | 5E+3                                           | 2E+4                         | 8E-6                            | 3E-8                               | 7E-5                              | 7E-4                                            |
|            |                                      | Y, see $^{88}\text{Nb}$                         | -                                              | 2E+4                         | 6E-6                            | 2E-8                               | -                                 | -                                               |
| 41         | Niobium-90                           | W, see $^{88}\text{Nb}$                         | 1E+3                                           | 3E+3                         | 1E-6                            | 4E-9                               | 1E-5                              | 1E-4                                            |
|            |                                      | Y, see $^{88}\text{Nb}$                         | -                                              | 2E+3                         | 1E-6                            | 3E-9                               | -                                 | -                                               |
| 41         | Niobium-93m                          | W, see $^{88}\text{Nb}$                         | 9E+3                                           | 2E+3                         | 8E-7                            | 3E-9                               | -                                 | -                                               |
|            |                                      | LLI wall (1E+4)                                 | (1E+4)                                         | -                            | -                               | -                                  | 2E-4                              | 2E-3                                            |
|            |                                      | Y, see $^{88}\text{Nb}$                         | -                                              | 2E+2                         | 7E-8                            | 2E-10                              | -                                 | -                                               |
| 41         | Niobium-94                           | W, see $^{88}\text{Nb}$                         | 9E+2                                           | 2E+2                         | 8E-8                            | 3E-10                              | 1E-5                              | 1E-4                                            |
|            |                                      | Y, see $^{88}\text{Nb}$                         | -                                              | 2E+1                         | 6E-9                            | 2E-11                              | -                                 | -                                               |
| 41         | Niobium-95m                          | W, see $^{88}\text{Nb}$                         | 2E+3                                           | 3E+3                         | 1E-6                            | 4E-9                               | -                                 | -                                               |
|            |                                      | LLI wall (2E+3)                                 | (2E+3)                                         | -                            | -                               | -                                  | 3E-5                              | 3E-4                                            |
|            |                                      | Y, see $^{88}\text{Nb}$                         | -                                              | 2E+3                         | 9E-7                            | 3E-9                               | -                                 | -                                               |



| Atomic No. | Radionuclide                | Class                                                                                     | Table 1<br>Occupational Values                        |                           |                                      | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to Sewers                                  |
|------------|-----------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------|--------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|
|            |                             |                                                                                           | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                |                                      | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                             |                                                                                           |                                                       | ALI<br>( $\mu\text{Ci}$ ) | DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                |
| 41         | Niobium-95                  | W, see $^{88}\text{Nb}$<br>Y, see $^{88}\text{Nb}$                                        | 2E+3<br>-                                             | 1E+3<br>1E+3              | 5E-7<br>5E-7                         | 2E-9<br>2E-9                                   | 3E-5<br>-                                        | 3E-4<br>-                                                      |
| 41         | Niobium-96                  | W, see $^{88}\text{Nb}$<br>Y, see $^{88}\text{Nb}$                                        | 1E+3<br>-                                             | 3E+3<br>2E+3              | 1E-6<br>1E-6                         | 4E-9<br>3E-9                                   | 2E-5<br>-                                        | 2E-4<br>-                                                      |
| 41         | Niobium-97 <sup>2</sup>     | W, see $^{88}\text{Nb}$<br>Y, see $^{88}\text{Nb}$                                        | 2E+4<br>-                                             | 8E+4<br>7E+4              | 3E-5<br>3E-5                         | 1E-7<br>1E-7                                   | 3E-4<br>-                                        | 3E-3<br>-                                                      |
| 41         | Niobium-98 <sup>2</sup>     | W, see $^{88}\text{Nb}$<br>Y, see $^{88}\text{Nb}$                                        | 1E+4<br>-                                             | 5E+4<br>5E+4              | 2E-5<br>2E-5                         | 8E-8<br>7E-8                                   | 2E-4<br>-                                        | 2E-3<br>-                                                      |
| 42         | Molybdenum-90               | D, all compounds except those given for Y<br>Y, oxides, hydroxides, and $\text{MoS}_2$    | 4E+3<br>2E+3                                          | 7E+3<br>5E+3              | 3E-6<br>2E-6                         | 1E-8<br>6E-9                                   | 3E-5<br>-                                        | 3E-4<br>-                                                      |
| 42         | Molybdenum-93m              | D, see $^{90}\text{Mo}$<br>Y, see $^{90}\text{Mo}$                                        | 9E+3<br>4E+3                                          | 2E+4<br>1E+4              | 7E-6<br>6E-6                         | 2E-8<br>2E-8                                   | 6E-5<br>-                                        | 6E-4<br>-                                                      |
| 42         | Molybdenum-93               | D, see $^{90}\text{Mo}$<br>Y, see $^{90}\text{Mo}$                                        | 4E+3<br>2E+4                                          | 5E+3<br>2E+2              | 2E-6<br>8E-8                         | 8E-9<br>2E-10                                  | 5E-5<br>-                                        | 5E-4<br>-                                                      |
| 42         | Molybdenum-99               | D, see $^{90}\text{Mo}$                                                                   | 2E+3<br>LLL wall<br>(1E+3)<br>1E+3                    | 3E+3<br>-                 | 1E-6<br>-                            | 4E-9<br>-                                      | -<br>2E-5<br>-                                   | -<br>2E-4<br>-                                                 |
| 42         | Molybdenum-101 <sup>2</sup> | D, see $^{90}\text{Mo}$<br>Y, see $^{90}\text{Mo}$                                        | 4E+4<br>(5E+4)<br>-                                   | 1E+5<br>1E+5              | 6E-5<br>6E-5                         | 2E-7<br>2E-7                                   | -<br>7E-4<br>-                                   | -<br>7E-3<br>-                                                 |
| 43         | Technetium-93n <sup>2</sup> | D, all compounds except those given for W<br>W, oxides, hydroxides, halides, and nitrates | 7E+4<br>-                                             | 2E+5<br>3E+5              | 6E-5<br>1E-4                         | 2E-7<br>4E-7                                   | 1E-3<br>-                                        | 1E-2<br>-                                                      |
| 43         | Technetium-93               | D, see $^{93m}\text{Tc}$<br>W, see $^{93m}\text{Tc}$                                      | 3E+4<br>-                                             | 7E+4<br>1E+5              | 3E-5<br>4E-5                         | 1E-7<br>1E-7                                   | 4E-4<br>-                                        | 4E-3<br>-                                                      |
| 43         | Technetium-94m <sup>2</sup> | D, see $^{93m}\text{Tc}$<br>W, see $^{93m}\text{Tc}$                                      | 2E+4<br>-                                             | 4E+4<br>6E+4              | 2E-5<br>2E-5                         | 6E-8<br>8E-8                                   | 3E-4<br>-                                        | 3E-3<br>-                                                      |
| 43         | Technetium-94               | D, see $^{93m}\text{Tc}$<br>W, see $^{93m}\text{Tc}$                                      | 9E+3<br>-                                             | 2E+4<br>2E+4              | 8E-6<br>1E-5                         | 3E-8<br>3E-8                                   | 1E-4<br>-                                        | 1E-3<br>-                                                      |
| 43         | Technetium-95m              | D, see $^{93m}\text{Tc}$<br>W, see $^{93m}\text{Tc}$                                      | 4E+3<br>-                                             | 5E+3<br>2E+3              | 2E-6<br>8E-7                         | 8E-9<br>3E-9                                   | 5E-5<br>-                                        | 5E-4<br>-                                                      |
| 43         | Technetium-95               | D, see $^{93m}\text{Tc}$<br>W, see $^{93m}\text{Tc}$                                      | 1E+4<br>-                                             | 2E+4<br>2E+4              | 9E-6<br>8E-6                         | 3E-8<br>3E-8                                   | 1E-4<br>-                                        | 1E-3<br>-                                                      |
| 43         | Technetium-96m <sup>2</sup> | D, see $^{93m}\text{Tc}$<br>W, see $^{93m}\text{Tc}$                                      | 2E+5<br>-                                             | 3E+5<br>2E+5              | 1E-4<br>1E-4                         | 4E-7<br>3E-7                                   | 2E-3<br>-                                        | 2E-2<br>-                                                      |
| 43         | Technetium-96               | D, see $^{93m}\text{Tc}$<br>W, see $^{93m}\text{Tc}$                                      | 2E+3<br>-                                             | 3E+3<br>2E+3              | 1E-6<br>9E-7                         | 5E-9<br>3E-9                                   | 3E-5<br>-                                        | 3E-4<br>-                                                      |
| 43         | Technetium-97m              | D, see $^{93m}\text{Tc}$<br>W, see $^{93m}\text{Tc}$                                      | 5E+3<br>-                                             | 7E+3<br>(7E+3)<br>1E+3    | 3E-6<br>-                            | -<br>1E-8<br>2E-9                              | 6E-5<br>-                                        | 6E-4<br>-                                                      |

| Atomic No. | Radionuclide                | Class                                                                                     | Table 1<br>Occupational Values     |                        |                      | Table 2<br>Effluent Concentrations |                          | Table 3<br>Releases to Sewers          |
|------------|-----------------------------|-------------------------------------------------------------------------------------------|------------------------------------|------------------------|----------------------|------------------------------------|--------------------------|----------------------------------------|
|            |                             |                                                                                           | Col. 1<br>Oral Ingestion ALI (μCi) | Inhalation             |                      | Col. 1<br>Air (μCi/ml)             | Col. 2<br>Water (μCi/ml) | Monthly Average Concentration (μCi/ml) |
|            |                             |                                                                                           |                                    | ALI (μCi)              | DAC (μCi/ml)         |                                    |                          |                                        |
| 43         | Technetium-97               | D, see <sup>93m</sup> Tc<br>W, see <sup>93m</sup> Tc                                      | 4E+4<br>-                          | 5E+4<br>6E+3           | 2E-5<br>2E-6         | 7E-8<br>8E-9                       | 5E-4<br>-                | 5E-3<br>-                              |
| 43         | Technetium-98               | D, see <sup>93m</sup> Tc<br>W, see <sup>93m</sup> Tc                                      | 1E+3<br>-                          | 2E+3<br>3E+2           | 7E-7<br>1E-7         | 2E-9<br>4E-10                      | 1E-5<br>-                | 1E-4<br>-                              |
| 43         | Technetium-99m              | D, see <sup>93m</sup> Tc<br>W, see <sup>93m</sup> Tc                                      | 8E+4<br>-                          | 2E+5<br>2E+5           | 6E-5<br>1E-4         | 2E-7<br>3E-7                       | 1E-3<br>-                | 1E-2<br>-                              |
| 43         | Technetium-99               | D, see <sup>93m</sup> Tc<br><br>W, see <sup>93m</sup> Tc                                  | 4E+3<br>-                          | 5E+3<br>(6E+3)<br>7E+2 | 2E-6<br>-            | -<br>8E-9<br>9E-10                 | 6E-5<br>-                | 6E-4<br>-                              |
| 43         | Technetium-101 <sup>2</sup> | D, see <sup>93m</sup> Tc<br><br>W, see <sup>93m</sup> Tc                                  | 9E+4<br>(1E+5)<br>-                | 3E+5<br>-              | 1E-4<br>-            | 5E-7<br>-                          | -<br>2E-3<br>-           | -<br>2E-2<br>-                         |
| 43         | Technetium-104 <sup>2</sup> | D, see <sup>93m</sup> Tc<br><br>W, see <sup>93m</sup> Tc                                  | 2E+4<br>(3E+4)<br>-                | 7E+4<br>-              | 3E-5<br>-            | 1E-7<br>-                          | -<br>4E-4<br>-           | -<br>4E-3<br>-                         |
| 44         | Ruthenium-94 <sup>2</sup>   | D, all compounds except those given for W and Y<br>W, halides<br>Y, oxides and hydroxides | 2E+4<br>-<br>-                     | 4E+4<br>6E+4<br>6E+4   | 2E-5<br>3E-5<br>2E-5 | 6E-8<br>9E-8<br>8E-8               | 2E-4<br>-                | 2E-3<br>-                              |
| 44         | Ruthenium-97                | D, see <sup>94</sup> Ru<br>W, see <sup>94</sup> Ru<br>Y, see <sup>94</sup> Ru             | 8E+3<br>-<br>-                     | 2E+4<br>1E+4<br>1E+4   | 8E-6<br>5E-6<br>5E-6 | 3E-8<br>2E-8<br>2E-8               | 1E-4<br>-                | 1E-3<br>-                              |
| 44         | Ruthenium-103               | D, see <sup>94</sup> Ru<br>W, see <sup>94</sup> Ru<br>Y, see <sup>94</sup> Ru             | 2E+3<br>-<br>-                     | 2E+3<br>1E+3<br>6E+2   | 7E-7<br>4E-7<br>3E-7 | 2E-9<br>1E-9<br>9E-10              | 3E-5<br>-                | 3E-4<br>-                              |
| 44         | Ruthenium-105               | D, see <sup>94</sup> Ru<br>W, see <sup>94</sup> Ru<br>Y, see <sup>94</sup> Ru             | 5E+3<br>-<br>-                     | 1E+4<br>1E+4<br>1E+4   | 6E-6<br>6E-6<br>5E-6 | 2E-8<br>2E-8<br>2E-8               | 7E-5<br>-                | 7E-4<br>-                              |
| 44         | Ruthenium-106               | D, see <sup>94</sup> Ru<br><br>W, see <sup>94</sup> Ru<br>Y, see <sup>94</sup> Ru         | 2E+2<br>(2E+2)<br>-                | 9E+1<br>-              | 4E-8<br>-            | 1E-10<br>-                         | -<br>3E-6<br>-           | -<br>3E-5<br>-                         |
| 45         | Rhodium-95 <sup>1</sup>     | D, all compounds except those given for W and Y<br>W, halides<br>Y, oxides and hydroxides | 2E+4<br>-<br>-                     | 6E+4<br>8E+4<br>7E+4   | 2E-5<br>3E-5<br>3E-5 | 8E-8<br>1E-7<br>9E-8               | 2E-4<br>-                | 2E-3<br>-                              |
| 45         | Rhodium-99                  | D, see <sup>99m</sup> Rh<br>W, see <sup>99m</sup> Rh<br>Y, see <sup>99m</sup> Rh          | 2E+3<br>-<br>-                     | 3E+3<br>2E+3<br>2E+3   | 1E-6<br>9E-7<br>8E-7 | 4E-9<br>3E-9<br>3E-9               | 3E-5<br>-                | 3E-4<br>-                              |

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

| Atomic No. | Radionuclide            | Class                                                                            | Table 1<br>Occupational Values                        |                                                   |                                               | Table 2<br>Effluent Concentrations            |                                                 | Table 3<br>Releases to Sewers                                 |
|------------|-------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------|
|            |                         |                                                                                  | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 2<br>Inhalation<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                         |                                                                                  |                                                       |                                                   |                                               |                                               |                                                 |                                                               |
|            |                         |                                                                                  |                                                       |                                                   |                                               |                                               |                                                 |                                                               |
| 46         | Palladium-109           | D, see $^{100}\text{Pd}$<br>W, see $^{100}\text{Pd}$<br>Y, see $^{100}\text{Pd}$ | 2E+3<br>-<br>-                                        | 6E+3<br>5E+3<br>5E+3                              | 3E-6<br>2E-6<br>2E-6                          | 9E-9<br>8E-9<br>6E-9                          | 3E-5<br>-<br>-                                  | 3E-4<br>-<br>-                                                |
| 47         | Silver-102 <sup>2</sup> | D, all compounds except those given for W and Y                                  | 5E+4<br>St. wall<br>(6E+4)                            | 2E+5<br>-<br>-                                    | 8E-5<br>-<br>-                                | 2E-7<br>-<br>-                                | -<br>9E-4<br>-                                  | -<br>9E-3<br>-                                                |
|            |                         | W, nitrates and sulfides                                                         | -                                                     | 2E+5                                              | 9E-5                                          | 3E-7                                          | -                                               | -                                                             |
|            |                         | Y, oxides and hydroxides                                                         | -                                                     | 2E+5                                              | 8E-5                                          | 3E-7                                          | -                                               | -                                                             |
| 47         | Silver-103 <sup>2</sup> | D, see $^{102}\text{Ag}$<br>W, see $^{102}\text{Ag}$<br>Y, see $^{102}\text{Ag}$ | 4E+4<br>-<br>-                                        | 1E+5<br>1E+5<br>1E+5                              | 4E-5<br>5E-5<br>5E-5                          | 1E-7<br>2E-7<br>2E-7                          | 5E-4<br>-<br>-                                  | 5E-3<br>-<br>-                                                |
| 47         | Silver-104 <sup>2</sup> | D, see $^{102}\text{Ag}$<br>W, see $^{102}\text{Ag}$<br>Y, see $^{102}\text{Ag}$ | 3E+4<br>-<br>-                                        | 9E+4<br>1E+5<br>1E+5                              | 4E-5<br>5E-5<br>5E-5                          | 1E-7<br>2E-7<br>2E-7                          | 4E-4<br>-<br>-                                  | 4E-3<br>-<br>-                                                |
| 47         | Silver-104 <sup>2</sup> | D, see $^{102}\text{Ag}$<br>W, see $^{102}\text{Ag}$<br>Y, see $^{102}\text{Ag}$ | 2E+4<br>-<br>-                                        | 7E+4<br>1E+5<br>1E+5                              | 3E-5<br>6E-5<br>6E-5                          | 1E-7<br>2E-7<br>2E-7                          | 3E-4<br>-<br>-                                  | 3E-3<br>-<br>-                                                |
| 47         | Silver-105              | D, see $^{102}\text{Ag}$<br>W, see $^{102}\text{Ag}$<br>Y, see $^{102}\text{Ag}$ | 3E+3<br>-<br>-                                        | 1E+3<br>2E+3<br>2E+3                              | 4E-7<br>7E-7<br>7E-7                          | 1E-9<br>2E-9<br>2E-9                          | 4E-5<br>-<br>-                                  | 4E-4<br>-<br>-                                                |
| 47         | Silver-106m             | D, see $^{102}\text{Ag}$<br>W, see $^{102}\text{Ag}$<br>Y, see $^{102}\text{Ag}$ | 8E+2<br>-<br>-                                        | 7E+2<br>9E+2<br>9E+2                              | 3E-7<br>4E-7<br>4E-7                          | 1E-9<br>1E-9<br>1E-9                          | 1E-5<br>-<br>-                                  | 1E-4<br>-<br>-                                                |
| 47         | Silver-106 <sup>2</sup> | D, see $^{102}\text{Ag}$                                                         | 6E+4<br>St. wall<br>(6E+4)                            | 2E+5<br>-<br>-                                    | 8E-5<br>-<br>-                                | 3E-7<br>-<br>-                                | -<br>9E-4<br>-                                  | -<br>9E-3<br>-                                                |
|            |                         | W, see $^{102}\text{Ag}$                                                         | -                                                     | 2E+5                                              | 9E-5                                          | 3E-7                                          | -                                               | -                                                             |
|            |                         | Y, see $^{102}\text{Ag}$                                                         | -                                                     | 2E+5                                              | 8E-5                                          | 3E-7                                          | -                                               | -                                                             |
| 47         | Silver-108m             | D, see $^{102}\text{Ag}$<br>W, see $^{102}\text{Ag}$<br>Y, see $^{102}\text{Ag}$ | 6E+2<br>-<br>-                                        | 2E+2<br>3E+2<br>2E+1                              | 8E-8<br>1E-7<br>1E-8                          | 3E-10<br>4E-10<br>3E-11                       | 9E-6<br>-<br>-                                  | 9E-5<br>-<br>-                                                |
| 47         | Silver-110m             | D, see $^{102}\text{Ag}$<br>W, see $^{102}\text{Ag}$<br>Y, see $^{102}\text{Ag}$ | 5E+2<br>-<br>-                                        | 1E+2<br>2E+2<br>9E+1                              | 5E-8<br>8E-8<br>4E-8                          | 2E-10<br>3E-10<br>1E-10                       | 6E-6<br>-<br>-                                  | 6E-5<br>-<br>-                                                |
| 47         | Silver-111              | D, see $^{102}\text{Ag}$                                                         | 9E+2<br>Liver<br>(1E+3)                               | 2E+3<br>(2E+3)<br>-                               | 6E-7<br>-                                     | -<br>2E-9                                     | -<br>2E-5                                       | -<br>2E-4                                                     |
|            |                         | W, see $^{102}\text{Ag}$                                                         | -                                                     | 9E+2                                              | 4E-7                                          | 1E-9                                          | -                                               | -                                                             |
|            |                         | Y, see $^{102}\text{Ag}$                                                         | -                                                     | 9E+2                                              | 4E-7                                          | 1E-9                                          | -                                               | -                                                             |
| 47         | Silver-112              | D, see $^{102}\text{Ag}$<br>W, see $^{102}\text{Ag}$<br>Y, see $^{102}\text{Ag}$ | 3E+3<br>-<br>-                                        | 8E+3<br>1E+4<br>9E+3                              | 3E-6<br>4E-6<br>4E-6                          | 1E-8<br>1E-8<br>1E-8                          | 4E-5<br>-<br>-                                  | 4E-4<br>-<br>-                                                |

| Atomic No. | Radionuclide             | Class                                           | Table 1<br>Occupational Values                        |                                     |                                                | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to Sewers                                  |
|------------|--------------------------|-------------------------------------------------|-------------------------------------------------------|-------------------------------------|------------------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|
|            |                          |                                                 | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                                | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                          |                                                 |                                                       | Col. 2<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                |
| 47         | Silver-115 <sup>2</sup>  | D, see <sup>102</sup> Ag                        | 3E+4<br>St. wall<br>(3E+4)                            | 9E+4                                | 4E-5                                           | 1E-7                                           | -                                                | -                                                              |
|            |                          | W, see <sup>102</sup> Ag                        | -                                                     | 9E+4                                | 4E-5                                           | 1E-7                                           | 4E-4                                             | 4E-3                                                           |
|            |                          | Y, see <sup>102</sup> Ag                        | -                                                     | 8E+4                                | 3E-5                                           | 1E-7                                           | -                                                | -                                                              |
| 48         | Cadmium-104 <sup>2</sup> | D, all compounds except those given for W and Y | 2E+4                                                  | 7E+4                                | 3E-5                                           | 9E-8                                           | 3E-4                                             | 3E-3                                                           |
|            |                          | W, sulfides, halides, and nitrates              | -                                                     | 1E+5                                | 5E-5                                           | 2E-7                                           | -                                                | -                                                              |
|            |                          | Y, oxides and hydroxides                        | -                                                     | 1E+5                                | 5E-5                                           | 2E-7                                           | -                                                | -                                                              |
| 48         | Cadmium-107              | D, see <sup>104</sup> Cd                        | 2E+4                                                  | 5E+4                                | 2E-5                                           | 8E-8                                           | 3E-4                                             | 3E-3                                                           |
|            |                          | W, see <sup>104</sup> Cd                        | -                                                     | 8E+4                                | 2E-5                                           | 8E-8                                           | -                                                | -                                                              |
|            |                          | Y, see <sup>104</sup> Cd                        | -                                                     | 5E+4                                | 2E-5                                           | 7E-8                                           | -                                                | -                                                              |
| 48         | Cadmium-109              | D, see <sup>104</sup> Cd                        | 3E+2<br>Kidneys<br>(4E+2)                             | 4E+3<br>Kidneys<br>(5E+1)           | 1E-8                                           | -                                              | -                                                | -                                                              |
|            |                          | W, see <sup>104</sup> Cd                        | -                                                     | 3E+2<br>Kidneys<br>(1E+2)           | 9E-8                                           | 7E-11                                          | 6E-6                                             | 6E-5                                                           |
|            |                          | Y, see <sup>104</sup> Cd                        | -                                                     | 1E+2                                | 5E-8                                           | 2E-10                                          | -                                                | -                                                              |
| 48         | Cadmium-113m             | D, see <sup>104</sup> Cd                        | 2E+1<br>Kidneys<br>(4E+1)                             | 2E+0<br>Kidneys<br>(4E+0)           | 1E-9                                           | -                                              | -                                                | -                                                              |
|            |                          | W, see <sup>104</sup> Cd                        | -                                                     | 8E+0<br>Kidneys<br>(1E+1)           | 4E-9                                           | 5E-12                                          | 5E-7                                             | 5E-6                                                           |
|            |                          | Y, see <sup>104</sup> Cd                        | -                                                     | 1E+1                                | 5E-9                                           | 2E-11                                          | -                                                | -                                                              |
| 48         | Cadmium-113              | D, see <sup>104</sup> Cd                        | 2E+1<br>Kidneys<br>(3E+1)                             | 2E+0<br>Kidneys<br>(3E+0)           | 9E-10                                          | -                                              | -                                                | -                                                              |
|            |                          | W, see <sup>104</sup> Cd                        | -                                                     | 8E+0<br>Kidneys<br>(1E+1)           | 3E-9                                           | 5E-12                                          | 4E-7                                             | 4E-6                                                           |
|            |                          | Y, see <sup>104</sup> Cd                        | -                                                     | 1E+1                                | 6E-9                                           | 2E-11                                          | -                                                | -                                                              |
| 48         | Cadmium-115m             | D, see <sup>104</sup> Cd                        | 3E+2                                                  | 5E+1<br>Kidneys<br>(8E+1)           | 2E-8                                           | -                                              | 4E-6                                             | 4E-5                                                           |
|            |                          | W, see <sup>104</sup> Cd                        | -                                                     | 1E+2                                | 5E-8                                           | 1E-10                                          | -                                                | -                                                              |
|            |                          | Y, see <sup>104</sup> Cd                        | -                                                     | 1E+2                                | 6E-8                                           | 2E-10                                          | -                                                | -                                                              |
| 48         | Cadmium-115              | D, see <sup>104</sup> Cd                        | 9E+2<br>LLI wall<br>(1E+3)                            | 1E+3                                | 8E-7                                           | 2E-9                                           | -                                                | -                                                              |
|            |                          | W, see <sup>104</sup> Cd                        | -                                                     | 1E+3                                | 5E-7                                           | -                                              | 1E-5                                             | 1E-4                                                           |
|            |                          | Y, see <sup>104</sup> Cd                        | -                                                     | 1E+3                                | 6E-7                                           | 2E-9                                           | -                                                | -                                                              |
| 48         | Cadmium-117m             | D, see <sup>104</sup> Cd                        | 5E+3                                                  | 1E+4                                | 5E-6                                           | 2E-8                                           | 6E-5                                             | 6E-4                                                           |
|            |                          | W, see <sup>104</sup> Cd                        | -                                                     | 2E+4                                | 7E-6                                           | 2E-8                                           | -                                                | -                                                              |
|            |                          | Y, see <sup>104</sup> Cd                        | -                                                     | 1E+4                                | 6E-6                                           | 2E-8                                           | -                                                | -                                                              |

| Atomic No. | Radionuclide                       | Class                                                                                                                  | Table 1<br>Occupational Values  |                      |                      | Table 2<br>Effluent Concentrations |                | Table 3<br>Releases to Sewers          |
|------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------|----------------------|----------------------|------------------------------------|----------------|----------------------------------------|
|            |                                    |                                                                                                                        | Col. 1                          | Col. 2               | Col. 3               | Col. 1                             | Col. 2         | Monthly Average Concentration (μCi/ml) |
|            |                                    |                                                                                                                        | Oral Ingestion ALI (μCi)        | Inhalation ALI (μCi) | DAC (μCi/ml)         | Air (μCi/ml)                       | Water (μCi/ml) |                                        |
| 48         | Cadmium-117                        | D, see <sup>104</sup> Cd<br>W, see <sup>104</sup> Cd<br>Y, see <sup>104</sup> Cd                                       | 5E+3<br>-<br>-                  | 1E+4<br>2E+4<br>1E+4 | 5E-6<br>7E-6<br>6E-6 | 2E-8<br>2E-8<br>2E-8               | 6E-5<br>-<br>- | 6E-4<br>-<br>-                         |
| 49         | Indium-109                         | D, all compounds except those given for W<br>W, oxides, hydroxides, halides, and nitrates                              | 2E+4<br>-                       | 4E+4<br>6E+4         | 2E-5<br>3E-5         | 6E-8<br>9E-8                       | 3E-4<br>-      | 3E-3<br>-                              |
| 49         | Indium-110 <sup>2</sup> (69.1 min) | D, see <sup>109</sup> In<br>W, see <sup>109</sup> In                                                                   | 2E+4<br>-                       | 4E+4<br>6E+4         | 2E-5<br>2E-5         | 6E-8<br>8E-8                       | 2E-4<br>-      | 2E-3<br>-                              |
| 49         | Indium-110 (4.9 h)                 | D, see <sup>109</sup> In<br>W, see <sup>109</sup> In                                                                   | 5E+3<br>-                       | 2E+4<br>2E+4         | 7E-6<br>8E-6         | 2E-8<br>3E-8                       | 7E-5<br>-      | 7E-4<br>-                              |
| 49         | Indium-111                         | D, see <sup>109</sup> In<br>W, see <sup>109</sup> In                                                                   | 4E+3<br>-                       | 6E+3<br>6E+3         | 3E-6<br>3E-6         | 9E-9<br>9E-9                       | 6E-5<br>-      | 6E-4<br>-                              |
| 49         | Indium-112 <sup>2</sup>            | D, see <sup>109</sup> In<br>W, see <sup>109</sup> In                                                                   | 2E+5<br>-                       | 6E+5<br>7E+5         | 3E-4<br>3E-4         | 9E-7<br>1E-6                       | 2E-3<br>-      | 2E-2<br>-                              |
| 49         | Indium-113m <sup>2</sup>           | D, see <sup>109</sup> In<br>W, see <sup>109</sup> In                                                                   | 5E+4<br>-                       | 1E+5<br>2E+5         | 6E-5<br>8E-5         | 2E-7<br>3E-7                       | 7E-4<br>-      | 7E-3<br>-                              |
| 49         | Indium-114m                        | D, see <sup>109</sup> In<br>W, see <sup>109</sup> In                                                                   | 3E+2<br>LLI wall<br>(4E+2)<br>- | 6E+1<br>1E+2         | 3E-8<br>4E-8         | 9E-11<br>1E-10                     | -<br>5E-6<br>- | -<br>5E-5<br>-                         |
| 49         | Indium-115a                        | D, see <sup>109</sup> In<br>W, see <sup>109</sup> In                                                                   | 1E+4<br>-                       | 4E+4<br>5E+4         | 2E-5<br>2E-5         | 6E-8<br>7E-8                       | 2E-4<br>-      | 2E-3<br>-                              |
| 49         | Indium-115                         | D, see <sup>109</sup> In<br>W, see <sup>109</sup> In                                                                   | 4E+1<br>-                       | 1E+0<br>5E+0         | 6E-10<br>2E-9        | 2E-12<br>8E-12                     | 5E-7<br>-      | 5E-6<br>-                              |
| 49         | Indium-116m <sup>2</sup>           | D, see <sup>109</sup> In<br>W, see <sup>109</sup> In                                                                   | 2E+4<br>-                       | 8E+4<br>1E+5         | 3E-5<br>5E-5         | 1E-7<br>2E-7                       | 3E-4<br>-      | 3E-3<br>-                              |
| 49         | Indium-117m <sup>2</sup>           | D, see <sup>109</sup> In<br>W, see <sup>109</sup> In                                                                   | 1E+4<br>-                       | 3E+4<br>4E+4         | 1E-5<br>2E-5         | 5E-8<br>6E-8                       | 2E-4<br>-      | 2E-3<br>-                              |
| 49         | Indium-117 <sup>2</sup>            | D, see <sup>109</sup> In<br>W, see <sup>109</sup> In                                                                   | 6E+4<br>-                       | 2E+5<br>2E+5         | 7E-5<br>9E-5         | 2E-7<br>3E-7                       | 8E-4<br>-      | 8E-3<br>-                              |
| 49         | Indium-119m <sup>2</sup>           | D, see <sup>109</sup> In<br>W, see <sup>109</sup> In                                                                   | 4E+4<br>St. wall<br>(5E+4)<br>- | 1E+5<br>1E+5         | 5E-5<br>6E-5         | 2E-7<br>2E-7                       | -<br>7E-4<br>- | -<br>7E-3<br>-                         |
| 50         | Tin-110                            | D, all compounds except those given for W<br>W, sulfides, oxides, hydroxides, halides, nitrates, and stannic phosphate | 4E+3<br>-                       | 1E+4<br>1E+4         | 5E-6<br>5E-6         | 2E-8<br>2E-8                       | 5E-5<br>-      | 5E-4<br>-                              |
| 50         | Tin-111 <sup>2</sup>               | D, see <sup>110</sup> Sn<br>W, see <sup>110</sup> Sn                                                                   | 7E+4<br>-                       | 2E+5<br>3E+5         | 9E-5<br>1E-4         | 3E-7<br>4E-7                       | 1E-3<br>-      | 1E-2<br>-                              |

| Atomic No. | Radionuclide               | Class                                                            | Table 1<br>Occupational Values                           |                                                 |                                                | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to<br>Sewers                                     |
|------------|----------------------------|------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------|------------------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------|
|            |                            |                                                                  | Col. 1<br>Oral<br>Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                                      |                                                | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly<br>Average<br>Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                            |                                                                  |                                                          | Col. 2<br>ALI<br>( $\mu\text{Ci}$ )             | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                      |
| 50         | Tin-113                    | D, see $^{110}\text{Sn}$                                         | $2\text{E}+3$<br>LLI wall<br>( $2\text{E}+3$ )           | $1\text{E}+3$                                   | $5\text{E}-7$                                  | $2\text{E}-9$                                  | -                                                | -                                                                    |
|            |                            | W, see $^{110}\text{Sn}$                                         | -                                                        | $5\text{E}+2$                                   | $2\text{E}-7$                                  | $8\text{E}-10$                                 | $3\text{E}-5$                                    | $3\text{E}-4$                                                        |
| 50         | Tin-117m                   | D, see $^{110}\text{Sn}$                                         | $2\text{E}+3$<br>LLI wall<br>( $2\text{E}+3$ )           | $1\text{E}+3$<br>Bone surf<br>( $2\text{E}+3$ ) | $5\text{E}-7$                                  | -                                              | -                                                | -                                                                    |
|            |                            | W, see $^{110}\text{Sn}$                                         | -                                                        | $1\text{E}+3$                                   | $6\text{E}-7$                                  | $3\text{E}-9$<br>$2\text{E}-9$                 | $3\text{E}-5$                                    | $3\text{E}-4$                                                        |
| 50         | Tin-119m                   | D, see $^{110}\text{Sn}$                                         | $3\text{E}+3$<br>LLI wall<br>( $4\text{E}+3$ )           | $2\text{E}+3$                                   | $1\text{E}-6$                                  | $3\text{E}-9$                                  | -                                                | -                                                                    |
|            |                            | W, see $^{110}\text{Sn}$                                         | -                                                        | $1\text{E}+3$                                   | $4\text{E}-7$                                  | $1\text{E}-9$                                  | $6\text{E}-5$                                    | $6\text{E}-4$                                                        |
| 50         | Tin-121m                   | D, see $^{110}\text{Sn}$                                         | $3\text{E}+3$<br>LLI wall<br>( $4\text{E}+3$ )           | $9\text{E}+2$                                   | $4\text{E}-7$                                  | $1\text{E}-9$                                  | -                                                | -                                                                    |
|            |                            | W, see $^{110}\text{Sn}$                                         | -                                                        | $5\text{E}+2$                                   | $2\text{E}-7$                                  | $8\text{E}-10$                                 | $5\text{E}-5$                                    | $5\text{E}-4$                                                        |
| 50         | Tin-121                    | D, see $^{110}\text{Sn}$                                         | $6\text{E}+3$<br>LLI wall<br>( $6\text{E}+3$ )           | $2\text{E}+4$                                   | $6\text{E}-6$                                  | $2\text{E}-8$                                  | -                                                | -                                                                    |
|            |                            | W, see $^{110}\text{Sn}$                                         | -                                                        | $1\text{E}+4$                                   | $5\text{E}-6$                                  | $2\text{E}-8$                                  | $8\text{E}-5$                                    | $8\text{E}-4$                                                        |
| 50         | Tin-123m <sup>2</sup>      | D, see $^{110}\text{Sn}$                                         | $5\text{E}+4$                                            | $1\text{E}+5$                                   | $5\text{E}-5$                                  | $2\text{E}-7$                                  | $7\text{E}-4$                                    | $7\text{E}-3$                                                        |
|            |                            | W, see $^{110}\text{Sn}$                                         | -                                                        | $1\text{E}+5$                                   | $6\text{E}-5$                                  | $2\text{E}-7$                                  | -                                                | -                                                                    |
| 50         | Tin-123                    | D, see $^{110}\text{Sn}$                                         | $5\text{E}+2$<br>LLI wall<br>( $6\text{E}+2$ )           | $6\text{E}+2$                                   | $3\text{E}-7$                                  | $9\text{E}-10$                                 | -                                                | -                                                                    |
|            |                            | W, see $^{110}\text{Sn}$                                         | -                                                        | $2\text{E}+2$                                   | $7\text{E}-8$                                  | $2\text{E}-10$                                 | $9\text{E}-6$                                    | $9\text{E}-5$                                                        |
| 50         | Tin-125                    | D, see $^{110}\text{Sn}$                                         | $4\text{E}+2$<br>LLI wall<br>( $5\text{E}+2$ )           | $9\text{E}+2$                                   | $4\text{E}-7$                                  | $1\text{E}-9$                                  | -                                                | -                                                                    |
|            |                            | W, see $^{110}\text{Sn}$                                         | -                                                        | $4\text{E}+2$                                   | $1\text{E}-7$                                  | $5\text{E}-10$                                 | $6\text{E}-6$                                    | $6\text{E}-5$                                                        |
| 50         | Tin-126                    | D, see $^{110}\text{Sn}$                                         | $3\text{E}+2$                                            | $6\text{E}+1$                                   | $2\text{E}-8$                                  | $8\text{E}-11$                                 | $4\text{E}-6$                                    | $4\text{E}-5$                                                        |
|            |                            | W, see $^{110}\text{Sn}$                                         | -                                                        | $7\text{E}+1$                                   | $3\text{E}-8$                                  | $9\text{E}-11$                                 | -                                                | -                                                                    |
| 50         | Tin-127                    | D, see $^{110}\text{Sn}$                                         | $7\text{E}+3$                                            | $2\text{E}+4$                                   | $8\text{E}-6$                                  | $3\text{E}-8$                                  | $9\text{E}-5$                                    | $9\text{E}-4$                                                        |
|            |                            | W, see $^{110}\text{Sn}$                                         | -                                                        | $2\text{E}+4$                                   | $8\text{E}-6$                                  | $3\text{E}-8$                                  | -                                                | -                                                                    |
| 50         | Tin-128 <sup>2</sup>       | D, see $^{110}\text{Sn}$                                         | $9\text{E}+3$                                            | $3\text{E}+4$                                   | $1\text{E}-5$                                  | $4\text{E}-8$                                  | $1\text{E}-4$                                    | $1\text{E}-3$                                                        |
|            |                            | W, see $^{110}\text{Sn}$                                         | -                                                        | $4\text{E}+4$                                   | $1\text{E}-5$                                  | $5\text{E}-8$                                  | -                                                | -                                                                    |
| 51         | Antimony-115 <sup>2</sup>  | D, all compounds except those given for W                        | $8\text{E}+4$                                            | $2\text{E}+5$                                   | $1\text{E}-4$                                  | $3\text{E}-7$                                  | $1\text{E}-3$                                    | $1\text{E}-2$                                                        |
|            |                            | W, oxides, hydroxides, halides, sulfides, sulfates, and nitrates | -                                                        | $3\text{E}+5$                                   | $1\text{E}-4$                                  | $4\text{E}-7$                                  | -                                                | -                                                                    |
| 51         | Antimony-116m <sup>2</sup> | D, see $^{115}\text{Sb}$                                         | $2\text{E}+4$                                            | $7\text{E}+4$                                   | $3\text{E}-5$                                  | $1\text{E}-7$                                  | $3\text{E}-4$                                    | $3\text{E}-3$                                                        |
|            |                            | W, see $^{115}\text{Sb}$                                         | -                                                        | $1\text{E}+5$                                   | $6\text{E}-5$                                  | $2\text{E}-7$                                  | -                                                | -                                                                    |
| 51         | Antimony-116 <sup>2</sup>  | D, see $^{115}\text{Sb}$                                         | $7\text{E}+4$<br>St. wall<br>( $9\text{E}+4$ )           | $3\text{E}+5$                                   | $1\text{E}-4$                                  | $4\text{E}-7$                                  | -                                                | -                                                                    |
|            |                            | W, see $^{115}\text{Sb}$                                         | -                                                        | $3\text{E}+5$                                   | $1\text{E}-4$                                  | $5\text{E}-7$                                  | $1\text{E}-3$                                    | $1\text{E}-2$                                                        |
| 51         | Antimony-117               | D, see $^{115}\text{Sb}$                                         | $7\text{E}+4$                                            | $2\text{E}+5$                                   | $9\text{E}-5$                                  | $3\text{E}-7$                                  | $9\text{E}-4$                                    | $9\text{E}-3$                                                        |
|            |                            | W, see $^{115}\text{Sb}$                                         | -                                                        | $3\text{E}+5$                                   | $1\text{E}-4$                                  | $4\text{E}-7$                                  | -                                                | -                                                                    |

| Atomic No. | Radionuclide                            | Class                                                | Table 1<br>Occupational Values                           |                                                        |                                      | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to<br>Sewers                                     |
|------------|-----------------------------------------|------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------|--------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------|
|            |                                         |                                                      | Col. 1<br>Oral<br>Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 2 Col. 3<br>Inhalation                            |                                      | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly<br>Average<br>Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                                         |                                                      |                                                          | ALI<br>( $\mu\text{Ci}$ )                              | DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                      |
| 51         | Antimony-118m                           | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 6E+3<br>5E+3                                             | 2E+4<br>2E+4                                           | 8E-6<br>9E-6                         | 3E-8<br>3E-8                                   | 7E-5<br>-                                        | 7E-4<br>-                                                            |
| 51         | Antimony-119                            | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 2E+4<br>2E+4                                             | 5E+4<br>3E+4                                           | 2E-5<br>1E-5                         | 6E-8<br>4E-8                                   | 2E-4<br>-                                        | 2E-3<br>-                                                            |
| 51         | Antimony-120 <sup>1</sup><br>(16 min)   | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 1E+5<br>St. wall<br>(2E+5)<br>-                          | 4E+5<br>-<br>5E+5                                      | 2E-4<br>-<br>2E-4                    | 6E-7<br>-<br>7E-7                              | -<br>2E-3<br>-                                   | -<br>2E-2<br>-                                                       |
| 51         | Antimony-120<br>(5.76 d)                | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 1E+3<br>9E+2                                             | 2E+3<br>1E+3                                           | 9E-7<br>5E-7                         | 3E-9<br>2E-9                                   | 1E-5<br>-                                        | 1E-4<br>-                                                            |
| 51         | Antimony-122                            | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 8E+2<br>LLI wall<br>(8E+2)<br>7E+2                       | 2E+3<br>-<br>1E+3                                      | 1E-6<br>-<br>4E-7                    | 3E-9<br>-<br>2E-9                              | -<br>1E-5<br>-                                   | -<br>1E-4<br>-                                                       |
| 51         | Antimony-124m <sup>2</sup>              | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 3E+5<br>2E+5                                             | 8E+5<br>6E+5                                           | 4E-4<br>2E-4                         | 1E-6<br>8E-7                                   | 3E-3<br>-                                        | 3E-2<br>-                                                            |
| 51         | Antimony-124                            | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 6E+2<br>5E+2                                             | 9E+2<br>2E+2                                           | 4E-7<br>1E-7                         | 1E-9<br>3E-10                                  | 7E-6<br>-                                        | 7E-5<br>-                                                            |
| 51         | Antimony-125                            | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 2E+3<br>-                                                | 2E+3<br>5E+2                                           | 1E-6<br>2E-7                         | 3E-9<br>7E-10                                  | 3E-5<br>-                                        | 3E-4<br>-                                                            |
| 51         | Antimony-126m <sup>2</sup>              | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 5E+4<br>St. wall<br>(7E+4)<br>-                          | 2E+5<br>-<br>2E+5                                      | 8E-5<br>-<br>8E-5                    | 3E-7<br>-<br>3E-7                              | -<br>9E-4<br>-                                   | -<br>9E-3<br>-                                                       |
| 51         | Antimony-126                            | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 6E+2<br>5E+2                                             | 1E+3<br>5E+2                                           | 5E-7<br>2E-7                         | 2E-9<br>7E-10                                  | 7E-6<br>-                                        | 7E-5<br>-                                                            |
| 51         | Antimony-127                            | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 8E+2<br>LLI wall<br>(8E+2)<br>7E+2                       | 2E+3<br>-<br>9E+2                                      | 9E-7<br>-<br>4E-7                    | 3E-9<br>-<br>1E-9                              | -<br>1E-5<br>-                                   | -<br>1E-4<br>-                                                       |
| 51         | Antimony-128 <sup>2</sup><br>(10.4 min) | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 8E+4<br>St. wall<br>(1E+5)<br>-                          | 4E+5<br>-<br>4E+5                                      | 2E-4<br>-<br>2E-4                    | 5E-7<br>-<br>6E-7                              | -<br>1E-3<br>-                                   | -<br>1E-2<br>-                                                       |
| 51         | Antimony-128<br>(9.01 h)                | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 1E+3<br>-                                                | 4E+3<br>3E+3                                           | 2E-6<br>1E-6                         | 6E-9<br>5E-9                                   | 2E-5<br>-                                        | 2E-4<br>-                                                            |
| 51         | Antimony-129                            | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 3E+3<br>-                                                | 9E+3<br>9E+3                                           | 4E-6<br>4E-6                         | 1E-8<br>1E-8                                   | 4E-5<br>-                                        | 4E-4<br>-                                                            |
| 51         | Antimony-130 <sup>2</sup>               | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 2E+4<br>-                                                | 6E+4<br>8E+4                                           | 3E-5<br>3E-5                         | 9E-8<br>1E-7                                   | 3E-4<br>-                                        | 3E-3<br>-                                                            |
| 51         | Antimony-131 <sup>2</sup>               | D, see $^{115}\text{Sb}$<br>W, see $^{115}\text{Sb}$ | 1E+4<br>Thyroid<br>(2E+4)<br>-                           | 2E+4<br>Thyroid<br>(4E+4)<br>2E+4<br>Thyroid<br>(4E+4) | 1E-5<br>-<br>1E-5<br>-               | -<br>6E-8<br>-                                 | -<br>2E-4<br>-                                   | -<br>2E-3<br>-                                                       |



| Atomic No. | Radionuclide               | Class                                     | Table 1<br>Occupational Values                 |                              |                                 | Table 2<br>Effluent Concentrations           |                                   | Table 3<br>Releases to Sewers                   |
|------------|----------------------------|-------------------------------------------|------------------------------------------------|------------------------------|---------------------------------|----------------------------------------------|-----------------------------------|-------------------------------------------------|
|            |                            |                                           | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu$ Ci) | Inhalation                   |                                 | Col. 1<br>Air<br>( $\mu$ Ci/m <sup>3</sup> ) | Col. 2<br>Water<br>( $\mu$ Ci/ml) | Monthly Average Concentration<br>( $\mu$ Ci/ml) |
|            |                            |                                           |                                                | Col. 2<br>All<br>( $\mu$ Ci) | Col. 3<br>DAC<br>( $\mu$ Ci/ml) |                                              |                                   |                                                 |
| 52         | Tellurium-116              | D, all compounds except those given for W | 8E+3                                           | 2E+4                         | 9E-6                            | 3E-8                                         | 1E-4                              | 1E-3                                            |
|            |                            | W, oxides, hydroxides, and nitrates       | -                                              | 3E+4                         | 1E-5                            | 4E-8                                         | -                                 | -                                               |
| 52         | Tellurium-121m             | D, see <sup>116</sup> Te                  | 5E+2<br>Bone surf<br>(7E+2)                    | 2E+2<br>Bone surf<br>(4E+2)  | 8E-8                            | -                                            | -                                 | -                                               |
|            |                            | W, see <sup>116</sup> Te                  | -                                              | 4E+2                         | 2E-7                            | 5E-10<br>6E-10                               | 1E-5                              | 1E-4                                            |
| 52         | Tellurium-121              | D, see <sup>116</sup> Te                  | 3E+3                                           | 4E+3                         | 2E-6                            | 6E-9                                         | 4E-5                              | 4E-4                                            |
|            |                            | W, see <sup>116</sup> Te                  | -                                              | 3E+3                         | 1E-6                            | 4E-9                                         | -                                 | -                                               |
| 52         | Tellurium-123m             | D, see <sup>116</sup> Te                  | 6E+2<br>Bone surf<br>(1E+3)                    | 2E+2<br>Bone surf<br>(5E+2)  | 9E-8                            | -                                            | -                                 | -                                               |
|            |                            | W, see <sup>116</sup> Te                  | -                                              | 5E+2                         | 2E-7                            | 8E-10<br>8E-10                               | 1E-5                              | 1E-4                                            |
| 52         | Tellurium-123              | D, see <sup>116</sup> Te                  | 5E+2<br>Bone surf<br>(1E+3)                    | 2E+2<br>Bone surf<br>(5E+2)  | 8E-8                            | -                                            | -                                 | -                                               |
|            |                            | W, see <sup>116</sup> Te                  | -                                              | 4E+2<br>Bone surf<br>(1E+3)  | 2E-7                            | 7E-10                                        | 2E-5                              | 2E-4                                            |
|            |                            |                                           | -                                              | -                            | -                               | 2E-9                                         | -                                 | -                                               |
| 52         | Tellurium-125m             | D, see <sup>116</sup> Te                  | 1E+3<br>Bone surf<br>(1E+3)                    | 4E+2<br>Bone surf<br>(1E+3)  | 2E-7                            | -                                            | -                                 | -                                               |
|            |                            | W, see <sup>116</sup> Te                  | -                                              | 7E+2                         | 3E-7                            | 1E-9<br>1E-9                                 | 2E-5                              | 2E-4                                            |
| 52         | Tellurium-127m             | D, see <sup>116</sup> Te                  | 6E+2                                           | 3E+2<br>Bone surf<br>(4E+2)  | 1E-7                            | -                                            | 9E-6                              | 9E-5                                            |
|            |                            | W, see <sup>116</sup> Te                  | -                                              | 3E+2                         | 1E-7                            | 6E-10<br>4E-10                               | -                                 | -                                               |
| 52         | Tellurium-127              | D, see <sup>116</sup> Te                  | 7E+3                                           | 2E+4                         | 9E-6                            | 3E-8                                         | 1E-4                              | 1E-3                                            |
|            |                            | W, see <sup>116</sup> Te                  | -                                              | 2E+4                         | 7E-6                            | 2E-8                                         | -                                 | -                                               |
| 52         | Tellurium-129m             | D, see <sup>116</sup> Te                  | 5E+2                                           | 6E+2<br>2E+2                 | 3E-7<br>1E-7                    | 9E-10<br>3E-10                               | 7E-6                              | 7E-5                                            |
|            |                            | W, see <sup>116</sup> Te                  | -                                              | -                            | -                               | -                                            | -                                 | -                                               |
| 52         | Tellurium-129 <sup>2</sup> | D, see <sup>116</sup> Te                  | 3E+4                                           | 6E+4                         | 3E-5                            | 9E-8                                         | 4E-4                              | 4E-3                                            |
|            |                            | W, see <sup>116</sup> Te                  | -                                              | 7E+4                         | 3E-5                            | 1E-7                                         | -                                 | -                                               |
| 52         | Tellurium-131m             | D, see <sup>116</sup> Te                  | 3E+2<br>Thyroid<br>(6E+2)                      | 4E+2<br>Thyroid<br>(1E+3)    | 2E-7                            | -                                            | -                                 | -                                               |
|            |                            | W, see <sup>116</sup> Te                  | -                                              | 4E+2<br>Thyroid<br>(9E+2)    | 2E-7                            | 2E-9                                         | 8E-6                              | 8E-5                                            |
|            |                            |                                           | -                                              | -                            | -                               | 1E-9                                         | -                                 | -                                               |
| 52         | Tellurium-131 <sup>2</sup> | D, see <sup>116</sup> Te                  | 3E+3<br>Thyroid<br>(6E+3)                      | 5E+3<br>Thyroid<br>(1E+4)    | 2E-6                            | -                                            | -                                 | -                                               |
|            |                            | W, see <sup>116</sup> Te                  | -                                              | 5E+3<br>Thyroid<br>(1E+4)    | 2E-6                            | 2E-8                                         | 8E-5                              | 8E-4                                            |
|            |                            |                                           | -                                              | -                            | -                               | 2E-8                                         | -                                 | -                                               |

| Atomic No. | Radionuclide                | Class                    | Table 1<br>Occupational Values     |                        |              | Table 2<br>Effluent Concentrations |                          | Table 3<br>Releases to Sewers          |
|------------|-----------------------------|--------------------------|------------------------------------|------------------------|--------------|------------------------------------|--------------------------|----------------------------------------|
|            |                             |                          | Col. 1<br>Oral Ingestion ALI (μCi) | Inhalation             |              | Col. 1<br>Air (μCi/ml)             | Col. 2<br>Water (μCi/ml) | Monthly Average Concentration (μCi/ml) |
|            |                             |                          |                                    | ALI (μCi)              | DAC (μCi/ml) |                                    |                          |                                        |
| 52         | Tellurium-132               | D, see <sup>116</sup> Te | 2E+2<br>Thyroid (7E+2)             | 2E+2<br>Thyroid (8E+2) | 9E-8         | -                                  | -                        | -                                      |
|            |                             | W, see <sup>116</sup> Te | -                                  | 2E+2<br>Thyroid (6E+2) | 9E-8         | 1E-9                               | 9E-6                     | 9E-5                                   |
|            |                             |                          | -                                  | -                      | -            | 9E-10                              | -                        | -                                      |
| 52         | Tellurium-133m <sup>2</sup> | D, see <sup>116</sup> Te | 3E+3<br>Thyroid (6E+3)             | 5E+3<br>Thyroid (1E+4) | 2E-6         | -                                  | -                        | -                                      |
|            |                             | W, see <sup>116</sup> Te | -                                  | 5E+3<br>Thyroid (1E+4) | 2E-6         | 2E-8                               | 9E-5                     | 9E-4                                   |
|            |                             |                          | -                                  | -                      | -            | 2E-8                               | -                        | -                                      |
| 52         | Tellurium-133 <sup>2</sup>  | D, see <sup>116</sup> Te | 1E+4<br>Thyroid (3E+4)             | 2E+4<br>Thyroid (6E+4) | 9E-6         | -                                  | -                        | -                                      |
|            |                             | W, see <sup>116</sup> Te | -                                  | 2E+4<br>Thyroid (6E+4) | 9E-6         | 8E-8                               | 4E-4                     | 4E-3                                   |
|            |                             |                          | -                                  | -                      | -            | 8E-8                               | -                        | -                                      |
| 52         | Tellurium-134 <sup>2</sup>  | D, see <sup>116</sup> Te | 2E+4<br>Thyroid (2E+4)             | 2E+4<br>Thyroid (5E+4) | 1E-5         | -                                  | -                        | -                                      |
|            |                             | W, see <sup>116</sup> Te | -                                  | 2E+4<br>Thyroid (5E+4) | 1E-5         | 7E-8                               | 3E-4                     | 3E-3                                   |
|            |                             |                          | -                                  | -                      | -            | 7E-8                               | -                        | -                                      |
| 53         | Iodine-120m <sup>2</sup>    | D, all compounds         | 1E+4<br>Thyroid (1E+4)             | 2E+4                   | 9E-6         | 3E-8                               | -                        | -                                      |
| 53         | Iodine-120 <sup>2</sup>     | D, all compounds         | 4E+3<br>Thyroid (8E+3)             | 9E+3<br>Thyroid (1E+4) | 4E-6         | -                                  | 2E-4                     | 2E-3                                   |
| 53         | Iodine-121                  | D, all compounds         | 1E+4<br>Thyroid (3E+4)             | 2E+4<br>Thyroid (5E+4) | 8E-6         | -                                  | -                        | -                                      |
| 53         | Iodine-123                  | D, all compounds         | 3E+3<br>Thyroid (1E+4)             | 6E+3<br>Thyroid (2E+4) | 3E-6         | -                                  | -                        | -                                      |
| 53         | Iodine-124                  | D, all compounds         | 5E+1<br>Thyroid (2E+2)             | 8E+1<br>Thyroid (3E+2) | 3E-8         | -                                  | -                        | -                                      |
| 53         | Iodine-125                  | D, all compounds         | 4E+1<br>Thyroid (1E+2)             | 6E+1<br>Thyroid (2E+2) | 3E-8         | -                                  | -                        | -                                      |
| 53         | Iodine-126                  | D, all compounds         | 2E+1<br>Thyroid (7E+1)             | 4E+1<br>Thyroid (1E+2) | 1E-8         | -                                  | -                        | -                                      |
| 52         | Iodine-128 <sup>2</sup>     | D, all compounds         | 4E+4<br>St. wall (6E+4)            | 1E+5                   | 5E-5         | 2E-7                               | -                        | -                                      |
| 53         | Iodine-129                  | D, all compounds         | 5E+0<br>Thyroid (2E+1)             | 9E+0<br>Thyroid (3E+1) | 4E-9         | -                                  | -                        | -                                      |
|            |                             |                          | -                                  | -                      | -            | 4E-11                              | 2E-7                     | 2E-6                                   |

| Atomic No. | Radionuclide             | Class                   | Table 1<br>Occupational Values                        |                                     |                                               | Table 2<br>Effluent Concentrations            |                                                 | Table 3<br>Releases to Sewers                                 |
|------------|--------------------------|-------------------------|-------------------------------------------------------|-------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------|
|            |                          |                         | Col. 1<br>Oral Ingestion<br>All<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                               | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                          |                         |                                                       | Col. 2<br>All<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{ml}$ ) |                                               |                                                 |                                                               |
|            |                          |                         |                                                       |                                     |                                               |                                               |                                                 |                                                               |
| 53         | Iodine-130               | D, all compounds        | 4E+2<br>Thyroid<br>(1E+3)                             | 7E+2<br>Thyroid<br>(2E+3)           | 3E-7<br>-                                     | -<br>3E-9                                     | -<br>2E-5                                       | -<br>2E-4                                                     |
| 53         | Iodine-131               | D, all compounds        | 3E+1<br>Thyroid<br>(9E+1)                             | 5E+1<br>Thyroid<br>(2E+2)           | 2E-8<br>-                                     | -<br>2E-10                                    | -<br>1E-6                                       | -<br>1E-5                                                     |
| 53         | Iodine-132m <sup>2</sup> | D, all compounds        | 4E+3<br>Thyroid<br>(1E+4)                             | 8E+3<br>Thyroid<br>(2E+4)           | 4E-6<br>-                                     | -<br>3E-8                                     | -<br>1E-4                                       | -<br>1E-3                                                     |
| 53         | Iodine-132               | D, all compounds        | 4E+3<br>Thyroid<br>(9E+3)                             | 8E+3<br>Thyroid<br>(1E+4)           | 3E-6<br>-                                     | -<br>2E-8                                     | -<br>1E-4                                       | -<br>1E-3                                                     |
| 53         | Iodine-133               | D, all compounds        | 1E+2<br>Thyroid<br>(5E+2)                             | 3E+2<br>Thyroid<br>(9E+2)           | 1E-7<br>-                                     | -<br>1E-9                                     | -<br>7E-6                                       | -<br>7E-5                                                     |
| 53         | Iodine-134 <sup>2</sup>  | D, all compounds        | 2E+4<br>Thyroid<br>(3E+4)                             | 5E+4<br>-                           | 2E-5<br>-                                     | 6E-8<br>-                                     | -<br>4E-4                                       | -<br>4E-3                                                     |
| 53         | Iodine-135               | D, all compounds        | 8E+2<br>Thyroid<br>(3E+3)                             | 2E+3<br>Thyroid<br>(4E+3)           | 7E-7<br>-                                     | -<br>6E-9                                     | -<br>3E-5                                       | -<br>3E-4                                                     |
| 54         | Xenon-120 <sup>2</sup>   | Submersion <sup>1</sup> | -                                                     | -                                   | 1E-5                                          | 4E-8                                          | -                                               | -                                                             |
| 54         | Xenon-121 <sup>2</sup>   | Submersion <sup>1</sup> | -                                                     | -                                   | 2E-6                                          | 1E-8                                          | -                                               | -                                                             |
| 54         | Xenon-122                | Submersion <sup>1</sup> | -                                                     | -                                   | 7E-5                                          | 3E-7                                          | -                                               | -                                                             |
| 54         | Xenon-123                | Submersion <sup>1</sup> | -                                                     | -                                   | 6E-6                                          | 3E-8                                          | -                                               | -                                                             |
| 54         | Xenon-125                | Submersion <sup>1</sup> | -                                                     | -                                   | 2E-5                                          | 7E-8                                          | -                                               | -                                                             |
| 54         | Xenon-127                | Submersion <sup>1</sup> | -                                                     | -                                   | 1E-5                                          | 6E-8                                          | -                                               | -                                                             |
| 54         | Xenon-129m               | Submersion <sup>1</sup> | -                                                     | -                                   | 2E-4                                          | 9E-7                                          | -                                               | -                                                             |
| 54         | Xenon-131m               | Submersion <sup>1</sup> | -                                                     | -                                   | 4E-4                                          | 2E-6                                          | -                                               | -                                                             |
| 54         | Xenon-133m               | Submersion <sup>1</sup> | -                                                     | -                                   | 1E-4                                          | 6E-7                                          | -                                               | -                                                             |
| 54         | Xenon-133                | Submersion <sup>1</sup> | -                                                     | -                                   | 1E-4                                          | 5E-7                                          | -                                               | -                                                             |
| 54         | Xenon-135m <sup>2</sup>  | Submersion <sup>1</sup> | -                                                     | -                                   | 9E-6                                          | 4E-8                                          | -                                               | -                                                             |
| 54         | Xenon-135                | Submersion <sup>1</sup> | -                                                     | -                                   | 1E-5                                          | 7E-8                                          | -                                               | -                                                             |
| 54         | Xenon-138 <sup>2</sup>   | Submersion <sup>1</sup> | -                                                     | -                                   | 4E-6                                          | 2E-8                                          | -                                               | -                                                             |
| 55         | Cesium-125 <sup>2</sup>  | D, all compounds        | 5E+4<br>St. wall<br>(9E+4)                            | 1E+5<br>-                           | 6E-5<br>-                                     | 2E-7<br>-                                     | -<br>1E-3                                       | -<br>1E-4                                                     |
| 55         | Cesium-127               | D, all compounds        | 6E+4                                                  | 9E+4                                | 4E-5                                          | 1E-7                                          | 9E-4                                            | 9E-3                                                          |

| Atomic No. | Radionuclide               | Class                                     | Table 1<br>Occupational Values                        |                                     |                                                | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to Sewers                                  |
|------------|----------------------------|-------------------------------------------|-------------------------------------------------------|-------------------------------------|------------------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|
|            |                            |                                           | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                                | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                            |                                           |                                                       | Col. 2<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                |
| 55         | Cesium-129                 | D, all compounds                          | 2E+4                                                  | 3E+4                                | 1E-5                                           | 5E-8                                           | 3E-4                                             | 3E-3                                                           |
| 55         | Cesium-130 <sup>2</sup>    | D, all compounds                          | 6E+4                                                  | 2E+5                                | 8E-5                                           | 3E-7                                           | -                                                | -                                                              |
|            |                            |                                           | St. wall<br>(1E+5)                                    | -                                   | -                                              | -                                              | 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                                                  | 1E+5                                | 6E-5                                           | 2E-7                                           | -                                                | -                                                              |
|            |                            |                                           | St. wall<br>(1E+5)                                    | -                                   | -                                              | -                                              | 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 <sup>2</sup>   | 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 <sup>2</sup>    | D, all compounds                          | 2E+4                                                  | 6E+4                                | 2E-5                                           | 8E-8                                           | -                                                | -                                                              |
|            |                            |                                           | St. wall<br>(3E+4)                                    | -                                   | -                                              | -                                              | 4E-4                                             | 4E-3                                                           |
| 56         | Barium-126 <sup>2</sup>    | 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 <sup>2</sup>   | D, all compounds                          | 4E+5                                                  | 1E+6                                | 6E-4                                           | 2E-6                                           | -                                                | -                                                              |
|            |                            |                                           | St. wall<br>(5E+5)                                    | -                                   | -                                              | -                                              | 7E-3                                             | 7E-2                                                           |
| 56         | Barium-131                 | D, all compounds                          | 3E+3                                                  | 8E+3                                | 3E-6                                           | 1E-8                                           | 4E-5                                             | 4E-4                                                           |
| 56         | Barium-133m                | D, all compounds                          | 2E+3                                                  | 9E+3                                | 4E-6                                           | 1E-8                                           | -                                                | -                                                              |
|            |                            |                                           | LLI wall<br>(3E+3)                                    | -                                   | -                                              | -                                              | 4E-5                                             | 4E-4                                                           |
| 56         | Barium-133                 | D, all compounds                          | 2E+3                                                  | 7E+2                                | 3E-7                                           | 9E-10                                          | 2E-5                                             | 2E-4                                                           |
| 56         | Barium-135m                | D, all compounds                          | 3E+3                                                  | 1E+4                                | 5E-6                                           | 2E-8                                           | 4E-5                                             | 4E-4                                                           |
| 56         | Barium-139 <sup>2</sup>    | 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<br>(6E+2)                                    | -                                   | -                                              | -                                              | 8E-6                                             | 8E-5                                                           |
| 56         | Barium-141 <sup>2</sup>    | D, all compounds                          | 2E+4                                                  | 7E+4                                | 3E-5                                           | 1E-7                                           | 3E-4                                             | 3E-3                                                           |
| 56         | Barium-142 <sup>2</sup>    | D, all compounds                          | 5E+4                                                  | 1E+5                                | 6E-5                                           | 2E-7                                           | 7E-4                                             | 7E-3                                                           |
| 57         | Lanthanum-131 <sup>2</sup> | 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                                           | -                                                | -                                                              |

| Atomic No. | Radionuclide               | Class                                                                             | Table 1<br>Occupational Values                 |                                              |                                 | Table 2<br>Effluent Concentrations           |                                   | Table 3<br>Releases to Sewers                   |
|------------|----------------------------|-----------------------------------------------------------------------------------|------------------------------------------------|----------------------------------------------|---------------------------------|----------------------------------------------|-----------------------------------|-------------------------------------------------|
|            |                            |                                                                                   | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu$ Ci) | Inhalation                                   |                                 | Col. 1<br>Air<br>( $\mu$ Ci/m <sup>3</sup> ) | Col. 2<br>Water<br>( $\mu$ Ci/ml) | Monthly Average Concentration<br>( $\mu$ Ci/ml) |
|            |                            |                                                                                   |                                                | ALI<br>( $\mu$ Ci)                           | DAC<br>( $\mu$ Ci/ml)           |                                              |                                   |                                                 |
| 57         | Lanthanum-132              | D, see <sup>131</sup> La<br>W, see <sup>131</sup> La                              | 3E+3                                           | 1E+4<br>1E+4                                 | 4E-6<br>5E-6                    | 1E-8<br>2E-8                                 | 4E-5                              | 4E-4                                            |
| 57         | Lanthanum-135              | D, see <sup>131</sup> La<br>W, see <sup>131</sup> La                              | 4E+4                                           | 1E+5<br>9E+4                                 | 4E-5<br>4E-5                    | 1E-7<br>1E-7                                 | 5E-4                              | 5E-3                                            |
| 57         | Lanthanum-137              | D, see <sup>131</sup> La<br>W, see <sup>131</sup> La                              | 1E+4                                           | 6E+1<br>Liver (7E+1)<br>3E+2<br>Liver (3E+2) | 3E-8<br>-<br>1E-7<br>-<br>4E-10 | -<br>1E-10<br>-<br>-<br>-                    | 2E-4                              | 2E-3                                            |
| 57         | Lanthanum-138              | D, see <sup>131</sup> La<br>W, see <sup>131</sup> La                              | 9E+2                                           | 4E+0<br>1E+1                                 | 1E-9<br>6E-9                    | 5E-12<br>2E-11                               | 1E-5                              | 1E-4                                            |
| 57         | Lanthanum-140              | D, see <sup>131</sup> La<br>W, see <sup>131</sup> La                              | 6E+2                                           | 1E+3<br>1E+3                                 | 6E-7<br>5E-7                    | 2E-9<br>2E-9                                 | 9E-6                              | 9E-5                                            |
| 57         | Lanthanum-141              | D, see <sup>131</sup> La<br>W, see <sup>131</sup> La                              | 4E+3                                           | 9E+3<br>1E+4                                 | 4E-6<br>5E-6                    | 1E-8<br>2E-8                                 | 5E-5                              | 5E-4                                            |
| 57         | Lanthanum-142 <sup>2</sup> | D, see <sup>131</sup> La<br>W, see <sup>131</sup> La                              | 8E+3                                           | 2E+4<br>3E+4                                 | 9E-6<br>1E-5                    | 3E-8<br>5E-8                                 | 1E-4                              | 1E-3                                            |
| 57         | Lanthanum-143 <sup>2</sup> | D, see <sup>131</sup> La<br>W, see <sup>131</sup> La                              | 4E+4<br>St. wall (4E+4)<br>-                   | 1E+5<br>-<br>9E+4                            | 4E-5<br>-<br>4E-5               | 1E-7<br>-<br>1E-7                            | -<br>5E-4<br>-                    | -<br>5E-3<br>-                                  |
| 58         | Cerium-134                 | W, all compounds except those given for Y<br>Y, oxides, hydroxides, and fluorides | 5E+2<br>LLI wall (6E+2)<br>-                   | 7E+2<br>-<br>7E+2                            | 3E-7<br>-<br>3E-7               | 1E-9<br>-<br>9E-10                           | -<br>8E-6<br>-                    | -<br>8E-5<br>-                                  |
| 58         | Cerium-135                 | W, see <sup>134</sup> Ce<br>Y, see <sup>134</sup> Ce                              | 2E+3<br>-                                      | 4E+3<br>4E+3                                 | 2E-6<br>1E-6                    | 5E-9<br>5E-9                                 | 2E-5                              | 2E-4                                            |
| 58         | Cerium-137m                | W, see <sup>134</sup> Ce<br>Y, see <sup>134</sup> Ce                              | 2E+3<br>LLI wall (2E+3)<br>-                   | 4E+3<br>-<br>4E+3                            | 2E-6<br>-<br>2E-6               | 6E-9<br>-<br>5E-9                            | -<br>3E-5<br>-                    | -<br>3E-4<br>-                                  |
| 58         | Cerium-137                 | W, see <sup>134</sup> Ce<br>Y, see <sup>134</sup> Ce                              | 5E+4<br>-                                      | 1E+5<br>1E+5                                 | 6E-5<br>5E-5                    | 2E-7<br>2E-7                                 | 7E-4                              | 7E-3                                            |
| 58         | Cerium-139                 | W, see <sup>134</sup> Ce<br>Y, see <sup>134</sup> Ce                              | 5E+3                                           | 8E+2<br>7E+2                                 | 3E-7<br>3E-7                    | 1E-9<br>9E-10                                | 7E-5                              | 7E-4                                            |
| 58         | Cerium-141                 | W, see <sup>134</sup> Ce<br>Y, see <sup>134</sup> Ce                              | 2E+3<br>LLI wall (2E+3)<br>-                   | 7E+2<br>-<br>6E+2                            | 3E-7<br>-<br>2E-7               | 1E-9<br>-<br>8E-10                           | -<br>3E-5<br>-                    | -<br>3E-4<br>-                                  |
| 58         | Cerium-143                 | W, see <sup>134</sup> Ce<br>Y, see <sup>134</sup> Ce                              | 1E+3<br>LLI wall (1E+3)<br>-                   | 2E+3<br>-<br>2E+3                            | 8E-7<br>-<br>7E-7               | 3E-9<br>-<br>2E-9                            | -<br>2E-5<br>-                    | -<br>2E-4<br>-                                  |

| Atomic No. | Radionuclide                  | Class                                          | Table 1<br>Occupational Values                        |                                     |        | Table 2<br>Effluent Concentrations            |                                                 | Table 3<br>Releases to Sewers                                 |
|------------|-------------------------------|------------------------------------------------|-------------------------------------------------------|-------------------------------------|--------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------|
|            |                               |                                                | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 2                              | Col. 3 | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                               |                                                |                                                       |                                     |        |                                               |                                                 |                                                               |
|            |                               |                                                |                                                       |                                     |        |                                               |                                                 |                                                               |
|            |                               |                                                | Inhalation                                            |                                     |        |                                               |                                                 |                                                               |
|            |                               |                                                | ALI<br>( $\mu\text{Ci}$ )                             | DAC<br>( $\mu\text{Ci}/\text{ml}$ ) |        |                                               |                                                 |                                                               |
| 58         | Cerium-144                    | W, see $^{134}\text{Ce}$                       | 2E+2<br>LLI wall<br>(3E+2)                            | 3E+1                                | 1E-8   | 4E-11                                         | -                                               | -                                                             |
|            |                               | Y, see $^{134}\text{Ce}$                       | -                                                     | 1E+1                                | 6E-9   | 2E-11                                         | 3E-6                                            | 3E-5                                                          |
| 59         | Praseodymium-136 <sup>2</sup> | W, all compounds except those given for Y      | 5E+4<br>St. wall<br>(7E+4)                            | 2E+5                                | 1E-4   | 3E-7                                          | -                                               | -                                                             |
|            |                               | Y, oxides, hydroxides, carbides, and fluorides | -                                                     | 2E+5                                | 9E-5   | 3E-7                                          | -                                               | -                                                             |
| 59         | Praseodymium-137 <sup>2</sup> | W, see $^{136}\text{Pr}$                       | 4E+4                                                  | 2E+5                                | 6E-5   | 2E-7                                          | 5E-4                                            | 5E-3                                                          |
|            |                               | Y, see $^{136}\text{Pr}$                       | -                                                     | 1E+5                                | 6E-5   | 2E-7                                          | -                                               | -                                                             |
| 59         | Praseodymium-138 <sup>m</sup> | W, see $^{136}\text{Pr}$                       | 1E+4                                                  | 5E+4                                | 2E-5   | 8E-8                                          | 1E-4                                            | 1E-3                                                          |
|            |                               | Y, see $^{136}\text{Pr}$                       | -                                                     | 4E+4                                | 2E-5   | 6E-8                                          | -                                               | -                                                             |
| 59         | Praseodymium-139              | W, see $^{136}\text{Pr}$                       | 4E+4                                                  | 1E+5                                | 5E-5   | 2E-7                                          | 6E-4                                            | 6E-3                                                          |
|            |                               | Y, see $^{136}\text{Pr}$                       | -                                                     | 1E+5                                | 5E-5   | 2E-7                                          | -                                               | -                                                             |
| 59         | Praseodymium-142 <sup>m</sup> | W, see $^{136}\text{Pr}$                       | 8E+4                                                  | 2E+5                                | 7E-5   | 2E-7                                          | 1E-3                                            | 1E-2                                                          |
|            |                               | Y, see $^{136}\text{Pr}$                       | -                                                     | 1E+5                                | 6E-5   | 2E-7                                          | -                                               | -                                                             |
| 59         | Praseodymium-142              | W, see $^{136}\text{Pr}$                       | 1E+3                                                  | 2E+3                                | 9E-7   | 3E-9                                          | 1E-5                                            | 1E-4                                                          |
|            |                               | Y, see $^{136}\text{Pr}$                       | -                                                     | 2E+3                                | 8E-7   | 3E-9                                          | -                                               | -                                                             |
| 59         | Praseodymium-143              | W, see $^{136}\text{Pr}$                       | 9E+2<br>LLI wall<br>(1E+3)                            | 8E+2                                | 3E-7   | 1E-9                                          | -                                               | -                                                             |
|            |                               | Y, see $^{136}\text{Pr}$                       | -                                                     | 7E+2                                | 3E-7   | 9E-10                                         | 2E-5                                            | 2E-4                                                          |
| 59         | Praseodymium-144 <sup>2</sup> | W, see $^{136}\text{Pr}$                       | 3E+4<br>St. wall<br>(4E+4)                            | 1E+5                                | 5E-5   | 2E-7                                          | -                                               | -                                                             |
|            |                               | Y, see $^{136}\text{Pr}$                       | -                                                     | 1E+5                                | 5E-5   | 2E-7                                          | 6E-4                                            | 6E-3                                                          |
| 59         | Praseodymium-145              | W, see $^{136}\text{Pr}$                       | 3E+3                                                  | 9E+3                                | 4E-6   | 1E-8                                          | 4E-5                                            | 4E-4                                                          |
|            |                               | Y, see $^{136}\text{Pr}$                       | -                                                     | 8E+3                                | 3E-6   | 1E-8                                          | -                                               | -                                                             |
| 59         | Praseodymium-147 <sup>2</sup> | W, see $^{136}\text{Pr}$                       | 5E+4<br>St. wall<br>(8E+4)                            | 2E+5                                | 8E-5   | 3E-7                                          | -                                               | -                                                             |
|            |                               | Y, see $^{136}\text{Pr}$                       | -                                                     | 2E+5                                | 8E-5   | 3E-7                                          | 1E-3                                            | 1E-2                                                          |
| 60         | Neodymium-136 <sup>2</sup>    | 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 $^{136}\text{Nd}$                       | 2E+3                                                  | 6E+3                                | 3E-6   | 9E-9                                          | 3E-5                                            | 3E-4                                                          |
|            |                               | Y, see $^{136}\text{Nd}$                       | -                                                     | 5E+3                                | 2E-6   | 7E-9                                          | -                                               | -                                                             |
| 60         | Neodymium-139 <sup>m</sup>    | W, see $^{136}\text{Nd}$                       | 5E+3                                                  | 2E+4                                | 7E-6   | 2E-8                                          | 7E-5                                            | 7E-4                                                          |
|            |                               | Y, see $^{136}\text{Nd}$                       | -                                                     | 1E+4                                | 6E-6   | 2E-8                                          | -                                               | -                                                             |

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

| Atomic No. | Radionuclide              | Class            | Table 1<br>Occupational Values                        |                             |                                      | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to Sewers                                  |
|------------|---------------------------|------------------|-------------------------------------------------------|-----------------------------|--------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|
|            |                           |                  | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 2<br>Inhalation        |                                      | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                           |                  |                                                       | ALI<br>( $\mu\text{Ci}$ )   | DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                |
| 62         | Samarium-141 <sup>2</sup> | W, all compounds | 3E+4                                                  | 1E+5                        | 4E-5                                 | 1E-7                                           | 4E-4                                             | 4E-3                                                           |
| 62         | Samarium-141 <sup>2</sup> | W, all compounds | 5E+4                                                  | 2E+5                        | 8E-5                                 | 2E-7                                           | -                                                | -                                                              |
|            |                           |                  | St. wall<br>(6E+4)                                    | -                           | -                                    | -                                              | 8E-4                                             | 8E-3                                                           |
| 62         | Samarium-142 <sup>2</sup> | W, all compounds | 8E+3                                                  | 3E+4                        | 1E-5                                 | 4E-8                                           | 1E-4                                             | 1E-3                                                           |
| 62         | Samarium-145              | W, all compounds | 6E+3                                                  | 5E+2                        | 2E-7                                 | 7E-10                                          | 8E-5                                             | 8E-4                                                           |
| 62         | Samarium-146              | W, all compounds | 1E+1<br>Bone surf<br>(3E+1)                           | 4E-2<br>Bone surf<br>(6E-2) | 1E-11<br>-                           | -<br>9E-14                                     | -<br>3E-7                                        | -<br>3E-6                                                      |
| 62         | Samarium-147              | W, all compounds | 2E+1<br>Bone surf<br>(3E+1)                           | 4E-2<br>Bone surf<br>(7E-2) | 2E-11<br>-                           | -<br>1E-13                                     | -<br>4E-7                                        | -<br>4E-6                                                      |
| 62         | Samarium-151              | W, all compounds | 1E+4<br>LLI wall<br>(1E+4)                            | 1E+2<br>Bone surf<br>(2E+2) | 4E-8<br>-                            | -<br>2E-10                                     | -<br>2E-4                                        | -<br>2E-3                                                      |
| 62         | Samarium-153              | W, all compounds | 2E+3<br>LLI wall<br>(2E+3)                            | 3E+3<br>-                   | 1E-6<br>-                            | 4E-9<br>-                                      | -<br>3E-5                                        | -<br>3E-4                                                      |
| 62         | Samarium-155 <sup>2</sup> | W, all compounds | 6E+4<br>St. wall<br>(8E+4)                            | 2E+5<br>-                   | 9E-5<br>-                            | 3E-7<br>-                                      | -<br>1E-3                                        | -<br>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<br>(12.62 h) | W, all compounds | 3E+3                                                  | 8E+3                        | 4E-6                                 | 1E-8                                           | 4E-5                                             | 4E-4                                                           |
| 63         | Europium-150<br>(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<br>Bone surf<br>(1E+2) | 4E-8<br>-                            | -<br>2E-10                                     | 5E-5<br>-                                        | 5E-4<br>-                                                      |
| 63         | Europium-156              | W, all compounds | 6E+2                                                  | 5E+2                        | 2E-7                                 | 6E-10                                          | 8E-6                                             | 8E-5                                                           |



| Atomic No. | Radioisotope                | Class                                                | Table 1<br>Occupational Values                        |                                                            |                                               | Table 2<br>Effluent Concentrations            |                                                 | Table 3<br>Releases to Sewers                                 |
|------------|-----------------------------|------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------|
|            |                             |                                                      | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                                                 |                                               | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                             |                                                      |                                                       | Col. 2<br>ALI<br>( $\mu\text{Ci}$ )                        | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{ml}$ ) |                                               |                                                 |                                                               |
| 63         | Europium-157                | W, all compounds                                     | 2E+3                                                  | 5E+3                                                       | 2E-6                                          | 7E-9                                          | 3E-5                                            | 3E-4                                                          |
| 63         | Europium-158 <sup>2</sup>   | W, all compounds                                     | 2E+4                                                  | 6E+4                                                       | 2E-5                                          | 8E-8                                          | 3E-4                                            | 3E-3                                                          |
| 64         | Gadolinium-145 <sup>2</sup> | D, all compounds except those given for W            | 5E+4<br>St. wall<br>(5E+4)                            | 2E+5                                                       | 6E-5                                          | 2E-7                                          | -                                               | -                                                             |
|            |                             | W, oxides, hydroxides, and fluorides                 | -                                                     | 2E+5                                                       | 7E-5                                          | 2E-7                                          | 6E-4                                            | 6E-3                                                          |
| 64         | Gadolinium-146              | D, see <sup>145</sup> Gd<br>W, see <sup>145</sup> Gd | 1E+3<br>-                                             | 1E+2<br>3E+2                                               | 5E-8<br>1E-7                                  | 2E-10<br>4E-10                                | 2E-5<br>-                                       | 2E-4<br>-                                                     |
| 64         | Gadolinium-147              | D, see <sup>145</sup> Gd<br>W, see <sup>145</sup> Gd | 2E+3<br>-                                             | 4E+3<br>4E+3                                               | 2E-6<br>1E-6                                  | 6E-9<br>5E-9                                  | 3E-5<br>-                                       | 3E-4<br>-                                                     |
| 64         | Gadolinium-148              | D, see <sup>145</sup> Gd<br>W, see <sup>145</sup> Gd | 1E+1<br>Bone surf<br>(2E+1)<br>-                      | 8E-3<br>Bone surf<br>(2E-2)<br>3E-2<br>Bone surf<br>(6E-2) | 3E-12<br>-                                    | -<br>2E-14<br>-                               | -<br>3E-7<br>-                                  | -<br>3E-6<br>-                                                |
| 64         | Gadolinium-149              | D, see <sup>145</sup> Gd<br>W, see <sup>145</sup> Gd | 3E+3<br>-                                             | 2E+3<br>2E+3                                               | 9E-7<br>1E-6                                  | 2E-9<br>3E-9                                  | 4E-5<br>-                                       | 4E-4<br>-                                                     |
| 64         | Gadolinium-151              | D, see <sup>145</sup> Gd<br>W, see <sup>145</sup> Gd | 6E+3<br>-                                             | 4E+2<br>Bone surf<br>(6E+2)<br>1E+3                        | 2E-7<br>-                                     | -<br>9E-10<br>2E-9                            | 9E-5<br>-                                       | 9E-4<br>-                                                     |
| 64         | Gadolinium-152              | D, see <sup>145</sup> Gd<br>W, see <sup>145</sup> Gd | 2E+1<br>Bone surf<br>(3E+1)<br>-                      | 1E-2<br>Bone surf<br>(2E-2)<br>4E-2<br>Bone surf<br>(8E-2) | 4E-12<br>-                                    | -<br>3E-14<br>-                               | -<br>4E-7<br>-                                  | -<br>4E-6<br>-                                                |
| 64         | Gadolinium-153              | D, see <sup>145</sup> Gd<br>W, see <sup>145</sup> Gd | 5E+3<br>-                                             | 1E+2<br>Bone surf<br>(2E+2)<br>6E+2                        | 6E-8<br>-                                     | -<br>3E-10<br>8E-10                           | 6E-5<br>-                                       | 6E-4<br>-                                                     |
| 64         | Gadolinium-159              | D, see <sup>145</sup> Gd<br>W, see <sup>145</sup> Gd | 3E+3<br>-                                             | 8E+3<br>6E+3                                               | 3E-6<br>2E-6                                  | 1E-8<br>8E-9                                  | 4E-5<br>-                                       | 4E-4<br>-                                                     |
| 65         | Terbium-147 <sup>2</sup>    | 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<br>(5.0 h)     | W, all compounds                                     | 2E+4                                                  | 3E+4                                                       | 1E-5                                          | 4E-8                                          | 2E-4                                            | 2E-3                                                          |

| Atomic No. | Radionuclide              | Class            | Table 1<br>Occupational Values                        |                             |                                      | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to Sewers                                  |
|------------|---------------------------|------------------|-------------------------------------------------------|-----------------------------|--------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|
|            |                           |                  | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                  |                                      | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                           |                  |                                                       | ALI<br>( $\mu\text{Ci}$ )   | DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                |
| 65         | Terbium-156m<br>(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<br>LLI wall<br>(5E+4)                            | 3E+2<br>Bone surf<br>(6E+2) | 1E-7<br>-                            | -<br>8E-10                                     | -<br>7E-4                                        | -<br>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<br>LLI wall<br>(2E+3)                            | 2E+3<br>-                   | 7E-7<br>-                            | 2E-9<br>-                                      | -<br>3E-5                                        | -<br>3E-4                                                      |
| 66         | Dysprosium-155            | W, all compounds | 9E+3                                                  | 3E+4                        | 1E-5                                 | 4E-8                                           | 1E-4                                             | 1E-3                                                           |
| 66         | Dysprosium-157            | W, all compounds | 2E+4                                                  | 6E+4                        | 3E-5                                 | 9E-8                                           | 3E-4                                             | 3E-3                                                           |
| 66         | Dysprosium-159            | W, all compounds | 1E+4                                                  | 2E+3                        | 1E-6                                 | 3E-9                                           | 2E-4                                             | 2E-3                                                           |
| 66         | Dysprosium-165            | W, all compounds | 1E+4                                                  | 5E+4                        | 2E-5                                 | 6E-8                                           | 2E-4                                             | 2E-3                                                           |
| 66         | Dysprosium-166            | W, all compounds | 6E+2<br>LLI wall<br>(8E+2)                            | 7E+2<br>-                   | 3E-7<br>-                            | 1E-9<br>-                                      | -<br>1E-5                                        | -<br>1E-4                                                      |
| 67         | Holmium-155 <sup>2</sup>  | W, all compounds | 4E+4                                                  | 2E+5                        | 6E-5                                 | 2E-7                                           | 6E-4                                             | 6E-3                                                           |
| 67         | Holmium-157 <sup>2</sup>  | W, all compounds | 3E+5                                                  | 1E+6                        | 6E-4                                 | 2E-6                                           | 4E-3                                             | 4E-2                                                           |
| 67         | Holmium-159 <sup>2</sup>  | 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 <sup>2</sup> | W, all compounds | 5E+4                                                  | 3E+5                        | 1E-4                                 | 4E-7                                           | 7E-4                                             | 7E-3                                                           |
| 67         | Holmium-162 <sup>2</sup>  | W, all compounds | 5E+5<br>St. wall<br>(8E+5)                            | 2E+6<br>-                   | 1E-3<br>-                            | 3E-6<br>-                                      | -<br>1E-2                                        | -<br>1E-1                                                      |
| 67         | Holmium-164m <sup>2</sup> | W, all compounds | 1E+5                                                  | 3E+5                        | 1E-4                                 | 4E-7                                           | 1E-3                                             | 1E-2                                                           |
| 67         | Holmium-164 <sup>2</sup>  | W, all compounds | 2E+5<br>St. wall<br>(2E+5)                            | 6E+5<br>-                   | 3E-4<br>-                            | 9E-7<br>-                                      | -<br>3E-3                                        | -<br>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<br>LLI wall<br>(9E+2)                            | 2E+3<br>-                   | 7E-7<br>-                            | 2E-9<br>-                                      | -<br>1E-5                                        | -<br>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                                                           |

| Atomic No. | Radionuclide               | Class                                                | Table 1<br>Occupational Values                 |                              |                                 | Table 2<br>Effluent Concentrations |                                   | Table 3<br>Releases to Sewers                   |
|------------|----------------------------|------------------------------------------------------|------------------------------------------------|------------------------------|---------------------------------|------------------------------------|-----------------------------------|-------------------------------------------------|
|            |                            |                                                      | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu$ Ci) | Inhalation                   |                                 | Col. 1<br>Air<br>( $\mu$ Ci/ml)    | Col. 2<br>Water<br>( $\mu$ Ci/ml) | Monthly Average Concentration<br>( $\mu$ Ci/ml) |
|            |                            |                                                      |                                                | Col. 2<br>ALI<br>( $\mu$ Ci) | Col. 3<br>DAC<br>( $\mu$ Ci/ml) |                                    |                                   |                                                 |
| 68         | Erbium-169                 | W, all compounds                                     | 3E+3<br>LLI wall<br>(4E+3)                     | 3E+3                         | 1E-6                            | 4E-9                               | -                                 | -                                               |
| 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<br>LLI wall<br>(1E+3)                     | 1E+3                         | 6E-7                            | 2E-9                               | -                                 | -                                               |
| 69         | Thulium-162 <sup>2</sup>   | W, all compounds                                     | 7E+4<br>St. wall<br>(7E+4)                     | 3E+5                         | 1E-4                            | 4E-7                               | -                                 | -                                               |
| 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<br>LLI wall<br>(2E+3)                     | 2E+3                         | 8E-7                            | 3E-9                               | -                                 | -                                               |
| 69         | Thulium-170                | W, all compounds                                     | 8E+2<br>LLI wall<br>(1E+3)                     | 2E+2                         | 9E-8                            | 3E-10                              | -                                 | -                                               |
| 69         | Thulium-171                | W, all compounds                                     | 1E+4<br>LLI wall<br>(1E+4)                     | 3E+2<br>Bone surf<br>(6E+2)  | 1E-7                            | -                                  | -                                 | -                                               |
| 69         | Thulium-172                | W, all compounds                                     | 7E+2<br>LLI wall<br>(8E+2)                     | 1E+3                         | 5E-7                            | 2E-9                               | -                                 | -                                               |
| 69         | Thulium-173                | W, all compounds                                     | 4E+3                                           | 1E+4                         | 5E-6                            | 2E-8                               | 6E-5                              | 6E-4                                            |
| 69         | Thulium-175 <sup>2</sup>   | W, all compounds                                     | 7E+4<br>St. wall<br>(9E+4)                     | 3E+5                         | 1E-4                            | 4E-7                               | -                                 | -                                               |
| 70         | Ytterbium-162 <sup>2</sup> | W, all compounds except those given for Y            | 7E+4                                           | 3E+5                         | 1E-4                            | 4E-7                               | 1E-3                              | 1E-2                                            |
|            |                            | Y, oxides, hydroxides, and fluorides                 | -                                              | 3E+5                         | 1E-4                            | 4E-7                               | -                                 | -                                               |
| 70         | Ytterbium-166              | W, see <sup>162</sup> Yb<br>Y, see <sup>162</sup> Yb | 1E+3                                           | 2E+3                         | 8E-7                            | 3E-9                               | 2E-5                              | 2E-4                                            |
| 70         | Ytterbium-167 <sup>2</sup> | W, see <sup>162</sup> Yb<br>Y, see <sup>162</sup> Yb | 3E+5                                           | 8E+5                         | 3E-4                            | 1E-6                               | 4E-3                              | 4E-2                                            |
| 70         | Ytterbium-169              | W, see <sup>162</sup> Yb<br>Y, see <sup>162</sup> Yb | 2E+3                                           | 8E+2                         | 4E-7                            | 1E-9                               | 2E-5                              | 2E-4                                            |
| 70         | Ytterbium-175              | W, see <sup>162</sup> Yb                             | 3E+3<br>LLI wall<br>(3E+3)                     | 4E+3                         | 1E-6                            | 5E-9                               | -                                 | -                                               |
|            |                            | Y, see <sup>162</sup> Yb                             | -                                              | 3E+3                         | 1E-6                            | 5E-9                               | 4E-5                              | 4E-4                                            |
| 70         | Ytterbium-177 <sup>2</sup> | W, see <sup>162</sup> Yb<br>Y, see <sup>162</sup> Yb | 2E+4                                           | 5E+4                         | 2E-5                            | 7E-8                               | 2E-4                              | 2E-3                                            |
| 70         | Ytterbium-178 <sup>2</sup> | W, see <sup>162</sup> Yb<br>Y, see <sup>162</sup> Yb | 1E+4                                           | 4E+4                         | 2E-5                            | 6E-8                               | 2E-4                              | 2E-3                                            |

| Atomic No. | Radionuclide               | Class                                                | Table 1<br>Occupational Values                        |                                     |                                                | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to Sewers                                  |
|------------|----------------------------|------------------------------------------------------|-------------------------------------------------------|-------------------------------------|------------------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|
|            |                            |                                                      | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                                | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                            |                                                      |                                                       | Col. 2<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                |
| 71         | Lutetium-169               | W, all compounds except those given for Y            | 3E+3                                                  | 4E+3                                | 2E-6                                           | 6E-9                                           | 3E-5                                             | 3E-4                                                           |
|            |                            | Y, oxides, hydroxides, and fluorides                 | -                                                     | 4E+3                                | 2E-6                                           | 6E-9                                           | -                                                | -                                                              |
| 71         | Lutetium-170               | W, see $^{169}\text{Lu}$<br>Y, see $^{169}\text{Lu}$ | 1E+3<br>-                                             | 2E+3<br>2E+3                        | 9E-7<br>8E-7                                   | 3E-9<br>3E-9                                   | 2E-5<br>-                                        | 2E-4<br>-                                                      |
| 71         | Lutetium-171               | W, see $^{169}\text{Lu}$<br>Y, see $^{169}\text{Lu}$ | 2E+3<br>-                                             | 2E+3<br>2E+3                        | 8E-7<br>8E-7                                   | 3E-9<br>3E-9                                   | 3E-5<br>-                                        | 3E-4<br>-                                                      |
| 71         | Lutetium-172               | W, see $^{169}\text{Lu}$<br>Y, see $^{169}\text{Lu}$ | 1E+3<br>-                                             | 1E+3<br>1E+3                        | 5E-7<br>5E-7                                   | 2E-9<br>2E-9                                   | 1E-5<br>-                                        | 1E-4<br>-                                                      |
| 71         | Lutetium-173               | W, see $^{169}\text{Lu}$                             | 5E+3                                                  | 3E+2<br>Bone surf<br>(5E+2)         | 1E-7<br>-                                      | -<br>6E-10                                     | 7E-5<br>-                                        | 7E-4<br>-                                                      |
|            |                            | Y, see $^{169}\text{Lu}$                             | -                                                     | 3E+2                                | 1E-7                                           | 4E-10                                          | -                                                | -                                                              |
| 71         | Lutetium-174m              | W, see $^{169}\text{Lu}$                             | 2E+3<br>LLI wall<br>(3E+3)                            | 2E+2<br>Bone surf<br>(3E+2)         | 1E-7<br>-                                      | -<br>5E-10                                     | -<br>4E-5                                        | -<br>4E-4                                                      |
|            |                            | Y, see $^{169}\text{Lu}$                             | -                                                     | 2E+2                                | 9E-8                                           | 3E-10                                          | -                                                | -                                                              |
| 71         | Lutetium-174               | W, see $^{169}\text{Lu}$                             | 5E+3                                                  | 1E+2<br>Bone surf<br>(2E+2)         | 5E-8<br>-                                      | -<br>3E-10                                     | 7E-5<br>-                                        | 7E-4<br>-                                                      |
|            |                            | Y, see $^{169}\text{Lu}$                             | -                                                     | 2E+2                                | 6E-8                                           | 2E-10                                          | -                                                | -                                                              |
| 71         | Lutetium-176m              | W, see $^{169}\text{Lu}$<br>Y, see $^{169}\text{Lu}$ | 8E+3<br>-                                             | 3E+4<br>2E+4                        | 1E-5<br>9E-6                                   | 3E-8<br>3E-8                                   | 1E-4<br>-                                        | 1E-3<br>-                                                      |
| 71         | Lutetium-176               | W, see $^{169}\text{Lu}$                             | 7E+2                                                  | 5E+0<br>Bone surf<br>(1E+1)         | 2E-9<br>-                                      | -<br>2E-11                                     | 1E-5<br>-                                        | 1E-4<br>-                                                      |
|            |                            | Y, see $^{169}\text{Lu}$                             | -                                                     | 8E+0                                | 3E-9                                           | 1E-11                                          | -                                                | -                                                              |
| 71         | Lutetium-177m              | W, see $^{169}\text{Lu}$                             | 7E+2                                                  | 1E+2<br>Bone surf<br>(1E+2)         | 5E-8<br>-                                      | -<br>2E-10                                     | 1E-5<br>-                                        | 1E-4<br>-                                                      |
|            |                            | Y, see $^{169}\text{Lu}$                             | -                                                     | 8E+1                                | 3E-8                                           | 1E-10                                          | -                                                | -                                                              |
| 71         | Lutetium-177               | W, see $^{169}\text{Lu}$                             | 2E+3<br>LLI wall<br>(3E+3)                            | 2E+3<br>-                           | 9E-7<br>-                                      | 3E-9<br>-                                      | -<br>4E-5                                        | -<br>4E-4                                                      |
|            |                            | Y, see $^{169}\text{Lu}$                             | -                                                     | 2E+3                                | 9E-7                                           | 3E-9                                           | -                                                | -                                                              |
| 71         | Lutetium-178m <sup>2</sup> | W, see $^{169}\text{Lu}$                             | 5E+4<br>St. wall<br>(6E+4)                            | 2E+5<br>-                           | 8E-5<br>-                                      | 3E-7<br>-                                      | -<br>8E-4                                        | -<br>8E-3                                                      |
|            |                            | Y, see $^{169}\text{Lu}$                             | -                                                     | 2E+5                                | 7E-5                                           | 2E-7                                           | -                                                | -                                                              |
| 71         | Lutetium-178 <sup>2</sup>  | W, see $^{169}\text{Lu}$                             | 4E+4<br>St. wall<br>(4E+4)                            | 1E+5<br>-                           | 5E-5<br>-                                      | 2E-7<br>-                                      | -<br>6E-4                                        | -<br>6E-3                                                      |
|            |                            | Y, see $^{169}\text{Lu}$                             | -                                                     | 1E+5                                | 5E-5                                           | 2E-7                                           | -                                                | -                                                              |
| 71         | Lutetium-179               | W, see $^{169}\text{Lu}$<br>Y, see $^{169}\text{Lu}$ | 6E+3<br>-                                             | 2E+4<br>2E+4                        | 8E-6<br>6E-6                                   | 3E-8<br>3E-8                                   | 9E-5<br>-                                        | 9E-4<br>-                                                      |

| Atomic No. | Radionuclide              | Class                                         | Table 1<br>Occupational Values                 |                              |                                 | Table 2<br>Effluent Concentrations |                                   | Table 3<br>Releases to Sewers                   |
|------------|---------------------------|-----------------------------------------------|------------------------------------------------|------------------------------|---------------------------------|------------------------------------|-----------------------------------|-------------------------------------------------|
|            |                           |                                               | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu$ Ci) | Inhalation                   |                                 | Col. 1<br>Air<br>( $\mu$ Ci/m)     | Col. 2<br>Water<br>( $\mu$ Ci/ml) | Monthly Average Concentration<br>( $\mu$ Ci/ml) |
|            |                           |                                               |                                                | Col. 2<br>ALI<br>( $\mu$ Ci) | Col. 3<br>DAC<br>( $\mu$ Ci/ml) |                                    |                                   |                                                 |
| 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 $^{170}\text{Hf}$                      | 1E+3                                           | 9E+0<br>Bone surf<br>(2E+1)  | 4E-9                            | -                                  | 2E-5                              | 2E-4                                            |
|            |                           | W, see $^{170}\text{Hf}$                      | -                                              | 4E+1<br>Bone surf<br>(6E+1)  | 2E-8                            | 3E-11                              | -                                 | -                                               |
| 72         | Hafnium-173               | D, see $^{170}\text{Hf}$                      | 5E+3                                           | 1E+4                         | 5E-6                            | 2E-8                               | 7E-5                              | 7E-4                                            |
|            |                           | W, see $^{170}\text{Hf}$                      | -                                              | 1E+4                         | 5E-6                            | 2E-8                               | -                                 | -                                               |
| 72         | Hafnium-175               | D, see $^{170}\text{Hf}$                      | 3E+3                                           | 9E+2<br>Bone surf<br>(1E+3)  | 4E-7                            | -                                  | 4E-5                              | 4E-4                                            |
|            |                           | W, see $^{170}\text{Hf}$                      | -                                              | 1E+3                         | 5E-7                            | 1E-9                               | -                                 | -                                               |
| 72         | Hafnium-177m <sup>2</sup> | D, see $^{170}\text{Hf}$                      | 2E+4                                           | 6E+4                         | 2E-5                            | 8E-8                               | 3E-4                              | 3E-3                                            |
|            |                           | W, see $^{170}\text{Hf}$                      | -                                              | 9E+4                         | 4E-5                            | 1E-7                               | -                                 | -                                               |
| 72         | Hafnium-178m              | D, see $^{170}\text{Hf}$                      | 3E+2                                           | 1E+0<br>Bone surf<br>(2E+0)  | 5E-10                           | -                                  | 3E-6                              | 3E-5                                            |
|            |                           | W, see $^{170}\text{Hf}$                      | -                                              | 5E+0<br>Bone surf<br>(9E+0)  | 2E-9                            | 3E-12                              | -                                 | -                                               |
| 72         | Hafnium-179m              | D, see $^{170}\text{Hf}$                      | 1E+3                                           | 3E+2<br>Bone surf<br>(6E+2)  | 1E-7                            | -                                  | 1E-5                              | 1E-4                                            |
|            |                           | W, see $^{170}\text{Hf}$                      | -                                              | 6E+2                         | 3E-7                            | 8E-10                              | -                                 | -                                               |
| 72         | Hafnium-180m              | D, see $^{170}\text{Hf}$                      | 7E+3                                           | 2E+4                         | 9E-6                            | 3E-8                               | 1E-4                              | 1E-3                                            |
|            |                           | W, see $^{170}\text{Hf}$                      | -                                              | 3E+4                         | 1E-5                            | 4E-8                               | -                                 | -                                               |
| 72         | Hafnium-181               | D, see $^{170}\text{Hf}$                      | 1E+3                                           | 2E+2<br>Bone surf<br>(4E+2)  | 7E-8                            | -                                  | 2E-5                              | 2E-4                                            |
|            |                           | W, see $^{170}\text{Hf}$                      | -                                              | 4E+2                         | 2E-7                            | 6E-10                              | -                                 | -                                               |
| 72         | Hafnium-182m <sup>2</sup> | D, see $^{170}\text{Hf}$                      | 4E+4                                           | 9E+4                         | 4E-5                            | 1E-7                               | 5E-4                              | 5E-3                                            |
|            |                           | W, see $^{170}\text{Hf}$                      | -                                              | 1E+5                         | 6E-5                            | 2E-7                               | -                                 | -                                               |
| 72         | Hafnium-182               | D, see $^{170}\text{Hf}$                      | 2E+2<br>Bone surf<br>(4E+2)                    | 8E-1<br>Bone surf<br>(2E+0)  | 3E-10                           | -                                  | -                                 | -                                               |
|            |                           | W, see $^{170}\text{Hf}$                      | -                                              | 3E+0<br>Bone surf<br>(7E+0)  | 1E-9                            | 2E-12                              | 5E-6                              | 5E-5                                            |
| 72         | Hafnium-183 <sup>2</sup>  | D, see $^{170}\text{Hf}$                      | 2E+4                                           | 5E+4                         | 2E-5                            | 6E-8                               | 3E-4                              | 3E-3                                            |
|            |                           | W, see $^{170}\text{Hf}$                      | -                                              | 6E+4                         | 2E-5                            | 8E-8                               | -                                 | -                                               |
| 72         | Hafnium-184               | D, see $^{170}\text{Hf}$                      | 2E+3                                           | 8E+3                         | 3E-6                            | 1E-8                               | 3E-5                              | 3E-4                                            |
|            |                           | W, see $^{170}\text{Hf}$                      | -                                              | 6E+3                         | 3E-6                            | 9E-9                               | -                                 | -                                               |

| Atomic No. | Radionuclide               | Class                                                                                                                           | Table 1<br>Occupational Values                        |                                     |                                                | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to Sewers                                  |
|------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-------------------------------------|------------------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|
|            |                            |                                                                                                                                 | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                                | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                            |                                                                                                                                 |                                                       | Col. 2<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                |
|            |                            |                                                                                                                                 |                                                       |                                     |                                                |                                                |                                                  |                                                                |
| 73         | Tantalum-172 <sup>2</sup>  | W, all compounds except those given for Y<br><br>Y, elemental Ta, oxides, hydroxides, halides, carbides, nitrates, and nitrides | 4E+4<br><br>-                                         | 1E+5<br><br>1E+5                    | 5E-5<br><br>4E-5                               | 2E-7<br><br>1E-7                               | 5E-4<br><br>-                                    | 5E-3<br><br>-                                                  |
| 73         | Tantalum-173               | W, see 172Ta<br>Y, see 172Ta                                                                                                    | 7E+3<br>-                                             | 2E+4<br>2E+4                        | 8E-6<br>7E-6                                   | 3E-8<br>2E-8                                   | 9E-5<br>-                                        | 9E-4<br>-                                                      |
| 73         | Tantalum-174 <sup>2</sup>  | W, see 172Ta<br>Y, see 172Ta                                                                                                    | 3E+4<br>-                                             | 1E+5<br>9E+4                        | 4E-5<br>4E-5                                   | 1E-7<br>1E-7                                   | 4E-4<br>-                                        | 4E-3<br>-                                                      |
| 73         | Tantalum-175               | W, see 172Ta<br>Y, see 172Ta                                                                                                    | 6E+3<br>-                                             | 2E+4<br>1E+4                        | 7E-6<br>6E-6                                   | 2E-8<br>2E-8                                   | 8E-5<br>-                                        | 8E-4<br>-                                                      |
| 73         | Tantalum-176               | W, see 172Ta<br>Y, see 172Ta                                                                                                    | 4E+3<br>-                                             | 1E+4<br>1E+4                        | 5E-6<br>5E-6                                   | 2E-8<br>2E-8                                   | 5E-5<br>-                                        | 5E-4<br>-                                                      |
| 73         | Tantalum-177               | W, see 172Ta<br>Y, see 172Ta                                                                                                    | 1E+4<br>-                                             | 2E+4<br>2E+4                        | 8E-6<br>7E-6                                   | 3E-8<br>2E-8                                   | 2E-4<br>-                                        | 2E-3<br>-                                                      |
| 73         | Tantalum-178               | W, see 172Ta<br>Y, see 172Ta                                                                                                    | 2E+4<br>-                                             | 9E+4<br>7E+4                        | 4E-5<br>3E-5                                   | 1E-7<br>1E-7                                   | 2E-4<br>-                                        | 2E-3<br>-                                                      |
| 73         | Tantalum-179               | W, see 172Ta<br>Y, see 172Ta                                                                                                    | 2E+4<br>-                                             | 5E+3<br>9E+2                        | 2E-6<br>4E-7                                   | 8E-9<br>1E-9                                   | 3E-4<br>-                                        | 3E-3<br>-                                                      |
| 73         | Tantalum-180m              | W, see 172Ta<br>Y, see 172Ta                                                                                                    | 2E+4<br>-                                             | 7E+4<br>6E+4                        | 3E-5<br>2E-5                                   | 9E-8<br>8E-8                                   | 3E-4<br>-                                        | 3E-3<br>-                                                      |
| 73         | Tantalum-180               | W, see 172Ta<br>Y, see 172Ta                                                                                                    | 1E+3<br>-                                             | 4E+2<br>2E+1                        | 2E-7<br>1E-8                                   | 6E-10<br>3E-11                                 | 2E-5<br>-                                        | 2E-4<br>-                                                      |
| 73         | Tantalum-182a <sup>2</sup> | W, see 172Ta<br><br>Y, see 172Ta                                                                                                | 2E+5<br>St. wall<br>(2E+5)<br><br>-                   | 5E+5<br><br>4E+5                    | 2E-4<br><br>2E-4                               | 8E-7<br><br>6E-7                               | -<br><br>3E-3                                    | -<br><br>3E-2                                                  |
| 73         | Tantalum-182               | W, see 172Ta<br>Y, see 172Ta                                                                                                    | 8E+2<br>-                                             | 3E+2<br>1E+2                        | 1E-7<br>6E-8                                   | 5E-10<br>2E-10                                 | 1E-5<br>-                                        | 1E-4<br>-                                                      |
| 73         | Tantalum-183               | W, see 172Ta<br><br>Y, see 172Ta                                                                                                | 9E+2<br>LLI wall<br>(1E+3)<br><br>-                   | 1E+3<br><br>1E+3                    | 5E-7<br><br>4E-7                               | 2E-9<br><br>1E-9                               | -<br><br>2E-5                                    | -<br><br>2E-4                                                  |
| 73         | Tantalum-184               | W, see 172Ta<br>Y, see 172Ta                                                                                                    | 2E+3<br>-                                             | 5E+3<br>5E+3                        | 2E-6<br>2E-6                                   | 8E-9<br>7E-9                                   | 3E-5<br>-                                        | 3E-4<br>-                                                      |
| 73         | Tantalum-185 <sup>2</sup>  | W, see 172Ta<br>Y, see 172Ta                                                                                                    | 3E+4<br>-                                             | 7E+4<br>6E+4                        | 3E-5<br>3E-5                                   | 1E-7<br>9E-8                                   | 4E-4<br>-                                        | 4E-3<br>-                                                      |
| 73         | Tantalum-186 <sup>2</sup>  | W, see 172Ta<br><br>Y, see 172Ta                                                                                                | 5E+4<br>St. wall<br>(7E+4)<br><br>-                   | 2E+5<br><br>2E+5                    | 1E-4<br><br>9E-5                               | 3E-7<br><br>3E-7                               | -<br><br>1E-3                                    | -<br><br>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                                                           |

| Atomic No. | Radionuclide              | Class                                                | Table 1<br>Occupational Values                           |                            |                                     | Table 2<br>Effluent Concentrations   |                                       | Table 3<br>Releases to<br>Sewers                                    |
|------------|---------------------------|------------------------------------------------------|----------------------------------------------------------|----------------------------|-------------------------------------|--------------------------------------|---------------------------------------|---------------------------------------------------------------------|
|            |                           |                                                      | Col. 1<br>Oral<br>Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                 |                                     | Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly<br>Average<br>Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                           |                                                      |                                                          | ALI<br>( $\mu\text{Ci}$ )  | DAL<br>( $\mu\text{Ci}/\text{ml}$ ) |                                      |                                       |                                                                     |
| 74         | Tungsten-178              | D, all compounds                                     | 5E+3                                                     | 2E+4                       | 8E-6                                | 3E-8                                 | 7E-5                                  | 7E-4                                                                |
| 74         | Tungsten-179 <sup>2</sup> | D, all compounds                                     | 5E+6                                                     | 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<br>ALI wall<br>(3E+3)                               | 7E+3                       | 3E-6                                | 9E-9                                 | -                                     | -                                                                   |
| 74         | Tungsten-187              | D, all compounds                                     | 2E+3                                                     | 9E+3                       | 8E-6                                | 1E-8                                 | 3E-5                                  | 3E-4                                                                |
| 74         | Tungsten-188              | D, all compounds                                     | 4E+2<br>ALI wall<br>(5E+2)                               | 1E+3                       | 9E-7                                | 2E-9                                 | -                                     | -                                                                   |
| 75         | Rhenium-177 <sup>2</sup>  | D, all compounds except<br>those given for W         | 9E+4<br>St. wall<br>(2E+5)                               | 3E+5                       | 1E-4                                | 4E-7                                 | -                                     | -                                                                   |
|            |                           | W, oxides, hydroxides,<br>and nitrates               | -                                                        | 4E+5                       | 1E-4                                | 5E-7                                 | -                                     | -                                                                   |
| 75         | Rhenium-178 <sup>2</sup>  | D, see <sup>177</sup> Re                             | 7E+4<br>St. wall<br>(1E+5)                               | 3E+5                       | 1E-4                                | 4E-7                                 | -                                     | -                                                                   |
|            |                           | W, see <sup>177</sup> Re                             | -                                                        | 3E+5                       | 1E-4                                | 4E-7                                 | -                                     | -                                                                   |
| 75         | Rhenium-181               | D, see <sup>177</sup> Re<br>W, see <sup>177</sup> Re | 5E+3<br>-                                                | 9E+3<br>8E+3               | 8E-6<br>4E-6                        | 1E-8<br>1E-8                         | 7E-5<br>-                             | 7E-4<br>-                                                           |
| 75         | Rhenium-182<br>(12.7 h)   | D, see <sup>177</sup> Re<br>W, see <sup>177</sup> Re | 7E+3<br>-                                                | 1E+4<br>2E+4               | 5E-6<br>4E-6                        | 2E-8<br>2E-8                         | 9E-5<br>-                             | 9E-4<br>-                                                           |
| 75         | Rhenium-182<br>(64.0 h)   | D, see <sup>177</sup> Re<br>W, see <sup>177</sup> Re | 1E+3<br>-                                                | 2E+3<br>2E+3               | 1E-6<br>9E-7                        | 3E-9<br>2E-9                         | 2E-5<br>-                             | 2E-4<br>-                                                           |
| 75         | Rhenium-184m              | D, see <sup>177</sup> Re<br>W, see <sup>177</sup> Re | 2E+3<br>-                                                | 3E+3<br>4E+2               | 1E-6<br>2E-7                        | 4E-9<br>5E-10                        | 3E-5<br>-                             | 3E-4<br>-                                                           |
| 75         | Rhenium-184               | D, see <sup>177</sup> Re<br>W, see <sup>177</sup> Re | 2E+3<br>-                                                | 4E+3<br>1E+3               | 1E-6<br>5E-7                        | 5E-9<br>2E-9                         | 3E-5<br>-                             | 3E-4<br>-                                                           |
| 75         | Rhenium-186m              | D, see <sup>177</sup> Re                             | 1E+3<br>St. wall<br>(2E+3)                               | 2E+3<br>St. wall<br>(2E+3) | 7E-7                                | -                                    | -                                     | -                                                                   |
|            |                           | W, see <sup>177</sup> Re                             | -                                                        | 2E+2                       | 4E-8                                | 2E-9<br>2E-10                        | 2E-5<br>-                             | 2E-4<br>-                                                           |
| 75         | Rhenium-186               | D, see <sup>177</sup> Re<br>W, see <sup>177</sup> Re | 2E+3<br>-                                                | 2E+3<br>2E+3               | 1E-6<br>7E-7                        | 4E-9<br>2E-9                         | 3E-5<br>-                             | 2E-4<br>-                                                           |
| 75         | Rhenium-187               | D, see <sup>177</sup> Re                             | 6E+5                                                     | 8E+5<br>St. wall<br>(9E+5) | 4E-4                                | -                                    | 8E-3                                  | 8E-2                                                                |
|            |                           | W, see <sup>177</sup> Re                             | -                                                        | 1E+5                       | 4E-5                                | 1E-6<br>1E-7                         | -                                     | -                                                                   |
| 75         | Rhenium-188m <sup>2</sup> | D, see <sup>177</sup> Re<br>W, see <sup>177</sup> Re | 8E+4<br>-                                                | 1E+5<br>1E+5               | 6E-5<br>4E-5                        | 2E-7<br>2E-7                         | 1E-3<br>-                             | 1E-2<br>-                                                           |
| 75         | Rhenium-188               | D, see <sup>177</sup> Re<br>W, see <sup>177</sup> Re | 2E+3<br>-                                                | 3E+3<br>3E+3               | 1E-6<br>1E-6                        | 4E-9<br>4E-9                         | 2E-5<br>-                             | 2E-4<br>-                                                           |

| Atomic No. | Radionuclide             | Class                                                                            | Table 1<br>Occupational Values                        |                                                   |                                                | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to Sewers                                  |
|------------|--------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------|------------------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|
|            |                          |                                                                                  | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 2<br>Inhalation<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                          |                                                                                  |                                                       |                                                   |                                                |                                                |                                                  |                                                                |
| 75         | Rhenium-189              | D, see <sup>177</sup> Re<br>W, see <sup>177</sup> Re                             | 3E+3                                                  | 5E+3                                              | 2E-6                                           | 7E-9                                           | 4E-5                                             | 4E-4                                                           |
|            |                          |                                                                                  | -                                                     | 4E+3                                              | 2E-6                                           | 6E-9                                           | -                                                | -                                                              |
| 76         | Osmium-180 <sup>2</sup>  | 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 <sup>2</sup>  | D, see <sup>180</sup> Os<br>W, see <sup>180</sup> Os<br>Y, see <sup>180</sup> Os | 1E+4                                                  | 4E+4                                              | 2E-5                                           | 6E-8                                           | 2E-4                                             | 2E-3                                                           |
|            |                          |                                                                                  | -                                                     | 5E+4                                              | 2E-5                                           | 6E-8                                           | -                                                | -                                                              |
|            |                          |                                                                                  | -                                                     | 4E+4                                              | 2E-5                                           | 6E-8                                           | -                                                | -                                                              |
| 76         | Osmium-182               | D, see <sup>180</sup> Os<br>W, see <sup>180</sup> Os<br>Y, see <sup>180</sup> Os | 2E+3                                                  | 6E+3                                              | 2E-6                                           | 8E-9                                           | 3E-5                                             | 3E-4                                                           |
|            |                          |                                                                                  | -                                                     | 4E+3                                              | 2E-6                                           | 6E-9                                           | -                                                | -                                                              |
|            |                          |                                                                                  | -                                                     | 4E+3                                              | 2E-6                                           | 6E-9                                           | -                                                | -                                                              |
| 76         | Osmium-185               | D, see <sup>180</sup> Os<br>W, see <sup>180</sup> Os<br>Y, see <sup>180</sup> Os | 2E+3                                                  | 5E+2                                              | 2E-7                                           | 7E-10                                          | 3E-5                                             | 3E-4                                                           |
|            |                          |                                                                                  | -                                                     | 8E+2                                              | 3E-7                                           | 1E-9                                           | -                                                | -                                                              |
|            |                          |                                                                                  | -                                                     | 8E+2                                              | 3E-7                                           | 1E-9                                           | -                                                | -                                                              |
| 76         | Osmium-189m              | D, see <sup>180</sup> Os<br>W, see <sup>180</sup> Os<br>Y, see <sup>180</sup> Os | 8E+4                                                  | 2E+5                                              | 1E-4                                           | 3E-7                                           | 1E-3                                             | 1E-2                                                           |
|            |                          |                                                                                  | -                                                     | 2E+5                                              | 9E-5                                           | 3E-7                                           | -                                                | -                                                              |
|            |                          |                                                                                  | -                                                     | 2E+5                                              | 7E-5                                           | 2E-7                                           | -                                                | -                                                              |
| 76         | Osmium-191m              | D, see <sup>180</sup> Os<br>W, see <sup>180</sup> Os<br>Y, see <sup>180</sup> Os | 1E+4                                                  | 3E+4                                              | 1E-5                                           | 4E-8                                           | 2E-4                                             | 2E-3                                                           |
|            |                          |                                                                                  | -                                                     | 2E+4                                              | 8E-6                                           | 3E-8                                           | -                                                | -                                                              |
|            |                          |                                                                                  | -                                                     | 2E+4                                              | 7E-6                                           | 2E-8                                           | -                                                | -                                                              |
| 76         | Osmium-191               | D, see <sup>180</sup> Os                                                         | 2E+3                                                  | 2E+3                                              | 9E-7                                           | 3E-9                                           | -                                                | -                                                              |
|            |                          | LLI wall (3E+3)                                                                  | -                                                     | -                                                 | -                                              | -                                              | 3E-5                                             | 3E-4                                                           |
|            |                          | W, see <sup>180</sup> Os                                                         | -                                                     | 2E+3                                              | 7E-7                                           | 2E-9                                           | -                                                | -                                                              |
|            |                          | Y, see <sup>180</sup> Os                                                         | -                                                     | 1E+3                                              | 6E-7                                           | 2E-9                                           | -                                                | -                                                              |
| 76         | Osmium-193               | D, see <sup>180</sup> Os                                                         | 2E+3                                                  | 5E+3                                              | 2E-6                                           | 6E-9                                           | -                                                | -                                                              |
|            |                          | LLI wall (2E+3)                                                                  | -                                                     | -                                                 | -                                              | -                                              | 2E-5                                             | 2E-4                                                           |
|            |                          | W, see <sup>180</sup> Os                                                         | -                                                     | 3E+3                                              | 1E-6                                           | 4E-9                                           | -                                                | -                                                              |
|            |                          | Y, see <sup>180</sup> Os                                                         | -                                                     | 3E+3                                              | 3E-6                                           | 4E-9                                           | -                                                | -                                                              |
| 76         | Osmium-194               | D, see <sup>180</sup> Os                                                         | 4E+2                                                  | 4E+1                                              | 2E-8                                           | 6E-11                                          | -                                                | -                                                              |
|            |                          | LLI wall (6E+2)                                                                  | -                                                     | -                                                 | -                                              | -                                              | 8E-6                                             | 8E-5                                                           |
|            |                          | W, see <sup>180</sup> Os                                                         | -                                                     | 6E+1                                              | 2E-8                                           | 8E-11                                          | -                                                | -                                                              |
|            |                          | Y, see <sup>180</sup> Os                                                         | -                                                     | 8E+0                                              | 3E-9                                           | 1E-11                                          | -                                                | -                                                              |
| 77         | Iridium-182 <sup>2</sup> | 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 <sup>182</sup> Ir<br>W, see <sup>182</sup> Ir<br>Y, see <sup>182</sup> Ir | 8E+3                                                  | 2E+4                                              | 1E-5                                           | 3E-8                                           | 1E-4                                             | 1E-3                                                           |
|            |                          |                                                                                  | -                                                     | 3E+4                                              | 1E-5                                           | 5E-8                                           | -                                                | -                                                              |
|            |                          |                                                                                  | -                                                     | 3E+4                                              | 1E-5                                           | 4E-8                                           | -                                                | -                                                              |



| Atomic No. | Radionuclide              | Class                    | Table 1<br>Occupational Values                        |                                     |                                                | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to Sewers                                  |
|------------|---------------------------|--------------------------|-------------------------------------------------------|-------------------------------------|------------------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|
|            |                           |                          | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                                | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                           |                          |                                                       | Col. 2<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                |
| 77         | Iridium-185               | D, see $^{182}\text{Ir}$ | $5\text{E}+3$                                         | $1\text{E}+4$                       | $5\text{E}-6$                                  | $2\text{E}-8$                                  | $7\text{E}-5$                                    | $7\text{E}-4$                                                  |
|            |                           | W, see $^{182}\text{Ir}$ | -                                                     | $1\text{E}+4$                       | $5\text{E}-6$                                  | $2\text{E}-8$                                  | -                                                | -                                                              |
|            |                           | Y, see $^{182}\text{Ir}$ | -                                                     | $1\text{E}+4$                       | $4\text{E}-6$                                  | $1\text{E}-8$                                  | -                                                | -                                                              |
| 77         | Iridium-186               | D, see $^{182}\text{Ir}$ | $2\text{E}+3$                                         | $8\text{E}+3$                       | $3\text{E}-6$                                  | $1\text{E}-8$                                  | $3\text{E}-5$                                    | $3\text{E}-4$                                                  |
|            |                           | W, see $^{182}\text{Ir}$ | -                                                     | $6\text{E}+3$                       | $3\text{E}-6$                                  | $9\text{E}-9$                                  | -                                                | -                                                              |
|            |                           | Y, see $^{182}\text{Ir}$ | -                                                     | $6\text{E}+3$                       | $2\text{E}-6$                                  | $8\text{E}-9$                                  | -                                                | -                                                              |
| 77         | Iridium-187               | D, see $^{182}\text{Ir}$ | $1\text{E}+4$                                         | $2\text{E}+4$                       | $1\text{E}-5$                                  | $5\text{E}-8$                                  | $1\text{E}-4$                                    | $1\text{E}-3$                                                  |
|            |                           | W, see $^{182}\text{Ir}$ | -                                                     | $3\text{E}+4$                       | $1\text{E}-5$                                  | $4\text{E}-8$                                  | -                                                | -                                                              |
|            |                           | Y, see $^{182}\text{Ir}$ | -                                                     | $3\text{E}+4$                       | $1\text{E}-5$                                  | $4\text{E}-8$                                  | -                                                | -                                                              |
| 77         | Iridium-188               | D, see $^{182}\text{Ir}$ | $2\text{E}+3$                                         | $5\text{E}+3$                       | $2\text{E}-6$                                  | $6\text{E}-9$                                  | $3\text{E}-5$                                    | $3\text{E}-4$                                                  |
|            |                           | W, see $^{182}\text{Ir}$ | -                                                     | $4\text{E}+3$                       | $1\text{E}-6$                                  | $5\text{E}-9$                                  | -                                                | -                                                              |
|            |                           | Y, see $^{182}\text{Ir}$ | -                                                     | $3\text{E}+3$                       | $1\text{E}-6$                                  | $5\text{E}-9$                                  | -                                                | -                                                              |
| 77         | Iridium-189               | D, see $^{182}\text{Ir}$ | $3\text{E}+3$                                         | $5\text{E}+3$                       | $2\text{E}-6$                                  | $7\text{E}-9$                                  | -                                                | -                                                              |
|            |                           | W, see $^{182}\text{Ir}$ | (LLI wall<br>( $5\text{E}+3$ ))                       | -                                   | -                                              | -                                              | $7\text{E}-5$                                    | $7\text{E}-4$                                                  |
|            |                           | Y, see $^{182}\text{Ir}$ | -                                                     | $4\text{E}+3$                       | $2\text{E}-6$                                  | $5\text{E}-9$                                  | -                                                | -                                                              |
| 77         | Iridium-190m <sup>2</sup> | D, see $^{182}\text{Ir}$ | $2\text{E}+5$                                         | $2\text{E}+5$                       | $8\text{E}-5$                                  | $2\text{E}-7$                                  | $2\text{E}-3$                                    | $2\text{E}-2$                                                  |
|            |                           | W, see $^{182}\text{Ir}$ | -                                                     | $2\text{E}+5$                       | $9\text{E}-5$                                  | $3\text{E}-7$                                  | -                                                | -                                                              |
|            |                           | Y, see $^{182}\text{Ir}$ | -                                                     | $2\text{E}+5$                       | $8\text{E}-5$                                  | $3\text{E}-7$                                  | -                                                | -                                                              |
| 77         | Iridium-190               | D, see $^{182}\text{Ir}$ | $1\text{E}+3$                                         | $9\text{E}+2$                       | $4\text{E}-7$                                  | $1\text{E}-9$                                  | $1\text{E}-5$                                    | $1\text{E}-4$                                                  |
|            |                           | W, see $^{182}\text{Ir}$ | -                                                     | $1\text{E}+3$                       | $4\text{E}-7$                                  | $1\text{E}-9$                                  | -                                                | -                                                              |
|            |                           | Y, see $^{182}\text{Ir}$ | -                                                     | $9\text{E}+2$                       | $4\text{E}-7$                                  | $1\text{E}-9$                                  | -                                                | -                                                              |
| 77         | Iridium-192m              | D, see $^{182}\text{Ir}$ | $3\text{E}+3$                                         | $9\text{E}+1$                       | $4\text{E}-8$                                  | $1\text{E}-10$                                 | $4\text{E}-5$                                    | $4\text{E}-4$                                                  |
|            |                           | W, see $^{182}\text{Ir}$ | -                                                     | $2\text{E}+2$                       | $9\text{E}-8$                                  | $3\text{E}-10$                                 | -                                                | -                                                              |
|            |                           | Y, see $^{182}\text{Ir}$ | -                                                     | $2\text{E}+1$                       | $6\text{E}-9$                                  | $2\text{E}-11$                                 | -                                                | -                                                              |
| 77         | Iridium-192               | D, see $^{182}\text{Ir}$ | $9\text{E}+2$                                         | $3\text{E}+2$                       | $1\text{E}-7$                                  | $4\text{E}-10$                                 | $1\text{E}-5$                                    | $1\text{E}-4$                                                  |
|            |                           | W, see $^{182}\text{Ir}$ | -                                                     | $4\text{E}+2$                       | $2\text{E}-7$                                  | $6\text{E}-10$                                 | -                                                | -                                                              |
|            |                           | Y, see $^{182}\text{Ir}$ | -                                                     | $2\text{E}+2$                       | $3\text{E}-8$                                  | $3\text{E}-10$                                 | -                                                | -                                                              |
| 77         | Iridium-194m              | D, see $^{182}\text{Ir}$ | $6\text{E}+2$                                         | $9\text{E}+1$                       | $4\text{E}-8$                                  | $1\text{E}-10$                                 | $9\text{E}-6$                                    | $9\text{E}-5$                                                  |
|            |                           | W, see $^{182}\text{Ir}$ | -                                                     | $2\text{E}+2$                       | $3\text{E}-8$                                  | $2\text{E}-10$                                 | -                                                | -                                                              |
|            |                           | Y, see $^{182}\text{Ir}$ | -                                                     | $1\text{E}+2$                       | $4\text{E}-8$                                  | $1\text{E}-10$                                 | -                                                | -                                                              |
| 77         | Iridium-194               | D, see $^{182}\text{Ir}$ | $1\text{E}+3$                                         | $3\text{E}+3$                       | $1\text{E}-6$                                  | $4\text{E}-9$                                  | $1\text{E}-5$                                    | $1\text{E}-4$                                                  |
|            |                           | W, see $^{182}\text{Ir}$ | -                                                     | $2\text{E}+3$                       | $9\text{E}-7$                                  | $3\text{E}-9$                                  | -                                                | -                                                              |
|            |                           | Y, see $^{182}\text{Ir}$ | -                                                     | $2\text{E}+3$                       | $8\text{E}-7$                                  | $2\text{E}-9$                                  | -                                                | -                                                              |
| 77         | Iridium-195m              | D, see $^{182}\text{Ir}$ | $8\text{E}+3$                                         | $2\text{E}+4$                       | $1\text{E}-5$                                  | $3\text{E}-8$                                  | $1\text{E}-4$                                    | $1\text{E}-3$                                                  |
|            |                           | W, see $^{182}\text{Ir}$ | -                                                     | $3\text{E}+4$                       | $1\text{E}-5$                                  | $4\text{E}-8$                                  | -                                                | -                                                              |
|            |                           | Y, see $^{182}\text{Ir}$ | -                                                     | $2\text{E}+4$                       | $9\text{E}-6$                                  | $3\text{E}-8$                                  | -                                                | -                                                              |
| 77         | Iridium-195               | D, see $^{182}\text{Ir}$ | $1\text{E}+4$                                         | $4\text{E}+4$                       | $2\text{E}-5$                                  | $6\text{E}-8$                                  | $2\text{E}-4$                                    | $2\text{E}-3$                                                  |
|            |                           | W, see $^{182}\text{Ir}$ | -                                                     | $5\text{E}+4$                       | $2\text{E}-5$                                  | $7\text{E}-8$                                  | -                                                | -                                                              |
|            |                           | Y, see $^{182}\text{Ir}$ | -                                                     | $4\text{E}+4$                       | $2\text{E}-5$                                  | $6\text{E}-8$                                  | -                                                | -                                                              |
| 78         | Platinum-186              | D, all compounds         | $1\text{E}+4$                                         | $4\text{E}+4$                       | $2\text{E}-5$                                  | $5\text{E}-8$                                  | $2\text{E}-4$                                    | $2\text{E}-3$                                                  |
| 78         | Platinum-188              | D, all compounds         | $2\text{E}+3$                                         | $2\text{E}+3$                       | $7\text{E}-7$                                  | $2\text{E}-9$                                  | $2\text{E}-5$                                    | $2\text{E}-4$                                                  |
| 78         | Platinum-189              | D, all compounds         | $1\text{E}+4$                                         | $3\text{E}+4$                       | $1\text{E}-5$                                  | $4\text{E}-8$                                  | $1\text{E}-4$                                    | $1\text{E}-3$                                                  |
| 78         | Platinum-191              | D, all compounds         | $4\text{E}+3$                                         | $8\text{E}+3$                       | $4\text{E}-6$                                  | $1\text{E}-8$                                  | $5\text{E}-5$                                    | $5\text{E}-4$                                                  |

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

| Atomic No. | Radionuclide               | Class                                                  | Table 1<br>Occupational Values                           |                                     |                                                | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to<br>Sewers                                     |
|------------|----------------------------|--------------------------------------------------------|----------------------------------------------------------|-------------------------------------|------------------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------|
|            |                            |                                                        | Col. 1<br>Oral<br>Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                                | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly<br>Average<br>Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                            |                                                        |                                                          | Col. 2<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                      |
| 80         | Mercury-193m               | Vapor                                                  | -                                                        | 8E+3                                | 4E-6                                           | 1E-8                                           | -                                                | -                                                                    |
|            |                            | Organic D                                              | 4E+3                                                     | 1E+4                                | 5E-6                                           | 2E-8                                           | 6E-5                                             | 6E-4                                                                 |
|            |                            | D, sulfates                                            | 3E+3                                                     | 9E+3                                | 4E-6                                           | 1E-8                                           | 4E-5                                             | 4E-4                                                                 |
|            |                            | W, oxides, hydroxides, halides, nitrates, and sulfides | -                                                        | 8E+3                                | 3E-6                                           | 1E-8                                           | -                                                | -                                                                    |
| 80         | Mercury-193                | Vapor                                                  | -                                                        | 3E+4                                | 1E-5                                           | 4E-8                                           | -                                                | -                                                                    |
|            |                            | Organic D                                              | 2E+4                                                     | 6E+4                                | 3E-5                                           | 9E-8                                           | 3E-4                                             | 3E-3                                                                 |
|            |                            | D, see $^{193\text{m}}\text{Hg}$                       | 2E+4                                                     | 4E+4                                | 2E-5                                           | 6E-8                                           | 2E-4                                             | 2E-3                                                                 |
|            |                            | W, see $^{193\text{m}}\text{Hg}$                       | -                                                        | 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 $^{193\text{m}}\text{Hg}$                       | 8E+2                                                     | 4E+1                                | 2E-8                                           | 6E-11                                          | 1E-5                                             | 1E-4                                                                 |
|            |                            | W, see $^{193\text{m}}\text{Hg}$                       | -                                                        | 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 $^{193\text{m}}\text{Hg}$                       | 2E+3                                                     | 5E+3                                | 2E-6                                           | 7E-9                                           | 3E-5                                             | 3E-4                                                                 |
|            |                            | W, see $^{193\text{m}}\text{Hg}$                       | -                                                        | 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 $^{193\text{m}}\text{Hg}$                       | 1E+4                                                     | 4E+4                                | 1E-5                                           | 5E-8                                           | 2E-4                                             | 2E-3                                                                 |
|            |                            | W, see $^{193\text{m}}\text{Hg}$                       | -                                                        | 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 $^{193\text{m}}\text{Hg}$                       | 3E+3                                                     | 7E+3                                | 3E-6                                           | 1E-8                                           | 4E-5                                             | 4E-4                                                                 |
|            |                            | W, see $^{193\text{m}}\text{Hg}$                       | -                                                        | 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 $^{193\text{m}}\text{Hg}$                       | 6E+3                                                     | 1E+4                                | 5E-6                                           | 2E-8                                           | 8E-5                                             | 8E-4                                                                 |
|            |                            | W, see $^{193\text{m}}\text{Hg}$                       | -                                                        | 9E+3                                | 4E-6                                           | 1E-8                                           | -                                                | -                                                                    |
| 80         | Mercury-199m <sup>2</sup>  | 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 $^{193\text{m}}\text{Hg}$                       | 6E+4                                                     | 1E+5                                | 6E-5                                           | 2E-7                                           | 8E-4                                             | 8E-3                                                                 |
|            |                            | W, see $^{193\text{m}}\text{Hg}$                       | -                                                        | 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 $^{193\text{m}}\text{Hg}$                       | 2E+3                                                     | 1E+3                                | 5E-7                                           | 2E-9                                           | 3E-5                                             | 3E-4                                                                 |
|            |                            | W, see $^{193\text{m}}\text{Hg}$                       | -                                                        | 1E+3                                | 5E-7                                           | 2E-9                                           | -                                                | -                                                                    |
| 81         | Thallium-204m <sup>2</sup> | D, all compounds                                       | 5E+4                                                     | 2E+5                                | 6E-5                                           | 2E-7                                           | -                                                | -                                                                    |
|            |                            | St. wall                                               | (7E+4)                                                   | -                                   | -                                              | -                                              | 1E-3                                             | 1E-2                                                                 |

| Atomic No. | Radionuclide               | Class                                                | Table 1<br>Occupational Values                        |                                     |                                                | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to Sewers                                  |
|------------|----------------------------|------------------------------------------------------|-------------------------------------------------------|-------------------------------------|------------------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|
|            |                            |                                                      | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                                | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                            |                                                      |                                                       | Col. 2<br>All<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                |
| 81         | Thallium-194 <sup>2</sup>  | D, all compounds                                     | 3E+5<br>St. wall<br>(3E+5)                            | 6E+5                                | 2E-4                                           | 8E-7                                           | -                                                | -                                                              |
| 81         | Thallium-195 <sup>2</sup>  | D, all compounds                                     | 6E+4                                                  | 1E+5                                | 5E-5                                           | 2E-7                                           | 4E-3                                             | 4E-2                                                           |
| 81         | Thallium-197               | D, all compounds                                     | 7E+4                                                  | 1E+5                                | 5E-5                                           | 2E-7                                           | 1E-3                                             | 1E-2                                                           |
| 81         | Thallium-198m <sup>2</sup> | 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 <sup>2</sup>     | D, all compounds                                     | 6E+4                                                  | 2E+5                                | 8E-5                                           | 3E-7                                           | 8E-4                                             | 8E-3                                                           |
| 82         | Lead-198                   | D, all compounds                                     | 3E+4                                                  | 6E+4                                | 3E-5                                           | 9E-8                                           | 4E-4                                             | 4E-3                                                           |
| 82         | Lead-199 <sup>2</sup>      | D, all compounds                                     | 2E+4                                                  | 7E+4                                | 3E-5                                           | 1E-7                                           | 3E-4                                             | 3E-3                                                           |
| 82         | Lead-200                   | D, all compounds                                     | 3E+3                                                  | 5E+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<br>Bone surf<br>(1E+0)                           | 2E-1<br>Bone surf<br>(4E-1)         | 1E-10                                          | -                                              | -                                                | -                                                              |
| 82         | Lead-211 <sup>2</sup>      | D, all compounds                                     | 1E+4                                                  | 6E+2                                | 3E-7                                           | 9E-10                                          | 2E-4                                             | 2E-3                                                           |
| 82         | Lead-212                   | D, all compounds                                     | 8E+1<br>Bone surf<br>(1E+2)                           | 3E+1                                | 1E-8                                           | 5E-11                                          | -                                                | -                                                              |
| 82         | Lead-214 <sup>2</sup>      | D, all compounds                                     | 9E+3                                                  | 8E+2                                | 3E-7                                           | 1E-9                                           | 1E-4                                             | 1E-3                                                           |
| 83         | Bismuth-200 <sup>2</sup>   | D, nitrates<br>W, all other compounds                | 3E+4<br>-                                             | 8E+4<br>1E+5                        | 4E-5<br>4E-5                                   | 1E-7<br>1E-7                                   | 4E-4<br>-                                        | 4E-3<br>-                                                      |
| 83         | Bismuth-201 <sup>2</sup>   | D, see <sup>200</sup> Bi<br>W, see <sup>200</sup> Bi | 1E+4<br>-                                             | 2E+4<br>4E+4                        | 1E-5<br>2E-5                                   | 4E-8<br>5E-8                                   | 2E-4<br>-                                        | 2E-3<br>-                                                      |
| 83         | Bismuth-202 <sup>2</sup>   | D, see <sup>200</sup> Bi<br>W, see <sup>200</sup> Bi | 1E+4<br>-                                             | 4E+4<br>8E+4                        | 2E-5<br>3E-5                                   | 6E-8<br>1E-7                                   | 2E-4<br>-                                        | 2E-3<br>-                                                      |

| Atomic No. | Radionuclide              | Class                                                                                  | Table 1<br>Occupational Values                    |                                                 |                                              | Table 2<br>Effluent Concentrations |                                  | Table 3<br>Releases to<br>Sewers                     |
|------------|---------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------|-------------------------------------------------|----------------------------------------------|------------------------------------|----------------------------------|------------------------------------------------------|
|            |                           |                                                                                        | Col. 1<br>Oral<br>Ingestion<br>ALI<br>( $\mu$ Ci) | Inhalation                                      |                                              | Col. 1<br>Air<br>( $\mu$ Ci/m)     | Col. 2<br>Water<br>( $\mu$ Ci/m) | Monthly<br>Average<br>Concentration<br>( $\mu$ Ci/m) |
|            |                           |                                                                                        |                                                   | ALI<br>( $\mu$ Ci)                              | DAC<br>( $\mu$ Ci/m)                         |                                    |                                  |                                                      |
| 83         | Bismuth-203               | D, see $^{200}\text{Bi}$<br>W, see $^{200}\text{Bi}$                                   | 2E+3<br>-                                         | 7E+3<br>6E+3                                    | 3E-6<br>3E-6                                 | 9E-9<br>9E-9                       | 3E-5<br>-                        | 3E-4<br>-                                            |
| 83         | Bismuth-205               | D, see $^{200}\text{Bi}$<br>W, see $^{200}\text{Bi}$                                   | 1E+3<br>-                                         | 3E+3<br>1E+3                                    | 1E-6<br>5E-7                                 | 3E-9<br>2E-9                       | 2E-5<br>-                        | 2E-4<br>-                                            |
| 83         | Bismuth-206               | D, see $^{200}\text{Bi}$<br>W, see $^{200}\text{Bi}$                                   | 6E+2<br>-                                         | 1E+3<br>9E+2                                    | 6E-7<br>4E-7                                 | 2E-9<br>1E-9                       | 9E-6<br>-                        | 9E-5<br>-                                            |
| 83         | Bismuth-207               | D, see $^{200}\text{Bi}$<br>W, see $^{200}\text{Bi}$                                   | 1E+3<br>-                                         | 2E+3<br>4E+2                                    | 7E-7<br>1E-7                                 | 2E-9<br>5E-10                      | 1E-5<br>-                        | 1E-4<br>-                                            |
| 83         | Bismuth-210m              | D, see $^{200}\text{Bi}$<br>W, see $^{200}\text{Bi}$                                   | 4E+1<br>Kidneys<br>(6E+1)                         | 5E+0<br>Kidneys<br>(6E+0)<br>7E-1               | 2E-9<br>-                                    | -<br>9E-12<br>9E-13                | -<br>8E-7<br>-                   | -<br>8E-6<br>-                                       |
| 83         | Bismuth-210               | D, see $^{200}\text{Bi}$<br>W, see $^{200}\text{Bi}$                                   | 8E+2<br>-                                         | 2E+2<br>Kidneys<br>(4E+2)<br>3E+1               | 1E-7<br>-                                    | -<br>5E-10<br>4E-11                | 1E-5<br>-                        | 1E-4<br>-                                            |
| 83         | Bismuth-212 <sup>2</sup>  | D, see $^{200}\text{Bi}$<br>W, see $^{200}\text{Bi}$                                   | 5E+3<br>-                                         | 2E+2<br>3E+2                                    | 1E-7<br>1E-7                                 | 3E-10<br>4E-10                     | 7E-5<br>-                        | 7E-4<br>-                                            |
| 83         | Bismuth-213 <sup>2</sup>  | D, see $^{200}\text{Bi}$<br>W, see $^{200}\text{Bi}$                                   | 7E+3<br>-                                         | 3E+2<br>4E+2                                    | 1E-7<br>1E-7                                 | 4E-10<br>5E-10                     | 1E-4<br>-                        | 1E-3<br>-                                            |
| 83         | Bismuth-214 <sup>2</sup>  | D, see $^{200}\text{Bi}$<br>W, see $^{200}\text{Bi}$                                   | 2E+4<br>St. wall<br>(2E+4)<br>-                   | 8E+2<br>-                                       | 3E-7<br>-                                    | 1E-9<br>-                          | -<br>3E-4<br>-                   | -<br>3E-3<br>-                                       |
| 84         | Polonium-203 <sup>2</sup> | D, all compounds except<br>those given for W<br>W, oxides, hydroxides,<br>and nitrates | 3E+4<br>-                                         | 6E+4<br>9E+4                                    | 3E-5<br>4E-5                                 | 9E-8<br>1E-7                       | 3E-4<br>-                        | 3E-3<br>-                                            |
| 84         | Polonium-205 <sup>2</sup> | D, see $^{203}\text{Po}$<br>W, see $^{203}\text{Po}$                                   | 2E+4<br>-                                         | 4E+4<br>7E+4                                    | 2E-5<br>3E-5                                 | 5E-8<br>1E-7                       | 3E-4<br>-                        | 3E-3<br>-                                            |
| 84         | Polonium-207              | D, see $^{203}\text{Po}$<br>W, see $^{203}\text{Po}$                                   | 8E+3<br>-                                         | 3E+4<br>3E+4                                    | 1E-5<br>1E-5                                 | 3E-8<br>4E-8                       | 1E-4<br>-                        | 1E-3<br>-                                            |
| 84         | Polonium-210              | D, see $^{203}\text{Po}$<br>W, see $^{203}\text{Po}$                                   | 3E+0<br>-                                         | 6E-1<br>6E-1                                    | 3E-10<br>3E-10                               | 9E-13<br>9E-13                     | 4E-8<br>-                        | 4E-7<br>-                                            |
| 85         | Astatine-207 <sup>2</sup> | D, halides<br>W                                                                        | 6E+3<br>-                                         | 3E+3<br>2E+3                                    | 1E-6<br>9E-7                                 | 4E-9<br>3E-9                       | 8E-5<br>-                        | 8E-4<br>-                                            |
| 85         | Astatine-211              | D, halides<br>W                                                                        | 1E+2<br>-                                         | 8E+1<br>5E+1                                    | 3E-8<br>2E-8                                 | 1E-10<br>8E-11                     | 2E-6<br>-                        | 2E-5<br>-                                            |
| 86         | Radon-220                 | With daughters<br>removed<br>With daughters<br>present                                 | -<br>-                                            | 2E+4<br>2E+1<br>(or 12 working<br>level months) | 7E-6<br>9E-9<br>(or 1.0<br>working<br>level) | 2E-8<br>3E-11                      | -<br>-                           | -<br>-                                               |

| Atomic No. | Radionuclide              | Class                                            | Table 1<br>Occupational Values                        |                                     |                                               | Table 2<br>Effluent Concentrations            |                                                 | Table 3<br>Releases to Sewers                                 |
|------------|---------------------------|--------------------------------------------------|-------------------------------------------------------|-------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------|
|            |                           |                                                  | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                               | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                           |                                                  |                                                       | Col. 2<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{ml}$ ) |                                               |                                                 |                                                               |
| 86         | Radon-222                 | With daughters removed<br>With daughters present | -<br>-                                                | 1E+4<br>(or 4 working level months) | 4E-6<br>(or 0.33 working level)               | 1E-8<br>1E-10                                 | -<br>-                                          | -<br>-                                                        |
| 87         | Francium-222 <sup>2</sup> | D, all compounds                                 | 2E+3                                                  | 5E+2                                | 2E-7                                          | 6E-10                                         | 3E-5                                            | 3E-4                                                          |
| 87         | Francium-223 <sup>2</sup> | D, all compounds                                 | 6E+2                                                  | 8E+2                                | 3E-7                                          | 1E-9                                          | 8E-6                                            | 8E-5                                                          |
| 88         | Radium-223                | W, all compounds                                 | 5E+0<br>Bone surf<br>(9E+0)                           | 7E-1<br>-                           | 3E-10<br>-                                    | 9E-13<br>-                                    | -<br>1E-7                                       | -<br>1E-6                                                     |
| 88         | Radium-224                | W, all compounds                                 | 8E+0<br>Bone surf<br>(2E+1)                           | 2E+0<br>-                           | 7E-10<br>-                                    | 2E-12<br>-                                    | -<br>2E-7                                       | -<br>2E-6                                                     |
| 88         | Radium-225                | W, all compounds                                 | 8E+0<br>Bone surf<br>(2E+1)                           | 7E-1<br>-                           | 3E-10<br>-                                    | 9E-13<br>-                                    | -<br>2E-7                                       | -<br>2E-6                                                     |
| 88         | Radium-226                | W, all compounds                                 | 2E+0<br>Bone surf<br>(5E+0)                           | 6E-1<br>-                           | 3E-10<br>-                                    | 9E-13<br>-                                    | -<br>6E-8                                       | -<br>6E-7                                                     |
| 88         | Radium-227 <sup>2</sup>   | W, all compounds                                 | 2E+4<br>Bone surf<br>(2E+4)                           | 1E+4<br>Bone surf<br>(2E+4)         | 6E-6<br>-                                     | -<br>3E-8                                     | -<br>3E-4                                       | -<br>3E-3                                                     |
| 88         | Radium-228                | W, all compounds                                 | 2E+0<br>Bone surf<br>(4E+0)                           | 1E+0<br>-                           | 5E-10<br>-                                    | 2E-12<br>-                                    | -<br>6E-8                                       | -<br>6E-7                                                     |
| 89         | Actinium-224              | D, all compounds except those given for W and Y  | 2E+3<br>LLI wall<br>(2E+3)                            | 3E+1<br>Bone surf<br>(4E+1)         | 1E-8<br>-                                     | -<br>5E-11                                    | -<br>3E-5                                       | -<br>3E-4                                                     |
|            |                           | W, halides and nitrates                          | -                                                     | 5E+1                                | 2E-8                                          | 7E-11                                         | -                                               | -                                                             |
|            |                           | Y, oxides and hydroxides                         | -                                                     | 5E+1                                | 2E-8                                          | 6E-11                                         | -                                               | -                                                             |
| 89         | Actinium-225              | D, see <sup>224</sup> Ac                         | 5E+1<br>LLI wall<br>(5E+1)                            | 3E-1<br>Bone surf<br>(5E-1)         | 1E-10<br>-                                    | -<br>7E-13                                    | -<br>7E-7                                       | -<br>7E-6                                                     |
|            |                           | W, see <sup>224</sup> Ac                         | -                                                     | 6E-1                                | 3E-10                                         | 9E-13                                         | -                                               | -                                                             |
|            |                           | Y, see <sup>224</sup> Ac                         | -                                                     | 6E-1                                | 3E-10                                         | 9E-13                                         | -                                               | -                                                             |
| 89         | Actinium-226              | D, see <sup>224</sup> Ac                         | 1E+2<br>LLI wall<br>(1E+2)                            | 3E+0<br>Bone surf<br>(4E+0)         | 1E-9<br>-                                     | -<br>5E-12                                    | -<br>2E-6                                       | -<br>2E-5                                                     |
|            |                           | W, see <sup>224</sup> Ac                         | -                                                     | 5E+0                                | 2E-9                                          | 7E-12                                         | -                                               | -                                                             |
|            |                           | Y, see <sup>224</sup> Ac                         | -                                                     | 5E+0                                | 2E-9                                          | 6E-12                                         | -                                               | -                                                             |
| 89         | Actinium-227              | D, see <sup>224</sup> Ac                         | 2E-1<br>Bone surf<br>(4E-1)                           | 4E-4<br>Bone surf<br>(8E-4)         | 2E-13<br>-                                    | -<br>1E-15                                    | -<br>5E-9                                       | -<br>5E-8                                                     |
|            |                           | W, see <sup>224</sup> Ac                         | -                                                     | 2E-3<br>Bone surf<br>(3E-3)         | 7E-13<br>-                                    | -<br>4E-15                                    | -<br>-                                          | -<br>-                                                        |
|            |                           | Y, see <sup>224</sup> Ac                         | -                                                     | 4E-3                                | 2E-12                                         | 6E-15                                         | -                                               | -                                                             |

| Atomic No. | Radionuclide                  | Class                                     | Table 1<br>Occupational Values                        |                             |                                      | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to Sewers                                  |
|------------|-------------------------------|-------------------------------------------|-------------------------------------------------------|-----------------------------|--------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|
|            |                               |                                           | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 2<br>Inhalation        |                                      | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                               |                                           |                                                       | ALI<br>( $\mu\text{Ci}$ )   | DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                |
| 89         | Actinium-228                  | D, see $^{224}\text{Ac}$                  | 2E+3                                                  | 9E+0<br>Bone surf<br>(2E+1) | 4E-9                                 | -                                              | 3E-5                                             | 3E-4                                                           |
|            |                               | W, see $^{224}\text{Ac}$                  | -                                                     | 4E+1<br>Bone surf<br>(6E+1) | 2E-8                                 | 2E-11                                          | -                                                | -                                                              |
|            |                               | Y, see $^{224}\text{Ac}$                  | -                                                     | 4E+1                        | 2E-8                                 | 8E-11                                          | -                                                | -                                                              |
| 90         | Thorium-226 <sup>2</sup>      | W, all compounds except those given for Y | 5E+3<br>St. wall<br>(5E+3)                            | 2E+2                        | 6E-8                                 | 2E-10                                          | -                                                | -                                                              |
|            |                               | Y, oxides and hydroxides                  | -                                                     | 1E+2                        | 6E-8                                 | 2E-10                                          | -                                                | -                                                              |
|            |                               | W, see $^{226}\text{Th}$                  | 1E+2                                                  | 3E-1                        | 1E-10                                | 5E-13                                          | 2E-6                                             | 2E-5                                                           |
| 90         | Thorium-227                   | Y, see $^{226}\text{Th}$                  | -                                                     | 3E-1                        | 1E-10                                | 5E-13                                          | -                                                | -                                                              |
|            | Thorium-228                   | W, see $^{226}\text{Th}$                  | 6E+0<br>Bone surf<br>(1E+1)                           | 1E-2<br>Bone surf<br>(2E-2) | 4E-12                                | -                                              | -                                                | -                                                              |
|            |                               | Y, see $^{226}\text{Th}$                  | -                                                     | 2E-2                        | 7E-12                                | 3E-14                                          | 2E-7                                             | 2E-6                                                           |
| 90         | Thorium-229                   | W, see $^{226}\text{Th}$                  | 6E-1<br>Bone surf<br>(1E+0)                           | 9E-4<br>Bone surf<br>(2E-3) | 4E-13                                | -                                              | -                                                | -                                                              |
|            |                               | Y, see $^{226}\text{Th}$                  | -                                                     | 2E-3<br>Bone surf<br>(3E-3) | 1E-12                                | 3E-15                                          | 2E-8                                             | 2E-7                                                           |
|            |                               | W, see $^{226}\text{Th}$                  | -                                                     | 3E-3                        | -                                    | 4E-15                                          | -                                                | -                                                              |
| 90         | Thorium-230                   | W, see $^{226}\text{Th}$                  | 4E+0<br>Bone surf<br>(9E+0)                           | 6E-3<br>Bone surf<br>(2E-2) | 3E-12                                | -                                              | -                                                | -                                                              |
|            |                               | Y, see $^{226}\text{Th}$                  | -                                                     | 2E-2<br>Bone surf<br>(2E-2) | 6E-12                                | 2E-14                                          | 1E-7                                             | 1E-6                                                           |
|            |                               | W, see $^{226}\text{Th}$                  | -                                                     | 3E-3                        | -                                    | 3E-14                                          | -                                                | -                                                              |
| 90         | Thorium-231                   | W, see $^{226}\text{Th}$                  | 4E+3                                                  | 6E+3                        | 3E-6                                 | 9E-9                                           | 5E-5                                             | 5E-4                                                           |
|            |                               | Y, see $^{226}\text{Th}$                  | -                                                     | 6E+3                        | 3E-6                                 | 9E-9                                           | -                                                | -                                                              |
| 90         | Thorium-232                   | W, see $^{226}\text{Th}$                  | 7E-1<br>Bone surf<br>(2E+0)                           | 1E-3<br>Bone surf<br>(3E-3) | 5E-13                                | -                                              | -                                                | -                                                              |
|            |                               | Y, see $^{226}\text{Th}$                  | -                                                     | 3E-3<br>Bone surf<br>(4E-3) | 1E-12                                | 4E-15                                          | 3E-8                                             | 3E-7                                                           |
|            |                               | W, see $^{226}\text{Th}$                  | -                                                     | 4E-3                        | -                                    | 6E-15                                          | -                                                | -                                                              |
| 90         | Thorium-234                   | W, see $^{226}\text{Th}$                  | 3E+2<br>LLI wall<br>(4E+2)                            | 2E+2                        | 8E-8                                 | 3E-10                                          | -                                                | -                                                              |
|            |                               | Y, see $^{226}\text{Th}$                  | -                                                     | 2E+2                        | 6E-8                                 | 2E-10                                          | 5E-6                                             | 5E-5                                                           |
|            |                               | W, see $^{226}\text{Th}$                  | -                                                     | 2E+2                        | 6E-8                                 | 2E-10                                          | -                                                | -                                                              |
| 91         | Protactinium-227 <sup>2</sup> | 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                                          | -                                                | -                                                              |
|            |                               | W, see $^{227}\text{Pa}$                  | 1E+3                                                  | 1E+1<br>Bone surf<br>(2E+1) | 5E-9                                 | -                                              | 2E-5                                             | 2E-4                                                           |
| 91         | Protactinium-228              | Y, see $^{226}\text{Pa}$                  | -                                                     | 1E+1                        | 5E-9                                 | 3E-11                                          | -                                                | -                                                              |
|            |                               | W, see $^{226}\text{Pa}$                  | -                                                     | 1E+1                        | 5E-9                                 | 2E-11                                          | -                                                | -                                                              |
|            |                               | Y, see $^{226}\text{Pa}$                  | -                                                     | 1E+1                        | 5E-9                                 | 2E-11                                          | -                                                | -                                                              |

| Atomic No. | Radionuclide             | Class                                                                                                         | Table 1<br>Occupational Values                        |                             |                                      | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to Sewers                                  |
|------------|--------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-----------------------------|--------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|
|            |                          |                                                                                                               | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                  |                                      | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                          |                                                                                                               |                                                       | ALI<br>( $\mu\text{Ci}$ )   | DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                |
| 91         | Protactinium-230         | W, see 227Pa                                                                                                  | 6E+2<br>Bone surf<br>(9E+2)                           | 5E+0                        | 2E-9                                 | 7E-12                                          | -                                                | -                                                              |
|            |                          | Y, see 227Pa                                                                                                  | -                                                     | 4E+0                        | 1E-9                                 | 5E-12                                          | 1E-5                                             | 1E-4                                                           |
| 91         | Protactinium-231         | W, see 227Pa                                                                                                  | 2E-1<br>Bone surf<br>(5E-1)                           | 2E-3<br>Bone surf<br>(4E-3) | 6E-13                                | -                                              | -                                                | -                                                              |
|            |                          | Y, see 226Pa                                                                                                  | -                                                     | 4E-3<br>Bone surf<br>(6E-3) | 2E-12                                | 6E-15                                          | 6E-9                                             | 6E-8                                                           |
| 91         | Protactinium-232         | W, see 227Pa                                                                                                  | 1E+3                                                  | 2E+1<br>Bone surf<br>(6E+1) | 9E-9                                 | -                                              | 2E-5                                             | 2E-4                                                           |
|            |                          | Y, see 227Pa                                                                                                  | -                                                     | 6E+1<br>Bone surf<br>(7E+1) | 2E-8                                 | 8E-11                                          | -                                                | -                                                              |
| 91         | Protactinium-233         | W, see 227Pa                                                                                                  | 1E+3<br>LLI wall<br>(2E+3)                            | 7E+2                        | 3E-7                                 | 1E-9                                           | -                                                | -                                                              |
|            |                          | Y, see 227Pa                                                                                                  | -                                                     | 6E+2                        | 2E-7                                 | 8E-10                                          | 2E-5                                             | 2E-4                                                           |
| 91         | Protactinium-234         | W, see 227Pa                                                                                                  | 2E+3                                                  | 8E+3                        | 3E-6                                 | 1E-8                                           | 3E-5                                             | 3E-4                                                           |
|            |                          | Y, see 227Pa                                                                                                  | -                                                     | 7E+3                        | 3E-6                                 | 9E-9                                           | -                                                | -                                                              |
| 92         | Uranium-230              | D, UF <sub>6</sub> , UO <sub>2</sub> F <sub>2</sub> , UO <sub>2</sub> (NO <sub>3</sub> ) <sub>2</sub>         | 4E+0<br>Bone surf<br>(6E+0)                           | 4E-1<br>Bone surf<br>(6E-1) | 2E-10                                | -                                              | -                                                | -                                                              |
|            |                          | W, UO <sub>3</sub> , UF <sub>4</sub> , UCl <sub>4</sub><br>Y, UO <sub>2</sub> , U <sub>3</sub> O <sub>8</sub> | -                                                     | 4E-1                        | 1E-10                                | 8E-13                                          | 8E-8                                             | 8E-7                                                           |
| 92         | Uranium-231              | D, see 230U                                                                                                   | 5E+3<br>LLI wall<br>(4E+3)                            | 8E+3                        | 3E-6                                 | 1E-8                                           | -                                                | -                                                              |
|            |                          | W, see 230U<br>Y, see 230U                                                                                    | -                                                     | 6E+3                        | 2E-6                                 | 8E-9                                           | 6E-5                                             | 6E-4                                                           |
| 92         | Uranium-232              | D, see 230U                                                                                                   | 2E+0<br>Bone surf<br>(4E+0)                           | 2E-1<br>Bone surf<br>(4E-1) | 9E-11                                | -                                              | -                                                | -                                                              |
|            |                          | W, see 230U<br>Y, see 230U                                                                                    | -                                                     | 4E-1                        | 2E-10                                | 6E-13                                          | 6E-8                                             | 6E-7                                                           |
| 92         | Uranium-233              | D, see 230U                                                                                                   | 1E+1<br>Bone surf<br>(2E+1)                           | 1E+0<br>Bone surf<br>(2E+0) | 5E-10                                | -                                              | -                                                | -                                                              |
|            |                          | W, see 230U<br>Y, see 230U                                                                                    | -                                                     | 7E-1                        | 3E-10                                | 3E-12                                          | 3E-7                                             | 3E-6                                                           |
| 92         | Uranium-234 <sup>3</sup> | D, see 230U                                                                                                   | 1E+1<br>Bone surf<br>(2E+1)                           | 1E+0<br>Bone surf<br>(2E+0) | 5E-10                                | -                                              | -                                                | -                                                              |
|            |                          | W, see 230U<br>Y, see 230U                                                                                    | -                                                     | 7E-1                        | 3E-10                                | 1E-12                                          | 3E-7                                             | 3E-6                                                           |



| Atomic No. | Radionuclide                 | Class                   | Table 1<br>Occupational Values                           |                                     |                                                | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to<br>Sewers                                     |
|------------|------------------------------|-------------------------|----------------------------------------------------------|-------------------------------------|------------------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------|
|            |                              |                         | Col. 1<br>Oral<br>Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                                | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly<br>Average<br>Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                              |                         |                                                          | Col. 2<br>ALL<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                      |
| 92         | Uranium-235 <sup>3</sup>     | D, see <sup>230</sup> U | 1E+1<br>Bone surf<br>(2E+1)                              | 1E+0<br>Bone surf<br>(2E+0)         | 6E-10                                          | -                                              | -                                                | -                                                                    |
|            |                              | W, see <sup>230</sup> U | -                                                        | 8E-1                                | 3E-10                                          | 3E-12                                          | 3E-7                                             | 3E-6                                                                 |
|            |                              | Y, see <sup>230</sup> U | -                                                        | 4E-2                                | 2E-11                                          | 1E-12                                          | -                                                | -                                                                    |
| 92         | Uranium-236                  | D, see <sup>230</sup> U | 1E+1<br>Bone surf<br>(2E+1)                              | 1E+0<br>Bone surf<br>(2E+0)         | 5E-10                                          | -                                              | -                                                | -                                                                    |
|            |                              | W, see <sup>230</sup> U | -                                                        | 8E-1                                | 3E-10                                          | 3E-12                                          | 3E-7                                             | 3E-6                                                                 |
|            |                              | Y, see <sup>230</sup> U | -                                                        | 4E-2                                | 2E-11                                          | 1E-12                                          | -                                                | -                                                                    |
| 92         | Uranium-237                  | D, see <sup>230</sup> U | 2E+3<br>LLI wall<br>(2E+3)                               | 3E+3                                | 1E-6                                           | 4E-9                                           | -                                                | -                                                                    |
|            |                              | W, see <sup>230</sup> U | -                                                        | 2E+3                                | 7E-7                                           | 2E-9                                           | 3E-5                                             | 3E-4                                                                 |
|            |                              | Y, see <sup>230</sup> U | -                                                        | 2E+3                                | 6E-7                                           | 2E-9                                           | -                                                | -                                                                    |
| 92         | Uranium-238 <sup>3</sup>     | D, see <sup>230</sup> U | 1E+1<br>Bone surf<br>(2E+1)                              | 1E+0<br>Bone surf<br>(2E+0)         | 6E-10                                          | -                                              | -                                                | -                                                                    |
|            |                              | W, see <sup>230</sup> U | -                                                        | 8E-1                                | 3E-10                                          | 3E-12                                          | 3E-7                                             | 3E-6                                                                 |
|            |                              | Y, see <sup>230</sup> U | -                                                        | 4E-2                                | 2E-11                                          | 1E-12                                          | -                                                | -                                                                    |
| 92         | Uranium-239 <sup>2</sup>     | D, see <sup>230</sup> U | 7E+4                                                     | 2E+5                                | 8E-5                                           | 3E-7                                           | 9E-4                                             | 9E-3                                                                 |
|            |                              | W, see <sup>230</sup> U | -                                                        | 2E+5                                | 7E-5                                           | 2E-7                                           | -                                                | -                                                                    |
|            |                              | Y, see <sup>230</sup> U | -                                                        | 2E+5                                | 6E-5                                           | 2E-7                                           | -                                                | -                                                                    |
| 92         | Uranium-240                  | D, see <sup>230</sup> U | 1E+3                                                     | 4E+3                                | 2E-6                                           | 5E-9                                           | 2E-5                                             | 2E-4                                                                 |
|            |                              | W, see <sup>230</sup> U | -                                                        | 3E+3                                | 1E-6                                           | 4E-9                                           | -                                                | -                                                                    |
|            |                              | Y, see <sup>230</sup> U | -                                                        | 2E+3                                | 1E-6                                           | 3E-9                                           | -                                                | -                                                                    |
| 92         | Uranium-natural <sup>3</sup> | D, see <sup>230</sup> U | 1E+1<br>Bone surf<br>(2E+1)                              | 1E+0<br>Bone surf<br>(2E+0)         | 5E-10                                          | -                                              | -                                                | -                                                                    |
|            |                              | W, see <sup>230</sup> U | -                                                        | 8E-1                                | 3E-10                                          | 3E-12                                          | 3E-7                                             | 3E-6                                                                 |
|            |                              | Y, see <sup>230</sup> U | -                                                        | 5E-2                                | 2E-11                                          | 9E-14                                          | -                                                | -                                                                    |
| 93         | Neptunium-232 <sup>2</sup>   | W, all compounds        | 1E+5                                                     | 2E+3<br>Bone surf<br>(5E+2)         | 7E-7                                           | -                                              | 2E-3                                             | 2E-2                                                                 |
|            |                              |                         | -                                                        | -                                   | -                                              | 6E-9                                           | -                                                | -                                                                    |
| 93         | Neptunium-233 <sup>2</sup>   | 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<br>LLI wall<br>(2E+4)                               | 8E+2<br>Bone surf<br>(1E+3)         | 3E-7                                           | -                                              | -                                                | -                                                                    |
|            |                              |                         | -                                                        | -                                   | -                                              | 2E-9                                           | 3E-4                                             | 3E-3                                                                 |
| 93         | Neptunium-236<br>(1.15E+5 y) | W, all compounds        | 3E+0<br>Bone surf<br>(6E+0)                              | 2E-2<br>Bone surf<br>(5E-2)         | 9E-12                                          | -                                              | -                                                | -                                                                    |
|            |                              |                         | -                                                        | -                                   | -                                              | 8E-14                                          | 9E-8                                             | 9E-7                                                                 |
| 93         | Neptunium-236m<br>(22.5 h)   | W, all compounds        | 3E+3<br>Bone surf<br>(4E+3)                              | 3E+1<br>Bone surf<br>(7E+1)         | 1E-8                                           | -                                              | -                                                | -                                                                    |
|            |                              |                         | -                                                        | -                                   | -                                              | 1E-10                                          | 5E-5                                             | 5E-4                                                                 |
| 93         | Neptunium-237                | W, all compounds        | 5E-1<br>Bone surf<br>(1E+0)                              | 4E-3<br>Bone surf<br>(1E-2)         | 2E-12                                          | -                                              | -                                                | -                                                                    |
|            |                              |                         | -                                                        | -                                   | -                                              | 1E-14                                          | 2E-8                                             | 2E-7                                                                 |

| Atomic No. | Radionuclide               | Class                                                | Table 1<br>Occupational Values                        |                                     |                                               | Table 2<br>Effluent Concentrations            |                                                 | Table 3<br>Releases to Sewers                                 |
|------------|----------------------------|------------------------------------------------------|-------------------------------------------------------|-------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------|
|            |                            |                                                      | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                          |                                               | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                            |                                                      |                                                       | Col. 2<br>ALL<br>( $\mu\text{Ci}$ ) | Col. 3<br>OAC<br>( $\mu\text{Ci}/\text{ml}$ ) |                                               |                                                 |                                                               |
| 93         | Neptunium-238              | W, all compounds                                     | 1E+3                                                  | 6E+1<br>Bone surf<br>(2E+2)         | 3E-8                                          | -                                             | 2E-5                                            | 2E-4                                                          |
| 93         | Neptunium-239              | W, all compounds                                     | 2E+3<br>LLI wall<br>(2E+3)                            | 2E+3                                | 9E-7                                          | 3E-9                                          | -                                               | -                                                             |
| 93         | Neptunium-240 <sup>2</sup> | W, all compounds                                     | 2E+4                                                  | 8E+4                                | 3E-5                                          | 1E-7                                          | 3E-4                                            | 3E-3                                                          |
| 94         | Plutonium-234              | W, all compounds except $\text{PuO}_2$               | 8E+3                                                  | 2E+2<br>2E+2                        | 9E-8<br>8E-8                                  | 3E-10<br>3E-10                                | 1E-4                                            | 1E-3                                                          |
| 94         | Plutonium-235 <sup>2</sup> | W, see $^{234}\text{Pu}$<br>Y, see $^{234}\text{Pu}$ | 9E+5                                                  | 3E+6<br>3E+6                        | 1E-3<br>1E-3                                  | 4E-6<br>3E-6                                  | 1E-2                                            | 1E-1                                                          |
| 94         | Plutonium-236              | W, see $^{234}\text{Pu}$<br>Y, see $^{234}\text{Pu}$ | 2E+0<br>Bone surf<br>(4E+0)                           | 2E-2<br>Bone surf<br>(4E-2)         | 8E-12                                         | -                                             | -                                               | -                                                             |
| 94         | Plutonium-237              | W, see $^{234}\text{Pu}$<br>Y, see $^{234}\text{Pu}$ | 1E+4                                                  | 3E+3<br>3E+3                        | 1E-6<br>1E-6                                  | 5E-9<br>4E-9                                  | 2E-4                                            | 2E-3                                                          |
| 94         | Plutonium-238              | W, see $^{234}\text{Pu}$<br>Y, see $^{234}\text{Pu}$ | 9E-1<br>Bone surf<br>(2E+0)                           | 7E-3<br>Bone surf<br>(1E-2)         | 3E-12                                         | -                                             | -                                               | -                                                             |
| 94         | Plutonium-239              | W, see $^{234}\text{Pu}$<br>Y, see $^{234}\text{Pu}$ | 8E-1<br>Bone surf<br>(1E+0)                           | 6E-3<br>Bone surf<br>(1E-2)         | 3E-12                                         | -                                             | -                                               | -                                                             |
| 94         | Plutonium-240              | W, see $^{234}\text{Pu}$<br>Y, see $^{234}\text{Pu}$ | 8E-1<br>Bone surf<br>(1E+0)                           | 6E-3<br>Bone surf<br>(1E-2)         | 3E-12                                         | -                                             | -                                               | -                                                             |
| 94         | Plutonium-241              | W, see $^{234}\text{Pu}$<br>Y, see $^{234}\text{Pu}$ | 4E+1<br>Bone surf<br>(7E+1)                           | 3E-1<br>Bone surf<br>(6E-1)         | 1E-10                                         | -                                             | -                                               | -                                                             |

| Atomic No. | Radionuclide                | Class                    | Table 1<br>Occupational Values                        |                             |                                     | Table 2<br>Effluent Concentrations            |                                                 | Table 3<br>Releases to Sewers                                 |
|------------|-----------------------------|--------------------------|-------------------------------------------------------|-----------------------------|-------------------------------------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------|
|            |                             |                          | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                  |                                     | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                             |                          |                                                       | ALI<br>( $\mu\text{Ci}$ )   | OAC<br>( $\mu\text{Ci}/\text{ml}$ ) |                                               |                                                 |                                                               |
| 94         | Plutonium-242               | W, see $^{234}\text{Pu}$ | 8E-1<br>Bone surf<br>(1E+0)                           | 7E-3<br>Bone surf<br>(1E-2) | 3E-12                               | -                                             | -                                               | -                                                             |
|            |                             | Y, see $^{234}\text{Pu}$ | -                                                     | 2E-2<br>Bone surf<br>(2E-2) | 7E-12                               | 2E-14                                         | 2E-8                                            | 2E-7                                                          |
| 94         | Plutonium-243               | W, see $^{234}\text{Pu}$ | 2E+4                                                  | 4E+4                        | 2E-5                                | 5E-8                                          | 2E-4                                            | 2E-3                                                          |
|            |                             | Y, see $^{234}\text{Pu}$ | -                                                     | 4E+4                        | 2E-5                                | 5E-8                                          | -                                               | -                                                             |
| 94         | Plutonium-244               | W, see $^{234}\text{Pu}$ | 8E-1<br>Bone surf<br>(2E+0)                           | 7E-3<br>Bone surf<br>(1E-2) | 3E-12                               | -                                             | -                                               | -                                                             |
|            |                             | Y, see $^{234}\text{Pu}$ | -                                                     | 2E-2<br>Bone surf<br>(2E-2) | 7E-12                               | 2E-14                                         | 2E-8                                            | 2E-7                                                          |
| 94         | Plutonium-245               | W, see $^{234}\text{Pu}$ | 2E+3                                                  | 5E+3                        | 2E-6                                | 6E-9                                          | 3E-5                                            | 3E-4                                                          |
|            |                             | Y, see $^{234}\text{Pu}$ | -                                                     | 4E+3                        | 2E-6                                | 6E-9                                          | -                                               | -                                                             |
| 94         | Plutonium-246               | W, see $^{234}\text{Pu}$ | 4E+2<br>LLI wall<br>(4E+2)                            | 3E+2                        | 1E-7                                | 4E-10                                         | -                                               | -                                                             |
|            |                             | Y, see $^{234}\text{Pu}$ | -                                                     | 3E+2                        | 1E-7                                | 4E-10                                         | 6E-6                                            | 6E-5                                                          |
| 95         | Americium-237 <sup>2</sup>  | W, all compounds         | 8E+4                                                  | 3E+5                        | 1E-4                                | 4E-7                                          | 1E-3                                            | 1E-2                                                          |
| 95         | Americium-238 <sup>2</sup>  | W, all compounds         | 4E+4                                                  | 3E+3                        | 1E-6                                | -                                             | 5E-4                                            | 5E-3                                                          |
|            |                             |                          | -                                                     | Bone surf<br>(6E+3)         | -                                   | 9E-9                                          | -                                               | -                                                             |
| 95         | Americium-239               | W, all compounds         | 5E+3                                                  | 1E+4                        | 5E-6                                | 2E-8                                          | 7E-5                                            | 7E-4                                                          |
| 95         | Americium-240               | W, all compounds         | 2E+3                                                  | 3E+3                        | 1E-6                                | 4E-9                                          | 3E-5                                            | 3E-4                                                          |
| 95         | Americium-241               | W, all compounds         | 8E-1<br>Bone surf<br>(1E+0)                           | 6E-3<br>Bone surf<br>(1E-2) | 3E-12                               | -                                             | -                                               | -                                                             |
|            |                             |                          | -                                                     | -                           | -                                   | 2E-14                                         | 2E-8                                            | 2E-7                                                          |
| 95         | Americium-242m              | W, all compounds         | 8E-1<br>Bone surf<br>(1E+0)                           | 6E-3<br>Bone surf<br>(1E-2) | 3E-12                               | -                                             | -                                               | -                                                             |
|            |                             |                          | -                                                     | -                           | -                                   | 2E-14                                         | 2E-8                                            | 2E-7                                                          |
| 95         | Americium-242               | W, all compounds         | 4E+3                                                  | 8E+1<br>Bone surf<br>(9E+1) | 4E-8                                | -                                             | 5E-5                                            | 5E-4                                                          |
|            |                             |                          | -                                                     | -                           | -                                   | 1E-10                                         | -                                               | -                                                             |
| 95         | Americium-243               | W, all compounds         | 8E-1<br>Bone surf<br>(1E+0)                           | 6E-3<br>Bone surf<br>(1E-2) | 3E-12                               | -                                             | -                                               | -                                                             |
|            |                             |                          | -                                                     | -                           | -                                   | 2E-14                                         | 2E-8                                            | 2E-7                                                          |
| 95         | Americium-244a <sup>2</sup> | W, all compounds         | 6E+4<br>St. wall<br>(8E+4)                            | 4E+3<br>Bone surf<br>(7E+3) | 2E-6                                | -                                             | -                                               | -                                                             |
|            |                             |                          | -                                                     | -                           | -                                   | 1E-8                                          | 1E-3                                            | 1E-2                                                          |
| 95         | Americium-244               | W, all compounds         | 3E+3                                                  | 2E+2<br>Bone surf<br>(3E+2) | 8E-8                                | -                                             | 4E-5                                            | 4E-4                                                          |
|            |                             |                          | -                                                     | -                           | -                                   | 4E-10                                         | -                                               | -                                                             |
| 95         | Americium-245               | W, all compounds         | 3E+4                                                  | 8E+4                        | 3E-5                                | 1E-7                                          | 4E-4                                            | 4E-3                                                          |

| Atomic No. | Radionuclide               | Class            | Table 1<br>Occupational Values                        |                             |                                     | Table 2<br>Effluent Concentrations            |                                                 | Table 3<br>Releases to Sewers                                 |
|------------|----------------------------|------------------|-------------------------------------------------------|-----------------------------|-------------------------------------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------|
|            |                            |                  | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                  |                                     | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                            |                  |                                                       | ALI<br>( $\mu\text{Ci}$ )   | DAL<br>( $\mu\text{Ci}/\text{ml}$ ) |                                               |                                                 |                                                               |
| 95         | Americium-246 <sup>2</sup> | W, all compounds | 5E+4<br>St. wall<br>(6E+4)                            | 2E+5                        | 8E-5                                | 3E-7                                          | -                                               | -                                                             |
| 95         | Americium-246 <sup>2</sup> | W, all compounds | 3E+4                                                  | 1E+5                        | 4E-5                                | 1E-7                                          | 8E-4                                            | 8E-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<br>Bone surf<br>(8E+1)                           | 6E-1<br>Bone surf<br>(6E-1) | 2E-10                               | -                                             | -                                               | -                                                             |
| 96         | Curium-241                 | W, all compounds | 1E+3                                                  | 3E+1<br>Bone surf<br>(4E+1) | 1E-8                                | -                                             | 2E-5                                            | 2E-4                                                          |
| 96         | Curium-242                 | W, all compounds | 3E+1<br>Bone surf<br>(9E+1)                           | 3E-1<br>Bone surf<br>(3E-1) | 1E-10                               | -                                             | -                                               | -                                                             |
| 96         | Curium-243                 | W, all compounds | 1E+0<br>Bone surf<br>(2E+0)                           | 9E-3<br>Bone surf<br>(2E-2) | 4E-12                               | -                                             | -                                               | -                                                             |
| 96         | Curium-244                 | W, all compounds | 1E+0<br>Bone surf<br>(3E+0)                           | 1E-2<br>Bone surf<br>(2E-2) | 5E-12                               | -                                             | -                                               | -                                                             |
| 96         | Curium-245                 | W, all compounds | 7E-1<br>Bone surf<br>(1E+0)                           | 6E-3<br>Bone surf<br>(1E-2) | 3E-12                               | -                                             | -                                               | -                                                             |
| 96         | Curium-246                 | W, all compounds | 7E-1<br>Bone surf<br>(1E+0)                           | 6E-3<br>Bone surf<br>(1E-2) | 3E-12                               | -                                             | -                                               | -                                                             |
| 96         | Curium-247                 | W, all compounds | 8E-1<br>Bone surf<br>(1E+0)                           | 6E-3<br>Bone surf<br>(1E-2) | 3E-12                               | -                                             | -                                               | -                                                             |
| 96         | Curium-248                 | W, all compounds | 2E-1<br>Bone surf<br>(4E-1)                           | 2E-3<br>Bone surf<br>(3E-3) | 7E-13                               | -                                             | -                                               | -                                                             |
| 96         | Curium-249 <sup>2</sup>    | W, all compounds | 5E+4                                                  | 2E+4<br>Bone surf<br>(3E+4) | 7E-6                                | -                                             | 7E-4                                            | 7E-3                                                          |
| 96         | Curium-250                 | W, all compounds | 4E-2<br>Bone surf<br>(6E-2)                           | 3E-4<br>Bone surf<br>(5E-4) | 1E-13                               | -                                             | -                                               | -                                                             |
| 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<br>Bone surf<br>(1E+0)                           | 4E-3<br>Bone surf<br>(9E-3) | 2E-12                               | -                                             | -                                               | -                                                             |
| 97         | Berkelium-249              | W, all compounds | 2E+2<br>Bone surf<br>(5E+2)                           | 2E+0<br>Bone surf<br>(4E+0) | 7E-10                               | -                                             | -                                               | -                                                             |

| Atomic No. | Radionuclide                 | Class                                                | Table 1<br>Occupational Values                           |                                                 |                                               | Table 2<br>Effluent Concentrations            |                                                 | Table 3<br>Releases to Sewers                                       |
|------------|------------------------------|------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------|
|            |                              |                                                      | Col. 1<br>Oral<br>Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                                      |                                               | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{ml}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{ml}$ ) | Monthly<br>Average<br>Concentration<br>( $\mu\text{Ci}/\text{ml}$ ) |
|            |                              |                                                      |                                                          | Col. 2<br>ALI<br>( $\mu\text{Ci}$ )             | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{ml}$ ) |                                               |                                                 |                                                                     |
| 97         | Berkelium-250                | W, all compounds                                     | $9\text{E}+3$                                            | $3\text{E}+2$<br>Bone surf<br>( $7\text{E}+2$ ) | $1\text{E}-7$                                 | -                                             | $1\text{E}-4$                                   | $1\text{E}-3$                                                       |
| 98         | Californium-244 <sup>2</sup> | W, all compounds except those given for Y            | $3\text{E}+4$<br>St. wall<br>( $3\text{E}+4$ )           | $6\text{E}+2$                                   | $2\text{E}-7$                                 | $8\text{E}-10$                                | -                                               | -                                                                   |
|            |                              | Y, oxides and hydroxides                             | -                                                        | $6\text{E}+2$                                   | $2\text{E}-7$                                 | $8\text{E}-10$                                | -                                               | -                                                                   |
| 98         | Californium-246              | W, see <sup>244</sup> Cf<br>Y, see <sup>244</sup> Cf | $4\text{E}+2$<br>-                                       | $9\text{E}+0$<br>$9\text{E}+0$                  | $4\text{E}-9$<br>$4\text{E}-9$                | $1\text{E}-11$<br>$1\text{E}-11$              | $5\text{E}-6$<br>-                              | $5\text{E}-5$<br>-                                                  |
| 98         | Californium-248              | W, see <sup>244</sup> Cf<br>Y, see <sup>244</sup> Cf | $8\text{E}+0$<br>Bone surf<br>( $2\text{E}+1$ )          | $6\text{E}-2$<br>Bone surf<br>( $1\text{E}-1$ ) | $3\text{E}-11$<br>-                           | -<br>$2\text{E}-13$<br>$1\text{E}-13$         | -<br>$2\text{E}-7$<br>$1\text{E}-13$            | -<br>$2\text{E}-6$<br>-                                             |
| 98         | Californium-249              | W, see <sup>244</sup> Cf<br>Y, see <sup>244</sup> Cf | $5\text{E}-1$<br>Bone surf<br>( $1\text{E}+0$ )          | $4\text{E}-3$<br>Bone surf<br>( $9\text{E}-3$ ) | $2\text{E}-12$<br>-                           | -<br>$1\text{E}-14$<br>-                      | -<br>$2\text{E}-8$<br>-                         | -<br>$2\text{E}-7$<br>-                                             |
|            |                              |                                                      | -                                                        | $1\text{E}-2$<br>Bone surf<br>( $1\text{E}-2$ ) | $4\text{E}-12$<br>-                           | -<br>$2\text{E}-14$<br>-                      | -<br>-                                          | -<br>-                                                              |
| 98         | Californium-250              | W, see <sup>244</sup> Cf<br>Y, see <sup>244</sup> Cf | $1\text{E}+0$<br>Bone surf<br>( $2\text{E}+0$ )          | $9\text{E}-3$<br>Bone surf<br>( $2\text{E}-2$ ) | $4\text{E}-12$<br>-                           | -<br>$3\text{E}-14$<br>$4\text{E}-14$         | -<br>$3\text{E}-8$<br>-                         | -<br>$3\text{E}-7$<br>-                                             |
| 98         | Californium-251              | W, see <sup>244</sup> Cf<br>Y, see <sup>244</sup> Cf | $5\text{E}-1$<br>Bone surf<br>( $1\text{E}+0$ )          | $4\text{E}-3$<br>Bone surf<br>( $9\text{E}-3$ ) | $2\text{E}-12$<br>-                           | -<br>$1\text{E}-14$<br>-                      | -<br>$2\text{E}-8$<br>-                         | -<br>$2\text{E}-7$<br>-                                             |
|            |                              |                                                      | -                                                        | $1\text{E}-2$<br>Bone surf<br>( $1\text{E}-2$ ) | $4\text{E}-12$<br>-                           | -<br>$2\text{E}-14$<br>-                      | -<br>-                                          | -<br>-                                                              |
| 98         | Californium-252              | W, see <sup>244</sup> Cf<br>Y, see <sup>244</sup> Cf | $2\text{E}+0$<br>Bone surf<br>( $5\text{E}+0$ )          | $2\text{E}-2$<br>Bone surf<br>( $4\text{E}-2$ ) | $8\text{E}-12$<br>-                           | -<br>$5\text{E}-14$<br>$5\text{E}-14$         | -<br>$7\text{E}-8$<br>-                         | -<br>$7\text{E}-7$<br>-                                             |
| 98         | Californium-253              | W, see <sup>244</sup> Cf<br>Y, see <sup>244</sup> Cf | $2\text{E}+2$<br>Bone surf<br>( $4\text{E}+2$ )          | $2\text{E}+0$                                   | $8\text{E}-10$                                | $3\text{E}-12$                                | -                                               | -                                                                   |
|            |                              |                                                      | -                                                        | $2\text{E}+0$                                   | $7\text{E}-10$                                | $2\text{E}-12$                                | $5\text{E}-6$                                   | $5\text{E}-5$                                                       |
| 98         | Californium-254              | W, see <sup>244</sup> Cf<br>Y, see <sup>244</sup> Cf | $2\text{E}+0$<br>-                                       | $2\text{E}-2$<br>$2\text{E}-2$                  | $9\text{E}-12$<br>$7\text{E}-12$              | $3\text{E}-14$<br>$2\text{E}-14$              | $3\text{E}-8$<br>-                              | $3\text{E}-7$<br>-                                                  |
| 99         | Einsteinium-250              | W, all compounds                                     | $4\text{E}+4$                                            | $5\text{E}+2$<br>Bone surf<br>( $1\text{E}+3$ ) | $2\text{E}-7$                                 | -                                             | $6\text{E}-4$                                   | $6\text{E}-3$                                                       |
| 99         | Einsteinium-251              | W, all compounds                                     | $7\text{E}+3$                                            | $9\text{E}+2$<br>Bone surf<br>( $1\text{E}+3$ ) | $4\text{E}-7$                                 | -                                             | $1\text{E}-4$                                   | $1\text{E}-3$                                                       |
| 99         | Einsteinium-253              | W, all compounds                                     | $2\text{E}+2$                                            | $1\text{E}+0$                                   | $6\text{E}-10$                                | $2\text{E}-12$                                | $2\text{E}-6$                                   | $2\text{E}-5$                                                       |

| Atomic No. | Radionuclide                                                                                                                                                                                                     | Class                   | Table 1<br>Occupational Values                        |                                                 |                                                | Table 2<br>Effluent Concentrations             |                                                  | Table 3<br>Releases to Sewers                                  |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------------------------------------|-------------------------------------------------|------------------------------------------------|------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|
|            |                                                                                                                                                                                                                  |                         | Col. 1<br>Oral Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation                                      |                                                | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}^3$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}^3$ ) | Monthly Average Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|            |                                                                                                                                                                                                                  |                         |                                                       | Col. 2<br>ALI<br>( $\mu\text{Ci}$ )             | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                |                                                  |                                                                |
| 99         | Einsteinium-254m                                                                                                                                                                                                 | W, all compounds        | $3\text{E}+2$<br>LLI wall<br>( $3\text{E}+2$ )        | $1\text{E}+1$                                   | $4\text{E}-9$                                  | $1\text{E}-11$                                 | -                                                | -                                                              |
| 99         | Einsteinium-254                                                                                                                                                                                                  | W, all compounds        | $8\text{E}+0$<br>Bone surf<br>( $2\text{E}+1$ )       | $7\text{E}-2$<br>Bone surf<br>( $1\text{E}-1$ ) | $3\text{E}-11$                                 | -                                              | $4\text{E}-6$                                    | $4\text{E}-5$                                                  |
| 100        | Fermium-252                                                                                                                                                                                                      | W, all compounds        | $5\text{E}+2$                                         | $1\text{E}+1$                                   | $5\text{E}-9$                                  | $2\text{E}-11$                                 | $6\text{E}-6$                                    | $6\text{E}-5$                                                  |
| 100        | Fermium-253                                                                                                                                                                                                      | W, all compounds        | $1\text{E}+3$                                         | $1\text{E}+1$                                   | $4\text{E}-9$                                  | $1\text{E}-11$                                 | $1\text{E}-5$                                    | $1\text{E}-4$                                                  |
| 100        | Fermium-254                                                                                                                                                                                                      | W, all compounds        | $3\text{E}+3$                                         | $9\text{E}+1$                                   | $4\text{E}-8$                                  | $1\text{E}-10$                                 | $4\text{E}-5$                                    | $4\text{E}-4$                                                  |
| 100        | Fermium-255                                                                                                                                                                                                      | W, all compounds        | $5\text{E}+2$                                         | $2\text{E}+1$                                   | $9\text{E}-9$                                  | $3\text{E}-11$                                 | $7\text{E}-6$                                    | $7\text{E}-5$                                                  |
| 100        | Fermium-257                                                                                                                                                                                                      | W, all compounds        | $2\text{E}+1$<br>Bone surf<br>( $4\text{E}+1$ )       | $2\text{E}-1$<br>Bone surf<br>( $2\text{E}-1$ ) | $7\text{E}-11$                                 | -                                              | -                                                | -                                                              |
| 101        | Mendelevium-257                                                                                                                                                                                                  | W, all compounds        | $7\text{E}+3$                                         | $8\text{E}+1$<br>Bone surf<br>( $9\text{E}+1$ ) | $4\text{E}-8$                                  | -                                              | $1\text{E}-4$                                    | $1\text{E}-3$                                                  |
| 101        | Mendelevium-258                                                                                                                                                                                                  | W, all compounds        | $3\text{E}+1$<br>Bone surf<br>( $5\text{E}+1$ )       | $2\text{E}-1$<br>Bone surf<br>( $3\text{E}-1$ ) | $1\text{E}-10$                                 | -                                              | -                                                | -                                                              |
| -          | 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 <sup>1</sup> | -                                                     | $2\text{E}+2$                                   | $1\text{E}-7$                                  | $1\text{E}-9$                                  | -                                                | -                                                              |
| -          | 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                                                    |                         | -                                                     | $2\text{E}-1$                                   | $1\text{E}-10$                                 | $1\text{E}-12$                                 | $1\text{E}-8$                                    | $1\text{E}-7$                                                  |
| -          | 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 |                         | -                                                     | $4\text{E}-4$                                   | $2\text{E}-13$                                 | $1\text{E}-15$                                 | $2\text{E}-9$                                    | $2\text{E}-8$                                                  |

## FOOTNOTES:

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

<sup>2</sup>These radionuclides have radiological half-lives of less than 2 hours. The total effective dose equivalent received during operations with these radionuclides might include a significant contribution from external exposure. The DAC values for all radionuclides, other than those designated Class "Submersion," are based upon the committed effective dose equivalent due to the intake of the radionuclide into the body and do NOT include potentially significant contributions to dose equivalent from external exposures. The licensee may substitute 1E-7  $\mu\text{Ci}/\text{m}$  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 § 20.1203.)

<sup>3</sup>For soluble mixtures of U-238, U-234, and U-235 in air, chemical toxicity may be the limiting factor (see § 20.1201(e)). 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)  $\mu\text{Ci}\cdot\text{hr}/\text{m}$ , 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:

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

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

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

## NOTE:

- 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.
- 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

| Radionuclide                                                                                                                                                                                                                                                                                                                                   | Table 1<br>Occupational Values                           |                                                   |                                              | Table 2<br>Effluent<br>Concentrations        |                                                | Table 3<br>Releases to<br>Sewers                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------|----------------------------------------------|----------------------------------------------|------------------------------------------------|--------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                | Col. 1<br>Oral<br>Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 2<br>Inhalation<br>ALI<br>( $\mu\text{Ci}$ ) | Col. 3<br>DAC<br>( $\mu\text{Ci}/\text{m}$ ) | Col. 1<br>Air<br>( $\mu\text{Ci}/\text{m}$ ) | Col. 2<br>Water<br>( $\mu\text{Ci}/\text{m}$ ) | Monthly<br>Average<br>Concentration<br>( $\mu\text{Ci}/\text{m}$ ) |
|                                                                                                                                                                                                                                                                                                                                                |                                                          |                                                   |                                              |                                              |                                                |                                                                    |
| 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                                        | -                                            | -                                              | -                                                                  |

| Radionuclide                                                                                                                                                                                                                                                                                                                                                                                                                    | Table 2<br>Occupational Values                 |                                         |                                      | Table 2<br>Effluent<br>Concentrations |                                        | Table 3<br>Releases to<br>Sewers                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------|--------------------------------------|---------------------------------------|----------------------------------------|----------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                 | Col. 1                                         | Col. 2                                  | Col. 3                               | Col. 1                                | Col. 2                                 | Monthly<br>Average<br>Concentration<br>( $\mu\text{Ci}/\text{m}^3$ ) |
|                                                                                                                                                                                                                                                                                                                                                                                                                                 | Oral<br>Ingestion<br>ALI<br>( $\mu\text{Ci}$ ) | Inhalation<br>ALI<br>( $\mu\text{Ci}$ ) | DAC<br>( $\mu\text{Ci}/\text{m}^3$ ) | Air<br>( $\mu\text{Ci}/\text{m}^3$ )  | Water<br>( $\mu\text{Ci}/\text{m}^3$ ) |                                                                      |
| 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-242-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, Nd-236-W, Nd-237-W, 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 $\mu\text{m}$ AMAD particle distribution assumed) prior to chemical separation of the uranium from the ore, the following values may be used for the DAC of the mixture: 6E-11 $\mu\text{Ci}$ of gross alpha activity from uranium-238, uranium-234, thorium-230, and radium-226 per milliliter of air; 3E-11 $\mu\text{Ci}$ of natural uranium per milliliter of air; or 45 micrograms of natural uranium per cubic meter of air. |
| 4 | If the identity and concentration of each radionuclide in a mixture are known, the limiting values should be derived as follows: determine, for each radionuclide in the mixture, the ratio between the concentration present in the mixture and the concentration otherwise established in Appendix B for the specific radionuclide when not in a mixture. The sum of such ratios for all of the radionuclides in the mixture may not exceed "1" (i.e., "unity").                                                     |

Example: If radionuclides "A," "B," and "C" are present in concentrations  $C_A$ ,  $C_B$ , and  $C_C$ , and if the applicable DACs are  $\text{DAC}_A$ ,  $\text{DAC}_B$ , and  $\text{DAC}_C$ , respectively, then the concentrations shall be limited so that the following relationship exists:

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

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