DOE/EH--0070

DE88 014691

External Dose-Rate Conversion Factors for Calculation of Dose to the Public

July 1988

U.S. Department of Energy

Assistant Secretary for Environment,
Safety and Health
Office of Environmental Guidance
and Compliance
Washington, D.C. 20545

This document is
PUBLICLY RELEASABLE
Bang Steele
Authorizing Official
Date: 4/6/04

MASTER *eb*

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

CONTENTS

	<u>Page</u>
LIST OF FIGURES.	v
LIST OF TABLES	v
1. INTRODUCTION	1
1.1 Description of External Dose-Rate Conversion Factors.	1
1.2 Adjustments to Previously Documented Methodology.	3
1.3 Outline of Report	5
2. CALCULATION OF EXTERNAL DOSE-RATE FACTORS FOR PHOTONS AND ELECTRONS.	7
2.1 Photon Dose-Rate Factors for Body Organs.	7
2.1.1 Immersion in contaminated air.	8
2.1.2 Immersion in contaminated water.	12
2.1.3 Exposure to a contaminated ground surface.	13
2.1.4 Dose-rate factors for photon spectrum from radioactive decay.	16
2.2 Electron Dose-Rate Factors for Skin	17
2.2.1 Immersion in contaminated water.	18
2.2.2 Immersion in contaminated air.	19
2.2.3 Exposure to a contaminated ground surface.	21
2.2.4 Dose-rate factors for electron spectrum from radioactive decay.	24
2.3 Effective Dose-Rate Factors for Photons	27
3. IMPLEMENTATION OF EXTERNAL DOSE-RATE FACTORS FOR PHOTONS AND ELECTRONS.	29
3.1 Radiations from Spontaneous Fission and Bremsstrahlung.	30
3.1.1 Spontaneous fission.	30
3.1.2 Bremsstrahlung	30
3.2 Corrections to the External Dose-Rate Factors	31
3.2.1 Effects of indoor residence.	32
3.2.2 Effects of ground roughness.	35
3.2.3 Exposure during boating activities	36
3.2.4 Exposure to contaminated shorelines.	37
3.2.5 Guidance on application of dose-reduction factors.	38
3.3 External Dose-Rate Factors for Sources in Soil.	39
3.3.1 Photon dose-rate factors	39
3.3.2 Electron dose-rate factors	40
3.4 External Dose-Rate Factors for Radioactive Decay Chains	41
REFERENCES	45

	<u>Page</u>
APPENDIX A. TABLES OF DOSE-RATE CONVERSION FACTORS FOR EXTERNAL EXPOSURE TO PHOTONS AND ELECTRONS	49
A.1 Dose-Rate Factors for Immersion in Contaminated Air	51
A.2 Dose-Rate Factors for Immersion in Contaminated Water . . .	91
A.3 Dose-Rate Factors for Exposure to a Contaminated Ground Surface	131
APPENDIX B. DIAGRAMS OF RADIOACTIVE DECAY CHAINS.	171
APPENDIX C. LISTING OF THE DOSFACTER COMPUTER CODE.	191

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
B.1 Diagrams of Radioactive Decay Chains.	171

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1 Organ-specific weighting factors for calculation of effective dose equivalents.	28
A.1 Dose-rate factors for body organs and effective dose-rate factor for immersion in contaminated air.	52
A.2 Dose-rate factors for body organs and effective dose-rate factor for immersion in contaminated water.	92
A.3 Dose-rate factors for body organs and effective dose-rate factor for exposure 1 m above contaminated ground surface . .	132

1. INTRODUCTION

This report presents a tabulation of dose-rate conversion factors for external exposure to photons and electrons emitted by radionuclides in the environment.* This report was prepared in conjunction with criteria for limiting dose equivalents to members of the public from operations of the U.S. Department of Energy (DOE), as given in DOE Order 5400.3, "Radiation Protection of the Public and the Environment." The dose-rate conversion factors are provided for use by the DOE and its contractors in performing calculations of external dose equivalents to members of the public.

The dose-rate conversion factors for external exposure to photons and electrons presented in this report are based on a methodology developed at Oak Ridge National Laboratory.^(1,2) However, as described in Section 1.2, some adjustments of the previously documented methodology have been made in obtaining the dose-rate conversion factors in this report.

1.1 Description of External Dose-Rate Conversion Factors

Dose-rate conversion factors for external exposure, which also are referred to as dose-rate factors, represent the external dose-equivalent rate per unit concentration of a radionuclide in the environment for a particular mode of exposure. The exposure modes considered for members of the public include the following:

- immersion in a contaminated atmospheric cloud;
- immersion in contaminated water; and
- exposure to a contaminated ground surface.

These exposure modes also are referred to as air immersion, water immersion, and ground-surface exposure.

* This report was prepared at Oak Ridge National Laboratory by D. C. Kocher, with the assistance of K. F. Eckerman.

The estimation of external dose from arbitrary distributions of radionuclides in the environment is a difficult problem. Therefore, simplified and idealized exposure conditions often are assumed; namely, that the distribution of sources at the location of an exposed individual is effectively infinite or semi-infinite in extent and that the radionuclide concentrations are uniform throughout the source region. In particular, a semi-infinite source region is assumed for immersion in contaminated air, and an infinite source region is assumed for immersion in contaminated water and exposure to a contaminated ground surface.

If we assume that an infinite or semi-infinite source region has a uniform radionuclide concentration C at time t , then the instantaneous external dose-equivalent rate to an exposed individual at that time, $dH(t)/dt$, can be written in the general form

$$dH(t)/dt = C(t) \times DRF, \quad (1)$$

where DRF denotes the dose-rate factor for external exposure and is independent of time. The dose-rate factor thus is defined as the external dose-equivalent rate per unit radionuclide concentration.

The external dose-rate factor is determined uniquely for a given radionuclide by the radiation type (i.e., photons or electrons), the mode of exposure (e.g., immersion in contaminated air), and the body organ or combination of organs for which the external dose-equivalent rate is desired. The dose-rate factor thus embodies all aspects of the calculation of external dose equivalents except for the radionuclide concentration, which is estimated either by direct measurement or by use of models for environmental transport of radionuclides. The determination of radionuclide concentrations in the environment, including their dependence on time after a release, is beyond the scope of this report.

In comparing calculated radiation doses with applicable limits for members of the public, the quantity of interest is the annual dose equivalent, H . For external exposure, H is the integral of the instantaneous dose-equivalent rate over a time period of one year and, from eq. (1), can be written in the general form

$$H = DRF \times \int C(t) dt. \quad (2)$$

1.2 Adjustments to Previously Documented Methodology

Some adjustments of the previously documented methodology^(1,2) have been made in calculating the external dose-rate factors presented in this report. The adjustments to the DOSFACTER computer code used to perform the calculations are described as follows.

- Calculations of photon and electron dose-rate factors for the body surface have been eliminated, since the body surface does not represent a tissue at risk from radiation exposure.
- Calculations of photon dose-rate factors for "total body," which represent the total energy absorbed in the body divided by the body mass, have been replaced by effective dose-rate factors for photons as described below. The effective dose-rate factor provides the more appropriate quantity for use in estimating risk from both external and internal exposures.
- Effective dose-rate factors for external exposure to photons have been calculated using the weighting factors for specific body organs recommended by the International Commission on Radiological Protection (ICRP).⁽³⁾ The effective dose-rate factors presented in this report were obtained from photon dose-rate factors for specific organs calculated according to the methodology documented previously.⁽¹⁾ Although dose-rate factors for skin are calculated in this report and a weighting factor for skin has been recommended by the ICRP for use in assessing the detriment to population groups (i.e., the collective dose),⁽⁴⁾ neither the photon nor the electron dose-rate factor for skin is included in the effective dose-rate factors tabulated in this report. This approach is consistent with the ICRP recommendation that the dose to skin be excluded in calculating effective dose equivalents to maximally exposed individuals in critical groups of the population.⁽⁴⁾

- The previous calculations of electron dose-rate factors for skin at a depth below the body surface of $70\text{ }\mu\text{m}$ ⁽¹⁾ have been revised slightly by assuming a depth of 7 mg/cm^2 , as recommended by the ICRP;⁽³⁾ this depth represents an average value over the body surface which is appropriate for use in environmental dose assessments. Since the density of epidermal tissue is assumed to be 1.12 g/cm^3 ,⁽⁵⁾ the adjustment from $70\text{ }\mu\text{m}$ to 7 mg/cm^2 represents a 12% decrease in the assumed depth of radiosensitive tissues of the skin. However, in most cases, the resulting increases in electron dose-rate factors for skin are small (e.g., about 3% for immersion in an atmospheric cloud of ^{85}Kr). In addition, the previous calculations of electron dose-rate factors for skin obtained as an average over the entire thickness of the dermis between 50 and $1250\text{ }\mu\text{m}$ ⁽¹⁾ have been eliminated, since the basal cell layer of the epidermis is regarded by the ICRP as the principal skin tissue at risk from radiation exposure.⁽³⁾ Finally, the DOSFACTER code now includes calculations of electron dose-rate factors for skin at depths below the body surface of 4, 8, and 40 mg/cm^2 , as recommended by Whitton;⁽⁶⁾ these depths represent appropriate values for different parts of the body surface. However, electron dose-rate factors for these depths of the skin are not tabulated in this report.

- In the previous version of the DOSFACTER code,⁽¹⁾ electron dose-rate factors for skin were calculated incorrectly for the particular case of ground-surface exposure to radionuclides that emit high-energy electrons. Specifically, for emitted electron energies above about 4.5 MeV, the subroutine BGRND that performs numerical integrations of eq. (25) in Section 2.2.3 of this report underestimated the electron dose-rate factor at a depth of $70\text{ }\mu\text{m}$ by an amount that increased with increasing energy. The largest error was about 50% for emitted electron energies near 10 MeV, which is the highest electron energy occurring in the decay of radionuclides considered in this report.⁽⁷⁾ This error has been corrected in the present calculations. However, the electron dose-rate factors for skin for ground-surface exposure are increased for only a few radionuclides, since the electrons emitted by most of the radionuclides considered in this report have

energies less than 4.5 MeV.⁽⁷⁾ Furthermore, for those few radionuclides that are affected by the correction, the resulting increase in the dose-rate factor is only a few percent or less, because most of the electrons emitted by these radionuclides also have energies less than 4.5 MeV.⁽⁷⁾

- The output of the DOSFACTER code has been reformatted so that all dose-rate factors for a given exposure mode are presented in a single table. This table gives (1) the photon dose-rate factors for all organs except skin, (2) the effective dose-rate factor for photons based on the dose-rate factors for all organs except skin, and (3) the photon, electron, and photon plus electron (i.e., total) dose-rate factors for skin.

1.3 Outline of Report

The remainder of this report is organized as follows. Section 2 presents the equations used to calculate the external dose-rate factors for photons and electrons, including photon dose-rate factors for all body organs, electron dose-rate factors for skin, and effective dose-rate factors for photons. This section also describes the data bases in the DOSFACTER computer code and the other assumptions used in calculating the dose-rate factors. Section 3 is concerned with implementation of the methodology presented in Section 2 and includes discussions of (1) potentially important radiations from the decay of radionuclides in the environment that are not taken into account in calculating the dose-rate factors, (2) corrections that can be applied to the dose-rate factors tabulated in this report to take into account the effects of indoor residence, ground roughness, exposure during boating activities, and exposure to contaminated shorelines, (3) methods for calculating external dose-rate factors for exposure to sources distributed with depth in soil, and (4) application of the dose-rate factors to the important cases of radionuclides that decay to radioactive daughter products.

Appendix A presents the tables of dose-rate conversion factors for external exposure to photons and electrons for immersion in contaminated air, immersion in contaminated water, and exposure to a contaminated ground surface. Appendix B presents diagrams of the parent-daughter relationships for all decay chains involving two or more of the radionuclides considered in this report. These diagrams show the half-lives, modes of decay, and branching fractions for each decay chain. Finally, Appendix C presents a complete listing of the version of the DOSFACTER computer code used in the calculations for this report.

2. CALCULATION OF EXTERNAL DOSE-RATE FACTORS FOR PHOTONS AND ELECTRONS

Photons and electrons usually are the only important radiations emitted by radionuclides in the environment that can penetrate the body surface and give a dose to radiosensitive tissues. This section presents the equations used to calculate the dose-rate factors for external exposure to photons and electrons for immersion in contaminated air, immersion in contaminated water, and exposure to a contaminated ground surface. The data bases in the DOSFACTER computer code and other assumptions used to obtain the results in Appendix A also are described.

For each radiation type and exposure mode, we first present the dose-rate factor equations for specific body organs from monoenergetic sources. These equations then are generalized to the spectrum of photons or electrons arising from the most common modes of radioactive decay, i.e., beta decay, alpha decay, and isomeric transitions.⁽⁷⁾ Finally, calculation of the effective dose-rate factor for external exposure to photons is described.

In unusual circumstances, spontaneous fission and bremsstrahlung also can produce penetrating radiations of potential importance to estimation of external dose to members of the public. These processes are not taken into account in calculating the dose-rate factors presented in this report but are discussed briefly in Section 3.1.

As discussed in Section 1, the methodology for calculating the external dose-rate factors for photons and electrons has been documented previously,^(1,2) except for the adjustments described in Section 1.2. The primary purpose of presenting a complete description of the methodology in this report is to permit an understanding of the calculations without the need for access to other documents.

2.1 Photon Dose-Rate Factors for Body Organs

The photon dose-rate factors for body organs presented in this report are based on Monte Carlo simulations of organ doses for a reference individual immersed in a contaminated atmospheric cloud. The Monte Carlo

simulations of organ doses for immersion in contaminated air also provide the basis for the photon dose-rate factors for body organs for immersion in contaminated water and exposure to a contaminated ground surface.

In all calculations of photon dose-rate factors, the reference individual is assumed to be an adult hermaphrodite of mass 70 kg and height 174 cm in which the shape, location, and composition of most of the body organs are described by Snyder *et al.*⁽⁸⁾ The organs for which the model of Snyder *et al.* was modified for the calculations in this report include ovaries, uterus, breast, and red bone marrow. The dose-rate factors for ovaries and uterus are based on a body mass (58 kg) and height (163 cm) that are more appropriate for an adult female, as described by O'Brien and Sanna.^(9,10) Breast was not considered by Snyder *et al.*, and we have assumed that the photon dose-rate factor for breast is the average of the values for skin and lungs at all energies. The description of red bone marrow by Snyder *et al.* assumes that the skeleton is a homogeneous mixture of bone and bone marrow. This model has been modified, as described by Kerr,⁽¹¹⁾ to take into account that red marrow is located in the trabecular bone cavities of the skeleton, with the result that bone provides a significant amount of shielding of the red marrow for photon energies below about 0.2 MeV [see also Section 2.2.1 of ref. (1)].

2.1.1 Immersion in contaminated air

For immersion in contaminated air, an exposed individual is assumed to be standing at the boundary of a semi-infinite (i.e., hemispherical) atmospheric cloud with uniform source concentration. For a unit concentration of sources of monoenergetic photons (γ) of emitted energy E_γ , the photon dose-rate factor for body organ k , denoted by DRF_γ^k , is given by

$$DRF_\gamma^k(E_\gamma) = (1/2)(KE_\gamma/\rho_a)G_\gamma^k(E_\gamma) , \quad (3)$$

where K is a constant described below, ρ_a is the density of air, and G_γ^k is the ratio of dose-equivalent rate in organ k to absorbed dose rate in air for photons of energy E_γ and is obtained as described below.

The factor KE_γ/ρ_a in eq. (3) is the absorbed dose rate in air per unit concentration of monoenergetic sources of energy E_γ in an infinite, uniformly contaminated atmospheric cloud of density ρ_a . This factor is obtained from the requirement of conservation of energy that the energy emitted per unit volume must equal the energy absorbed per unit volume throughout the source region and from the definition of absorbed dose as the energy absorbed per unit mass of material in the source medium.

The factor of $1/2$ in eq. (3) was recommended by Dillman⁽¹²⁾ to express the assumption that the source region is semi-infinite rather than infinite in extent for all emitted photon energies. However, calculations by Ryman et al.⁽¹³⁾ of the effects of the air-ground interface on the absorbed dose rate in air at 1 m above ground, which represents the average height of body organs for an individual standing on the ground, have shown that assuming the factor of $1/2$ for all photon energies (1) increasingly underestimates the dose as the energy decreases below 30 keV, e.g., by about 70% at 10 keV and by a factor of 2 below 6 keV, (2) overestimates the dose at energies between 30 keV and 1 MeV, but only by about 20% near 70 keV and less at other energies, and (3) underestimates the dose at energies above 1 MeV, but only by a few percent. An energy-dependent correction factor for air-ground interface effects has not been incorporated in the calculations in this report, because the correction factor (1) is less than 20% at the photon energies of primary importance to external dose, (2) has been calculated only at the single height above ground of 1 m rather than as an average over the height of the exposed individual, and (3) does not take into account additional perturbations of the radiation field in air above ground caused by the presence of the exposed individual.

The value of the constant K in eq. (3) depends on the units in which the dose-rate factor is expressed. In this report, the dose-rate factors for air immersion are given in units of mrem/y per $\mu\text{Ci}/\text{m}^3$; i.e., the unit concentration of sources is assumed to be $1 \mu\text{Ci}/\text{m}^3$ and the dose-equivalent rates in body organs are expressed in mrem/y. Then, if the density of air is expressed in g/m^3 and the energy of the emitted photon in MeV, K is obtained as follows from the relationships that $1 \mu\text{Ci}$ of activity is 3.7×10^4 disintegrations (dis) per second, an absorbed dose of 1 rad is 100 erg of absorbed energy per gram of material in the source medium, and

1 MeV of energy is 1.6×10^{-6} erg:

$$\begin{aligned}
 K &= (3.7 \times 10^4 \text{ dis}/\mu\text{Ci}\cdot\text{s})(10^{-2} \text{ g}\cdot\text{rad}/\text{erg})(1.6 \times 10^{-6} \text{ erg}/\text{MeV}) \\
 &\quad \times (10^3 \text{ mrad}/\text{rad})(3.1536 \times 10^7 \text{ s}/\text{y}) \\
 &= 1.87 \times 10^7 \text{ g}\cdot\text{mrad}/\text{MeV}\cdot\mu\text{Ci}\cdot\text{y} .
 \end{aligned} \tag{4}$$

Thus, the units on the right-hand side of eq. (3) are mrad/y per $\mu\text{Ci}/\text{m}^3$, and the dose-rate factor is obtained in units of mrem/y per $\mu\text{Ci}/\text{m}^3$ by assuming a quality factor of one for converting absorbed dose in rad to dose equivalent in rem.

The dose-rate factors for air immersion presented in this report are based on the calculations of Eckerman *et al.*⁽¹⁴⁾ for an infinite, uniformly contaminated cloud source. Briefly, Eckerman *et al.* obtained dose-rate factors for different body organs from (1) organ doses from monoenergetic sources at the body surface calculated using Monte Carlo methods by O'Brien and Sanna^(9,10) and (2) the energy spectra of scattered photons in air from monoenergetic sources in an infinite, uniformly contaminated atmospheric cloud calculated by Dillman.⁽¹²⁾ The organ dose-rate factors from monoenergetic sources in an atmospheric cloud were obtained by integrating the organ doses per photon per unit area at the body surface given by O'Brien and Sanna over the spectrum of scattered photons in air given by Dillman for each source energy considered. The results of these calculations in units of Sv/y per Bq/cm^3 for an assumed air density of $1.29 \times 10^3 \text{ g}/\text{m}^3$ at 0°C and 760 mm pressure are given in Table 2 of ref. (2).

Jacob *et al.*⁽¹⁵⁾ recently noted that the calculations of O'Brien and Sanna^(9,10) described above contain an error which results in a systematic underestimation of the organ dose-rate factors for air immersion obtained by Eckerman *et al.*⁽¹⁴⁾ and used in this report. The dose-rate factors are underestimated by about 10-30% depending on the organ, and the same systematic underestimation of photon dose-rate factors occurs in the results for water immersion and ground-surface exposure described in Sections 2.1.2 and 2.1.3. The photon dose-rate factors in this report have not been corrected for this error, because revised results in the form needed for the DOSFACTER code were not available. (Oak Ridge National Laboratory is undertaking an effort to produce an appropriate set

of corrected photon dose-rate factors using Monte Carlo methods.) It also is important to bear in mind that the error in the present calculations usually will be much less than any error in measurements or calculations of radionuclide concentrations in the environment. Thus, the error in the dose-rate factors generally is not of concern with regard to the accuracy of estimates of external dose.

The dose-rate factor for immersion in contaminated air in eq. (3) is expressed in terms of the ratio of organ dose-equivalent rate to absorbed dose rate in air, G_{γ}^k , rather than directly in terms of the dose-rate factors for air immersion calculated by Eckerman *et al.*⁽¹⁴⁾ and documented in ref. (2), because this ratio also is needed in calculating organ dose-rate factors for immersion in contaminated water and exposure to a contaminated ground surface (see Sections 2.1.2 and 2.1.3). Again, as defined in eq. (3), the values of G_{γ}^k for different body organs as a function of photon energy are obtained from the organ dose-rate factors for an infinite cloud source calculated by Eckerman *et al.* divided by the dose-rate factor in air, KE_{γ}/ρ_a , for the same unit source concentration. The values of G_{γ}^k used in the present calculations are listed in the function subprogram FAC in Appendix C. Results are given for 23 body organs at 15 photon energies between 0.01 and 10 MeV.

The density of air assumed for use in eq. (3) is $1.189 \times 10^3 \text{ g/m}^3$. This value is appropriate for dry air at 20° C and 750 mm pressure, and is about 8% less than the density at 0° C and 760 mm pressure assumed by Eckerman *et al.*⁽¹⁴⁾ Thus, the organ dose-rate factors for air immersion given in Appendix A.1 are about 8% greater than those that would be obtained directly from Table 2 of ref. (2). The lower air density assumed in the present calculations also results in similar increases in the organ dose-rate factors for exposure to a contaminated ground surface presented in Section 2.1.3.

The dose-rate factors for air immersion in Appendix A.1 assume continuous exposure outdoors for 100% of the time during a year. Correction factors which account for shielding of photons by building structures during indoor residence are discussed in Section 3.2.1.

2.1.2 Immersion in contaminated water

For immersion in contaminated water, an exposed individual is assumed to be submersed in an infinite medium with uniform source concentration. Thus, as with the dose-rate factor for air immersion in eq. (3), the dose-rate factor for immersion in contaminated water can be obtained from the principle of conservation of energy. However, since calculations of organ dose-rate factors for water immersion, similar to those of Eckerman *et al.*⁽¹⁴⁾ for air immersion described in Section 2.1.1, are not available in the literature, we further assume that the ratio of dose-equivalent rate for organ k to dose-equivalent rate in tissue at the body surface of the exposed individual is the same for the two exposure modes. Thus, for immersion in contaminated water, the dose-rate factor for organ k is given in terms of the ratio of organ dose-equivalent rate to absorbed dose rate in air for air immersion, G_{γ}^k , in eq. (3) as

$$DRF_{\gamma}^k(E_{\gamma}) = (KE_{\gamma}/\rho_w)(R_{\gamma}^w/R_{\gamma}^a)G_{\gamma}^k(E_{\gamma}) , \quad (5)$$

where K is the constant calculated in eq. (4), ρ_w is the density of water and is assumed to be $0.99823 \times 10^6 \text{ g/m}^3$ for a temperature of 20°C , and R_{γ}^w and R_{γ}^a are the ratio of energy absorption in tissue to energy absorption in water (w) and air (a) for emitted energy E_{γ} , respectively, obtained as described below. The dose-rate factors are in units of mrem/y per $\mu\text{Ci/m}^3$.

The energy-absorption ratios R_{γ}^w and R_{γ}^a are obtained from the photon mass energy-absorption coefficients, μ_{en}/ρ , in tissue (t), water, and air as follows:

$$R_{\gamma}^w = (\mu_{en}/\rho)_t / (\mu_{en}/\rho)_w , \quad (6)$$

$$R_{\gamma}^a = (\mu_{en}/\rho)_t / (\mu_{en}/\rho)_a . \quad (7)$$

For both air immersion and water immersion, the emission of monoenergetic photons uniformly throughout the source region results in a continuous energy spectrum of photons between zero energy and the emitted energy at every point in the source region; and it is this continuous spectrum of photons that is incident upon the body surface. In the present calculations, the energy-absorption ratios R_{γ}^a for air immersion in eq. (7) were obtained from the calculations of Dillman,⁽¹²⁾ in which the ratios of

mass energy-absorption coefficients in tissue and air are averaged over the spectrum of photons in an infinite, uniformly contaminated atmospheric cloud. The values of R_γ^a at 25 photon energies between 0.01 and 10 MeV are listed in the subroutine CALC in Appendix C.

The mass energy-absorption coefficients in tissue and water are nearly equal at all photon energies. Therefore, it is an excellent approximation to evaluate the energy-absorption ratio R_γ^w for water immersion in eq. (6) at the emitted energy E_γ , instead of averaging over the spectrum of photons in an infinite, uniformly contaminated water medium; this approximation has been used in the present calculations. The mass energy-absorption coefficients in tissue and water at 25 photon energies between 0.01 and 10 MeV were obtained from refs. (16-18) and are listed in the subroutine CALC in Appendix C.

The dose-rate factors for water immersion in Appendix A.2 assume continuous exposure for 100% of the time during a year. While this assumption may be reasonable for air immersion and ground-surface exposure, a more realistic exposure time is needed for water immersion. An exposure time of 1% is recommended in the absence of site-specific information;⁽¹⁹⁾ i.e., the dose-rate factors in Appendix A.2 should be reduced by a factor of 100 in estimating external dose equivalents to members of the public. An additional correction factor which accounts for photon exposure during boating activities is discussed in Section 3.2.3.

2.1.3 Exposure to a contaminated ground surface

For exposure to a contaminated ground surface, an individual is assumed to be standing on a smooth, infinite plane with uniform source concentration. Since calculations of organ dose-rate factors for ground-surface exposure, similar to those of Eckerman et al.⁽¹⁴⁾ for air immersion described in Section 2.1.1, were not available at the time this methodology was developed, we have assumed that the ratio of organ dose-equivalent rate to absorbed dose rate in air at any height above ground is the same as the ratio G_γ^k for air immersion defined with eq. (3). Therefore, for exposure to a contaminated ground surface, the dose-rate factor for organ k is calculated from the product of absorbed dose rate in

air above ground and the ratio G_γ^k as

$$DRF_\gamma^k(z, E_\gamma) = KE_\gamma \int_\sigma \Phi_\gamma^a(r, E_\gamma) d\sigma \times G_\gamma^k(E_\gamma) , \quad (8)$$

where K is the constant calculated in eq. (4), z is the height of the receptor location above the ground surface denoted by σ , Φ_γ^a is the point-isotropic specific absorbed fraction^(16,20) for photons in air described below, and r is the distance from any point on the ground surface to the receptor location.

The specific absorbed fraction in air, Φ_γ^a , is defined as the fraction of the emitted energy E_γ that is absorbed per unit mass of air at a distance r from an isotropic point source. In this report, the dose-rate factors for exposure to a contaminated ground surface are given in units of mrem/y per $\mu\text{Ci}/\text{m}^2$. Therefore, from the units for the constant K in eq. (4), the specific absorbed fraction is given in units of g^{-1} .

The specific absorbed fraction for photons in air is given by⁽¹⁶⁾

$$\Phi_\gamma^a(r, E_\gamma) = (1/4\pi r^2)(\mu_{\text{en}}/\rho)_a B_{\text{en}}^a(\mu_a r) \exp(-\mu_a r) , \quad (9)$$

where $(\mu_{\text{en}}/\rho)_a$ and μ_a are the mass energy-absorption and linear attenuation coefficients in air, respectively, B_{en}^a is the energy-absorption buildup factor in air described below, and each of these parameters is a function of the photon energy E_γ . In order to obtain the specific absorbed fraction in units of g^{-1} , the mass energy-absorption coefficient is given in units of cm^2/g , the linear attenuation coefficient in cm^{-1} , and the distance r in cm. The buildup factor is dimensionless.

We use the Berger form of the buildup factor given by⁽²¹⁾

$$B_{\text{en}}^a(\mu_a r) = 1 + (C_a \mu_a r) \exp(D_a \mu_a r) , \quad (10)$$

where the coefficients C_a and D_a are functions of the photon energy E_γ . These coefficients are obtained from linear least-squares fits of eq. (10) to published buildup factors in air.^(22,23)

By integration of eq. (8) over an infinite ground surface using eqs. (9) and (10) and the relation

$$d\sigma = 2\pi r dr , \quad (11)$$

we obtain the dose-rate factor for organ k for exposure at a height z

above a contaminated ground surface in the form

$$\text{DRF}_\gamma^k(z, E_\gamma) = (1/2)KE_\gamma(\mu_{\text{en}}/\rho)_a \left\{ E_1(\mu_a z) - [C_a/(D_a-1)] \exp[(D_a-1)\mu_a z] \right\} G_\gamma^k(E_\gamma) , \quad (12)$$

where E_1 is the first-order exponential integral given by

$$E_1(\mu_a z) = \int_z^\infty (1/r) \exp(-\mu_a r) dr . \quad (13)$$

The dose-rate factors in this report are calculated for the single height $z = 100$ cm (1 m) above ground.

In implementing eqs. (12) and (13), mass energy-absorption and attenuation coefficients in air for 25 photon energies between 0.01 and 10 MeV were obtained from refs. (17) and (18) and are listed in the subroutine CALC in Appendix C. Values of linear attenuation coefficients in cm^{-1} are obtained from the mass attenuation coefficients in cm^2/g by multiplying by the density of air ($1.189 \times 10^{-3} \text{ g/cm}^3$). Values of the coefficients C_a and D_a in the Berger form of the buildup factor in eq. (10) also are listed in the subroutine CALC in Appendix C. The exponential integral in eq. (13) is calculated using polynomial and rational approximations given by eqs. 5.1.53 and 5.1.56 of ref. (24).

As discussed in Section 2.2.3 of ref. (1), the use in eq. (8) of the ratio G_γ^k for air immersion often results in underestimates of photon dose-rate factors for ground-surface exposure, because the radiation field at a height of 1 m above ground (1) has an angular distribution that is strongly peaked in the direction almost parallel to the ground surface (i.e., in the direction almost normal to the body surface), rather than an isotropic angular distribution as in the case of air immersion, and (2) has an energy distribution that is weighted more toward higher energies for a given emitted energy than the energy distribution for air immersion. Recent calculations by Jacob et al.⁽¹⁵⁾ for plane sources on the ground, which also simulate the effects of ground roughness by locating the sources at a depth of 3 mm in soil, indicate that the photon dose-rate factors for ground-surface exposure in this report may be underestimated by as much as 40% for emitted photon energies above 200 keV but may be overestimated for energies below 50 keV. These results have

not been incorporated in the calculations in this report, partly for the reasons discussed in Section 2.1.1 and partly because the dose-rate factor in eq. (12) does not incorporate the effects of ground roughness which were included in the calculations of Jacob *et al.*

The dose-rate factors for ground-surface exposure in Appendix A.3 assume continuous exposure outdoors for 100% of the time during a year. Correction factors to the photon dose-rate factors for this exposure mode which account for shielding by building structures during indoor residence, ground roughness, and exposure to contaminated shorelines are discussed in Sections 3.2.1, 3.2.2, and 3.2.4, respectively. Methods for calculating external dose-rate factors for exposure to photon sources distributed with depth in soil are discussed in Section 3.3.1.

2.1.4 Dose-rate factors for photon spectrum from radioactive decay

The spectrum of photons emitted by radionuclides is assumed to consist entirely of discrete γ - and x-rays from beta decay, alpha decay, or isomeric transitions [e.g., see ref. (7)]. Therefore, for a particular radionuclide and exposure mode, the photon dose-rate factor for organ k is given in terms of the dose-rate factors for monoenergetic sources by

$$DRF_{\gamma}^k = \sum_i f_{\gamma_i} DRF_{\gamma}^k(E_{\gamma_i}) , \quad (14)$$

where f_{γ_i} is the intensity of the i th photon of energy E_{γ_i} in number per decay and the summation includes all discrete photons in the decay spectrum of the radionuclide. Contributions to the dose-rate factors from the continuous spectra of photons from spontaneous fission or bremsstrahlung are not taken into account in the results tabulated in this report but are discussed in Section 3.1.

2.2 Electron Dose-Rate Factors for Skin

This section presents the equations for the electron dose-rate factors as a function of depth in tissue for air immersion, water immersion, and ground-surface exposure. Skin is the only organ for which electron dose-rate factors are calculated in this report. Calculations were not performed for the lens of the eye, because the dose-rate factors always are less than those for skin due to the greater depth below the body surface of the radiosensitive tissues for the lens of the eye.⁽³⁾ Thus, limitation of external electron dose to the skin to ensure prevention of non-stochastic radiation effects also will prevent such effects in the lens of the eye. Electron dose-rate factors need not be considered for any other organs, due to the relatively short range in tissue of electrons from radioactive decay.

The DOSFACTER code listed in Appendix C calculates electron dose-rate factors for four different depths of the skin below the body surface: 4, 8, and 40 mg/cm² to represent exposures of specific parts of the body, as recommended by Whitton,⁽⁶⁾ and 7 mg/cm², as recommended by the ICRP.⁽³⁾ Results are presented in Appendix A of this report only for the depth of 7 mg/cm², since this depth is an average value that is appropriate for environmental exposures which result in relatively uniform irradiations of the entire body surface.

In the electron dose-rate factor equations for monoenergetic sources in Sections 2.2.1-2.2.3, the symbol ϵ denotes electrons in general. Then, in Section 2.2.4, the symbols e and β specifically denote discrete electrons from atomic de-excitation processes and continuous electrons from beta decay, respectively. The dose-rate factor as a function of depth in tissue is presented first for immersion in contaminated water, because the equation for this exposure mode contains terms that are used in the equation for immersion in contaminated air.

2.2.1 Immersion in contaminated water

For immersion in an infinite, uniformly contaminated water medium, the electron dose-rate factor at depth x in tissue (t) from a unit concentration of sources of monoenergetic electrons (ϵ) of emitted energy E_ϵ is given by⁽²⁵⁾

$$DRF_\epsilon^t(x, E_\epsilon) = (KE_\epsilon/\rho_w) R_\epsilon^w q(x, E_\epsilon) G_\epsilon^t(x/r_0^w, E_\epsilon) , \quad (15)$$

where K is the constant calculated in eq. (4), ρ_w is the density of water and is assumed to be 0.99823×10^6 g/m³, R_ϵ^w is the ratio of energy absorption in tissue to energy absorption in water for energy E_ϵ , q is a leakage correction factor, G_ϵ^t is a geometrical reduction factor defined as the ratio of dose-equivalent rate at depth x in a semi-infinite tissue medium to absorbed dose rate in the contaminated water, and r_0^w is the mean electron range in water for energy E_ϵ . The quantities R_ϵ^w , G_ϵ^t , and q are described below. The dose-rate factor is in units of mrem/y per $\mu\text{Ci}/\text{m}^3$.

The energy-absorption ratio R_ϵ^w is obtained from the electron mass stopping powers, $dE/\rho dx$, in tissue (t) and water (w) as

$$R_\epsilon^w = (dE/\rho dx)_t / (dE/\rho dx)_w . \quad (16)$$

Since the stopping powers in tissue and water are nearly equal at all electron energies, the ratio in eq. (16) is evaluated at the emitted energy E_ϵ , rather than as an average over the spectrum of electrons in an infinite, uniformly contaminated water medium. The mass stopping powers in tissue and water at 25 electron energies between 0.01 and 10 MeV were obtained from ref. (26) and are listed in the subroutine CALC in Appendix C.

The geometrical reduction factor G_ϵ^t is analogous to the ratio of dose-equivalent rate for organ k to absorbed dose rate in air, G_γ^k , in the photon dose-rate factor equations in Section 2.1. This factor is obtained from electron specific absorbed fractions in water calculated using Monte Carlo methods, as described by Berger.⁽²⁵⁾ Water is assumed to be a tissue-equivalent material, and the geometrical reduction factor assumes that a semi-infinite tissue medium is in contact with a semi-infinite, uniformly contaminated water medium. The contaminated water is treated as semi-infinite in extent because electrons cannot penetrate through the

body. Thus, any point on the body surface is irradiated by only half of the source region, and G_e^t has the value one-half at the body surface and decreases with increasing depth in tissue. The geometrical reduction factors used in the present calculations were obtained from ref. (27), and the values at 25 electron energies between 0.01 and 10 MeV and at 21 values of the ratio x/r_0^w (i.e., the depth below the body surface relative to the electron range in water) are listed in the function subprogram G in Appendix C. Values of the electron range in water at 25 energies between 0.01 and 10 MeV were obtained from ref. (26) and are listed in the subroutine CALC in Appendix C.

The leakage correction factor q accounts for the finite lateral extent of the body surface and is given by the empirical formula⁽²⁵⁾

$$q(x, E_e) = 1 - q_1(E_e) q_2(x/a), \quad (17)$$

where the parameter a depends only on the emitted energy E_e . Values of q_1 and a for 17 electron energies between 0.02 and 4 MeV and values of q_2 for 15 values of the ratio x/a between 0 and 1 were obtained from ref. (25) and are listed in the function subprogram G in Appendix C.

As noted in Section 2.1.2, the dose-rate factors for water immersion in Appendix A.2 assume exposure for 100% of the time, but a more realistic exposure time (e.g., 1%)⁽¹⁹⁾ should be applied in estimating dose equivalents to members of the public. Electron dose-rate factors for skin from exposure during boating activities are discussed in Section 3.2.3.

2.2.2 Immersion in contaminated air

For an exposed individual standing at the boundary of a semi-infinite, uniformly contaminated atmospheric cloud, we assume that the electron range in air for emitted energy E_e is less than the average height of the body surface above ground, which is taken to be 1 m. Therefore, the source region is assumed to be effectively infinite in extent, and the electron dose-rate factor at depth x in tissue for immersion in contaminated air is given in terms of the geometrical reduction factor G_e^t for immersion in contaminated water as⁽²⁵⁾

$$\text{DRF}_e^t(x, E_e) = (KE_e/\rho_a)(R_e^a/\alpha) q(x, E_e) G_e^t(x/r_0^w, E_e) , \quad (18)$$

where K is the constant calculated in eq. (4), ρ_a is the density of air and is assumed to be $1.189 \times 10^3 \text{ g/m}^3$, R_e^a/α is the ratio of energy absorption in tissue to energy absorption in air for emitted energy E_e described below, and the leakage correction factor q and the geometrical reduction factor G_e^t are described in Section 2.2.1. The dose-rate factor is in units of mrem/y per $\mu\text{Ci/m}^3$.

The energy-absorption ratio R_e^a/α consists of two factors. The first factor is the ratio of mass stopping powers in tissue and air,

$$R_e^a = (dE/\rho dx)_t / (dE/\rho dx)_a , \quad (19)$$

which is evaluated at the emitted energy E_e . The second factor, α , also depends on the emitted energy and accounts for the variations in mass stopping powers in tissue and air over the continuous energy spectrum of electrons incident on the body surface for the monoenergetic source of energy E_e in an infinite, uniformly contaminated atmospheric cloud. The mass stopping powers in tissue and air at 25 electron energies between 0.01 and 10 MeV and values of α at 8 electron energies between 0.01 and 2 MeV were obtained from refs. (26) and (25), respectively, and are listed in the subroutine CALC in Appendix C.

The assumption that the source region is effectively infinite in extent for immersion in contaminated air results in overestimates of electron dose-rate factors in tissue whenever the electron energy is sufficiently high that the range is greater than 1 m in air plus the assumed depth of tissue below the body surface. As described in Section 2.2.3 below, electron dose-rate factors for skin at a depth of 7 mg/cm^2 in tissue are overestimated for emitted electron energies above 0.36 MeV. The extent of overestimation increases with increasing electron energy above this value and approaches a factor of two at the highest electron energies occurring in radioactive decay.⁽⁷⁾

As noted in Section 2.1.1, the dose-rate factors for air immersion in Appendix A.1 assume exposure outdoors for 100% of the time. The effects of indoor residence on electron dose-rate factors for skin for air immersion are discussed in Section 3.2.1.

2.2.3 Exposure to a contaminated ground surface

The geometrical reduction factor G_e^t used in calculating electron dose-rate factors as a function of depth in tissue for air immersion and water immersion cannot be used in calculating dose-rate factors for exposure to a contaminated ground surface, because the geometrical reduction factor applies only to the case of a source volume that is effectively semi-infinite in extent and is in contact with the body surface of an exposed individual. Thus, the dose-rate factor for ground-surface exposure must be obtained by explicit consideration of the specific absorbed fraction for electrons.

In principle, the electron dose-rate factor at any depth in tissue for exposure to a contaminated ground surface should be calculated by considering transport of electrons in air between any source point on the ground and the assumed height of the body surface above ground followed by transport through tissue to the assumed depth of the skin. However, electron specific absorbed fractions for transport through two different media have not been considered in the literature, so the problem must be reduced to a consideration of electron transport through a single medium.

The calculations in this report assume that exposures of the skin occur at a single height of 100 cm (1 m) above ground. Consideration of electron transport through air followed by tissue is reduced to a consideration of transport through air alone by replacing the assumed thickness of tissue by an equivalent thickness of air which is added to the assumed height of the body surface above ground. (This assumption produces more accurate results than the alternative of considering transport through tissue alone by replacing the assumed height of the body surface above ground by an equivalent thickness of tissue, because most of the energy loss of electrons in transport between the ground surface and the depth of skin below the body surface occurs during transport through 1 m of air.) Thus, for height z of the body surface above ground and depth x in tissue, the effective height z' in air above ground at which the electron dose-rate factor in tissue is calculated is given by

$$z' = z + 1.14(\rho_t/\rho_a)x , \quad (20)$$

where ρ_t and ρ_a are the densities of tissue and air, respectively, and the

factor 1.14 approximates the ratio of mass stopping powers in tissue and air for any electron energy.⁽²⁵⁾ (Since the calculations in the DOSFACTER code are performed by expressing the distances x , z , and z' in units of g/cm^2 , rather than cm , the density of tissue is not used explicitly in calculating the effective height z' .)

The electron dose-rate factor in tissue at the height z' in air above ground defined by eq. (20) then is given by

$$\text{DRF}_e^t(z', E_e) = (1/2)KE_e R_e^a \int_{\sigma} \Phi_e^a(r, E_e) d\sigma, \quad (21)$$

where K is the constant calculated in eq. (4), R_e^a is the ratio of mass stopping powers in tissue and air evaluated at the emitted energy E_e [see eq. (19)], σ denotes the ground surface, Φ_e^a is the specific absorbed fraction for electrons in air, and r is the distance from any point on the ground surface to the receptor location at height z' in air above ground. The factor of $1/2$ accounts for the impenetrability of the body to electrons, so that any point on the body surface is irradiated by only half of the source region. The dose-rate factor is in units of mrem/y per $\mu\text{Ci}/\text{m}^2$.

An analytical equation for the electron specific absorbed fraction, analogous to eq. (9) for photons, has not been developed. Thus, eq. (21) must be evaluated numerically using tabulations of electron specific absorbed fractions. In order to facilitate numerical integrations, we use the electron scaled point kernel, F_e , developed by Berger,^(25,27) which is defined in terms of the specific absorbed fraction by the equation

$$F_e(r/r_0, E_e) d(r/r_0) = 4\pi\rho\Phi_e(r, E_e)r^2 dr, \quad (22)$$

where r_0 is the electron range for energy E_e in the medium of density ρ . Thus, scaling of the specific absorbed fraction is accomplished by expressing distances in units of the electron range.

Tables of scaled point kernels in water, F_e^w , are given by Berger,⁽²⁷⁾ and the results for 25 electron energies between 0.01 and 10 MeV and 25 values of the scaled distance in water, r/r_0^w , between 0 and 1.20 are listed in the subroutine BGRND in Appendix C. The dose-rate factor in eq. (21) depends on the electron scaled point kernel in air, F_e^a , which is obtained from the scaled point kernel in water according to the

equation⁽²⁵⁾

$$F_{\epsilon}^a(r/r_0^a, E_{\epsilon}) = \alpha' F_{\epsilon}^w(\alpha' r/r_0^a, E_{\epsilon}) , \quad (23)$$

where α' is a scaling parameter that depends on the energy E_{ϵ} . Values of α' for 8 electron energies between 0.01 and 2 MeV were obtained from ref. (25) and are listed in the subroutine BGRND in Appendix C.

By expressing eq. (21) in terms of the scaled point kernel in air defined in eqs. (22) and (23) and using the element of surface area $d\sigma$ given by eq. (11), we obtain the electron dose-rate factor in tissue above ground in the form

$$DRF_{\epsilon}^t(z', E_{\epsilon}) = (1/4)(KE_{\epsilon}/\rho_a)(1/r_0^a)R_{\epsilon}^a \Omega(z', E_{\epsilon}) , \quad (24)$$

where

$$\Omega(z', E_{\epsilon}) = \int_{z'/r_0^a}^{\infty} (1/u) F_{\epsilon}^a(u, E_{\epsilon}) du , \quad (25)$$

and u is the scaled distance r/r_0^a . Again, z' is given by eq. (20) and embodies the assumed height of the body surface above ground (100 cm) and the assumed depth of the skin below the body surface (7 mg/cm² for the calculations presented in this report).

The integral over scaled distance u in eq. (25) is evaluated numerically using Simpson's rule. For values of u greater than about 1.20, the electron scaled point kernel and, thus, the integral in eq. (25) are zero. For values of u less than 0.05, the integration is facilitated by use of the excellent approximation that the scaled point kernel for any energy varies linearly with u for values between 0 and 0.05.⁽²⁷⁾ [For $u < 0.05$, the previous version of the DOSFACTER code⁽¹⁾ incorrectly calculated the integral in eq. (25), as described in Section 1.2. For a height of the body surface above ground of 100 cm and a depth in tissue of 7 mg/cm², scaled distances less than 0.05 correspond to emitted electron energies greater than about 4.5 MeV.⁽²⁶⁾]

As shown in Fig. 9 of ref. (1), calculation of electron dose-rate factors for skin for ground-surface exposure at a single height of 1 m above ground provides a reasonable approximation to the dose-rate factor averaged over the height of an exposed individual for emitted electron

energies above about 1 MeV. As the energy decreases below 1 MeV, however, the dose-rate factor at 1 m increasingly underestimates the value averaged over the height of the body. Indeed, for energies below 0.36 MeV, the dose-rate factor at 1 m is zero for a depth of skin of 7 mg/cm², based on eq. (20) and known electron ranges in air,⁽²⁶⁾ which is a particularly inappropriate approximation to the dose-rate factor for portions of the skin closer to the ground surface. However, in cases where the external dose to skin from exposure to electron sources on the ground surface is underestimated, the external dose to skin generally will be unimportant compared with the dose to other organs from internal and external exposures.

As noted in Section 2.1.3, the dose-rate factors for ground-surface exposure in Appendix A.3 assume exposure outdoors for 100% of the time. The effects of indoor residence, ground roughness, and exposure to contaminated shorelines on electron dose-rate factors for skin for ground-surface exposure are discussed in Sections 3.2.1, 3.2.2, and 3.2.4, respectively. External dose-rate factors for exposure to electron sources distributed with depth in soil are discussed in Section 3.3.2.

2.2.4 Dose-rate factors for electron spectrum from radioactive decay

The spectrum of electrons emitted by radionuclides is assumed to consist of (1) discrete electrons (e) from Auger and internal conversion processes following beta decay, alpha decay, or isomeric transitions and (2) continuous electrons (β) from beta decay [e.g., see ref. (7)]. Therefore, for a particular radionuclide and exposure mode, the electron dose-rate factor for skin is given in terms of the dose-rate factors for monoenergetic sources by

$$DRF_{\epsilon}^t = \sum_i f_{e_i} DRF_{\epsilon}^t(E_{e_i}) + \sum_j f_{\beta_j} \int_0^{E_{\beta_j}^m} N_{\beta_j}(E) DRF_{\epsilon}^t(E) dE, \quad (26)$$

where f_{e_i} is the intensity of the i th discrete electron of energy E_{e_i} in number per decay, f_{β_j} is the intensity of the j th continuous beta transition with endpoint energy $E_{\beta_j}^m$ in number per decay, $N_{\beta_j}(E)$ is the

probability per unit energy for emission of an electron with energy between E and $E+dE$ for the j th continuous beta transition, obtained from the Fermi theory of beta decay⁽²⁸⁾ as described below, and the summations include all discrete and continuous electrons in the decay spectrum of the radionuclide. Contributions to the dose-rate factors from the continuous spectrum of electrons from spontaneous fission are not taken into account in the results tabulated in this report but are discussed in Section 3.1.

Evaluation of the second term on the right-hand side of eq. (26) requires knowledge of the energy distribution function for beta decay, $N_\beta(E)$. A rigorous calculation of this function is a formidable task requiring extensive computer calculations^(29,30) which are not feasible for the large number of radionuclides considered in this report. Rather, we have used an approximation, developed by Evans,⁽³¹⁾ which simplifies the calculation yet also yields adequate numerical accuracy (i.e., often within 1% of the results from rigorous calculations).

The energy distribution function for beta decay, properly normalized so that the probability per decay that an electron is emitted with energy between zero and the endpoint is unity, is given by⁽²⁸⁾

$$N_\beta(E) = \frac{f_0(E)f_1(E)f_C(Z,E)}{\int_0^{E_\beta^m} f_0(E)f_1(E)f_C(Z,E) dE}, \quad (27)$$

where $f_0(E)$ is the statistical factor for an allowed transition, $f_1(E)$ is the correction factor for a first-forbidden unique transition, $f_C(Z,E)$ is the correction factor for the Coulomb (electrostatic) interaction, Z is the atomic number of the daughter nucleus, and E_β^m is the endpoint energy. The factors f_0 , f_1 , and f_C are dimensionless. Because of the small rest mass of the electron, relativistic relationships must be used for these factors.

The statistical factor for an allowed transition is given by

$$f_0 = \eta W(W^m - W)^2, \quad (28)$$

where W is the total energy of the electron, η is the electron momentum, and W^m is the total energy for the endpoint of the spectrum. In terms of the electron kinetic energy E in MeV and the rest-mass energy of 0.511 MeV, the total energy and momentum are given by

$$W = E/0.511 + 1 , \quad (29)$$

$$\eta = (W^2 - 1)^{1/2} . \quad (30)$$

The correction factor for a first-forbidden unique transition (i.e., a transition between initial and final nuclear states of opposite parity and spins differing by two units of angular momentum) is given by

$$f_1 = \eta^2 + (W^m - W)^2 \quad (31)$$

For allowed transitions or higher forbidden transitions, the factor f_1 is assumed to be unity.

The simplifying approximation to the energy distribution function for beta decay developed by Evans involves the relativistic correction factor for the Coulomb interaction, which is written as⁽³¹⁾

$$f_C = \eta^{2s} \exp(\pi y) |\Gamma(1+s+iy)|^2 , \quad (32)$$

where

$$s = [1 - (Z/137)^2]^{1/2} - 1 , \quad (33)$$

$$y = \pm ZW/137\eta . \quad (34)$$

In eq. (32), Γ is the complex gamma function which, in the present calculations, is evaluated for argument $z = 1+s+iy$ using the power-series approximation

$$1/\Gamma(z) = \sum_k c_k z^k , \quad (35)$$

where the coefficients c_k are given with eq. 6.1.34 of ref. (32). The parameter y in eq. (34) is positive for β^- decay and negative for β^+ decay.

The integral over energy in the denominator of eq. (27) is evaluated numerically using Simpson's rule. As input to the numerical procedure, the integrand is calculated at 10-keV intervals between zero energy and the endpoint energy of each beta spectrum.

2.3 Effective Dose-Rate Factors for Photons

The ICRP has recommended that limits on dose equivalent to whole body or specific body organs be replaced by a limit on the effective dose equivalent from external and internal exposures.⁽³⁾ A limit on effective dose equivalent is intended to provide a limit on risk from stochastic radiation effects for any uniform or nonuniform irradiations of the body. The DOE has adopted the ICRP recommendation in its current radiation protection standards for members of the public.

As defined by the ICRP,^(3,4) the effective dose-rate factor for any of the three external exposure modes considered in this report, denoted by DRF_E , is a weighted sum of the dose-rate factors for several body organs:

$$DRF_E = \sum_k w_k DRF^k, \quad (36)$$

where k is an index denoting each organ, w_k is a weighting factor giving the proportion of the stochastic risk resulting from the k th organ under conditions of uniform whole-body irradiation, and DRF^k is the external dose-rate factor for the k th organ for the particular exposure mode.

The organ-specific weighting factors w_k assigned by the ICRP⁽³⁾ are given in Table 1. In the present calculations, "gonads" is assumed to be the testes, since the external dose-rate factors for this organ always are greater than those for the ovaries, and "bone surfaces" is assumed to be the skeleton. The organ labeled "remainder" refers to the five organs other than those listed in the table which have the highest external dose-rate factors, and a weighting factor $w_k = 0.06$ is assigned to each of these organs. For external exposure, the organs included in the "remainder" category vary with photon energy. For example, at 0.05 MeV, this category includes bladder, kidneys, liver, marrow, and thymus; but at 2 MeV, bladder and liver are replaced by brain and upper large intestine.

It is important to note that the dose-rate factor for skin is not included in the effective dose-rate factor calculated in this report, because the ICRP has recommended that the dose to skin be excluded in calculating effective dose equivalents to maximally exposed individuals in critical population groups.⁽⁴⁾ Thus, for external exposure, the effective dose-rate factor results from photon irradiations only, and the dose-rate

Table 1. Organ-specific weighting factors
for calculation of effective
dose equivalent^a

Organ	w_k
Gonads	0.25
Breast	0.15
Red marrow	0.12
Lungs	0.12
Thyroid	0.03
Bone surfaces	0.03
Remainder	0.30

^aValues from ref. (3).

factor for skin is used principally to evaluate compliance with dose limits for individual organs which ensure prevention of non-stochastic radiation effects. However, the ICRP also has recommended that the dose to skin may be included in the effective dose equivalent with a weighting factor of 0.01 in assessing the collective detriment from exposures of population groups.⁽⁴⁾ The listings in Appendix A of external dose-rate factors for skin for photons plus electrons permit inclusion of the dose to skin in the effective dose equivalent with its appropriate weighting factor, if so desired.

3. IMPLEMENTATION OF EXTERNAL DOSE-RATE FACTORS FOR PHOTONS AND ELECTRONS

The dose-rate conversion factors for external exposure to photons and electrons that result from implementation of the methodology presented in Section 2 are listed in Appendix A. Dose-rate factors have been calculated for approximately 500 radionuclides of potential importance in environmental dose assessments. The energies and intensities of the photons and electrons used to calculate the dose-rate factors for each radionuclide were obtained from a compilation of evaluated radioactive decay data.⁽⁷⁾ All other data required for the calculations are contained in the DOSFACTER code itself; these data have been described in Sections 2.1-2.3 and are given in the code listing in Appendix C.

The dose-rate factors for immersion in contaminated air and immersion in contaminated water are given in units of mrem/y per $\mu\text{Ci}/\text{m}^3$, and the values for exposure to a contaminated ground surface are given in units of mrem/y per $\mu\text{Ci}/\text{m}^2$. If dose-rate factors in units of Sv/y per Bq/cm^3 for air immersion and water immersion and in units of Sv/y per Bq/cm^2 for ground-surface exposure are desired, as given in refs. (1) and (2), then the values for air immersion and water immersion in this report should be reduced by a factor of 3.7×10^3 and the values for ground-surface exposure should be reduced by a factor of 3.7×10^5 .

The remainder of this section discusses some potentially important considerations in applying the dose-rate factors in Appendix A to obtain realistic estimates of external dose equivalents to members of the public. These considerations include (1) penetrating radiations from radioactive decay that are not taken into account in the calculations, (2) corrections that can be applied to the dose-rate factors to take into account the effects of indoor residence, ground roughness, exposure during boating activities, and exposure to contaminated shorelines, (3) methods for calculating external dose-rate factors for exposure to sources distributed with depth in soil, and (4) application of the dose-rate factors to the important cases of radionuclides that decay to radioactive daughter products.

3.1 Radiations from Spontaneous Fission and Bremsstrahlung

The external dose-rate factors in Appendix A take into account only photons and electrons from beta decay, alpha decay, and isomeric transitions. In unusual circumstances, penetrating radiations from spontaneous fission decay or bremsstrahlung also could be important in estimating external dose equivalents to members of the public.

3.1.1 *Spontaneous fission*

Spontaneous fission occurs in the decay of several radionuclides in the actinide series, and results in the emission of photons, electrons, and neutrons as well as fission fragments. However, spontaneous fission is an important decay mode for only a few radionuclides (e.g., ^{248}Cm , ^{252}Cf , ^{254}Cf , and ^{256}Fm); in these cases, the dose-rate factors in this report considerably underestimate external dose equivalents.

Branching fractions for spontaneous fission for the radionuclides considered in this report are given in Appendix 5 of ref. (7). Empirical relationships for the continuous energy spectra of photons, electrons, and neutrons from spontaneous fission that could be applied to the estimation of external dose equivalents are given by Dillman and Jones.⁽³³⁾ However, external dose equivalents from spontaneous fission usually will be unimportant in dose assessments for members of the public, either because radionuclides with significant branching fractions for spontaneous fission will occur in relatively small concentrations in the environment or because dose equivalents from internal exposure will be much more important for these radionuclides.

3.1.2 *Bremsstrahlung*

Bremsstrahlung is the continuous spectrum of photons produced primarily by the slowing down of electrons emitted in radioactive decay by interaction with the material surrounding the radiating atom (i.e., air, water, or soil for radionuclides in the environment). Bremsstrahlung also

is produced by interaction of an ejected electron with the decaying nucleus itself, but this contribution is negligible.⁽³⁰⁾ Bremsstrahlung usually will be important in estimating external dose equivalents only for radionuclides that are pure beta emitters with relatively high decay energies (e.g., ^{90}Sr and its daughter ^{90}Y).

Methods for calculating the spectrum of bremsstrahlung in a number of materials have been implemented by Dillman.⁽³⁰⁾ Simplified methods, based on an approximation given by Evans,⁽³¹⁾ have been implemented by O'Donnell *et al.*⁽³⁴⁾ However, contributions to external dose equivalents from bremsstrahlung usually will be unimportant in dose assessments for members of the public, either because of the presence of significant concentrations of photon-emitting radionuclides in the environment or because, for radionuclides that are pure beta emitters, dose equivalents from internal exposure will be much more important.

3.2 Corrections to the External Dose-Rate Factors

This section discusses corrections that can be applied to the external dose-rate factors for photons and electrons in Appendix A to take into account the effects of indoor residence, ground roughness, exposure during boating activities, and exposure to contaminated shorelines. These corrections, which are referred to as dose-reduction factors, are multiplicative factors that are less than or equal to unity and, thus, serve to reduce estimates of external dose equivalents. These factors may be applied to the external dose-rate factors for particular exposure modes to obtain more realistic estimates of dose equivalents to members of the public.

Two separate factors must be taken into account in estimating the effects of dose-reduction factors on external dose equivalents to members of the public: (1) the reduction in dose during a particular exposure situation (e.g., during indoor residence) and (2) the fraction of the time during a year that the reduction in dose occurs. Thus, in estimating annual dose equivalents, the dose-reduction factor for a particular exposure situation must be weighted by the fraction of the year during which the reduction in dose is assumed to occur. Both of these factors

are discussed in Sections 3.2.1-3.2.4.

None of the dose-reduction factors for external exposure discussed in this section were applied to the photon and electron dose-rate factors tabulated in Appendix A. Guidance on use of the dose-reduction factors in estimating external dose equivalents to members of the public is presented in Section 3.2.5.

3.2.1 *Effects of indoor residence*

The dose-rate factors for immersion in contaminated air in Appendix A.1 and exposure to a contaminated ground surface in Appendix A.3 assume that exposed individuals spend all of the time outdoors. A more realistic dose assessment for these exposure modes would take into account the effects of shielding by building structures in reducing external dose equivalents during indoor residence.

Photon exposures. For routine releases from nuclear reactors, the U.S. Nuclear Regulatory Commission (NRC) recommends that the following dose-reduction factors be applied in calculating external dose equivalents from photons to take into account both the shielding provided by building structures during indoor residence and the fraction of the time individuals spend indoors:⁽³⁵⁾

Photon dose-reduction factors for air immersion and ground-surface exposure to account for indoor residence -

- 0.7 for maximally exposed individuals;
- 0.5 for average individuals in population groups.

In both cases, the recommended shielding factor during indoor residence is 0.5. The difference in the two dose-reduction factors then reflects the assumed fraction of the time spent indoors, i.e., about 50% for maximally exposed individuals but nearly 100% for average individuals in population groups.⁽³⁵⁾ These dose-reduction factors were based on an analysis by Burson and Profio.⁽³⁶⁾ Similar values, based on a compilation by Oakley,⁽³⁷⁾ have been recommended by the National Council on Radiation Protection and Measurements.⁽³⁸⁾

The dose-reduction factors listed above may also be applied to routine releases from sources other than nuclear reactors and to accidental releases. In general, however, the values are most appropriate for emitted photon energies above a few hundred keV. For photons of lower energy, use of these dose-reduction factors may considerably overestimate external dose equivalents during indoor residence.⁽³⁹⁾

The photon dose-reduction factors for indoor residence recommended by the NRC are based on a shielding factor that is representative of living areas in single-family homes. In some cases, however, it may be more appropriate to assume that exposed individuals are residing in basements of homes or in schools, apartment houses, or office buildings. These structures generally provide significantly greater shielding than living areas in single-family homes. For immersion in contaminated air, representative shielding factors range from 0.6 for the basement of a wood frame house to 0.2 or less for a large office or industrial-type building; and, for ground-surface exposure, representative shielding factors range from 0.1 for the basement of a home to 0.005 for the basement of large, multi-story structures.⁽³⁶⁾

The photon dose-reduction factors for indoor residence for ground-surface exposure recommended by Burson and Profio⁽³⁶⁾ for a variety of structures and adopted by the NRC⁽³⁵⁾ for single-family homes take into account activity deposited on the outside walls and roof of the structure, as well as activity deposited on the ground surface. A simple model for estimating dose-reduction factors for activity deposited on the outside walls and roof of a building is given in ref. (39).

Electron exposures. The NRC has not considered the effects of indoor residence on external dose equivalents from electrons.⁽³⁵⁾ However, since electrons from radioactive decay cannot penetrate building structures, external dose equivalents from electrons during indoor residence can be estimated on the basis of concentrations of radionuclides in indoor air and on the floor of the building [e.g., see Section II of ref. (39)].

The following discussion of dose-reduction factors for electrons during indoor residence applies primarily to routine (i.e., chronic) releases of radionuclides to the atmosphere, in which case steady-state concentrations of airborne radionuclides inside and outside buildings may be assumed. For acute or accidental releases, however, the relationship

between indoor and outdoor airborne concentrations of radionuclides will vary with time during and after a release, and will depend on the timing and extent of building ventilation. Therefore, for such releases, it may be prudent to assume no reduction in external dose equivalents from electrons during indoor residence.

For noble-gas radionuclides, air immersion is the only external exposure mode of concern. The effects of indoor residence on electron dose equivalents to skin should be negligible during chronic releases (i.e., the dose-reduction factor should be essentially unity), unless the range of the emitted electrons in air is somewhat greater than the interior dimensions of building rooms, because the indoor and outdoor air concentrations for noble gases will be nearly the same. For ^{85}Kr , for example, the electron energies from beta decay are less than 0.687 MeV⁽⁷⁾ and the corresponding electron ranges in air are less than 2.6 m,⁽²⁶⁾ which is a representative radius of rooms in single-family homes. Thus, a dose-reduction factor of unity during indoor exposures to electrons from ^{85}Kr decay is a reasonable assumption. However, if the electron range in air is somewhat greater than the dimensions of building rooms (i.e., if the emitted electron energy is about 1 MeV or greater), then the assumption of a dose-reduction factor of unity will overestimate electron dose equivalents to skin from exposure to noble gases during indoor residence. The extent of overestimation as it depends on the electron range in air relative to the dimensions of building rooms has not been treated in the literature.

For depositing radionuclides, the indoor air concentration can be considerably less than the outdoor air concentration during chronic releases.⁽³⁹⁾ Thus, if the indoor and outdoor deposition velocities are comparable, then the dose-reduction factors for external exposure to electrons during indoor residence can be substantial for both air immersion and ground-surface exposure. Similar to the case of noble gases discussed above, the dose-reduction factor for electrons for air immersion or ground-surface exposure can be assumed equal to the ratio of indoor and outdoor concentrations of airborne or deposited radionuclides, respectively, provided the electron range in air is comparable to or less than the dimensions of building rooms. For greater electron ranges in air, this assumption again overestimates electron dose equivalents to skin

during indoor residence, but by unknown amounts.

Exposure times. As stated previously, indoor residence times recommended by the NRC⁽³⁵⁾ for maximally exposed and average individuals are 50% and nearly 100%, respectively. These values apply to residence in homes or apartments. However, substantially lower residence times are more appropriate for other locations; e.g., residence times of about 15% for schools and 25% for office buildings would be reasonable.

3.2.2 *Effects of ground roughness*

The dose-rate factors for exposure to a contaminated ground surface in Appendix A.3 assume that the source region is a smooth plane. A more realistic dose assessment for this exposure mode would take into account the effects of ground roughness in reducing external dose equivalents, i.e., the shielding provided by terrain irregularities and surface vegetation for sources on the ground surface. A dose-reduction factor for ground roughness would be applied in addition to the dose-reduction factor for indoor residence discussed in Section 3.2.1. Thus, no additional consideration of exposure times is needed in estimating the effects of ground roughness on external dose equivalents.

Photon exposures. The NRC has not considered photon dose-reduction factors for ground-surface exposure that take into account ground roughness.⁽³⁵⁾ However, dose-reduction factors for a photon spectrum representative of fallout following releases from nuclear reactor accidents are given by Burson and Profio.⁽³⁶⁾ The recommended values range from essentially 1.0 for paved areas to about 0.5 for a deeply plowed field, and a representative average value is about 0.7. As in the case of building shielding during indoor residence discussed in Section 3.2.1, the average dose-reduction factor for ground roughness should overestimate external dose equivalents from ground-surface exposure if the radionuclides emit mostly low-energy photons.⁽³⁹⁾

Electron exposures. Electron dose-reduction factors for ground-surface exposure that take into account ground roughness have not been treated in the literature. However, some reduction in dose due to terrain irregularities and surface vegetation undoubtedly occurs. Furthermore,

the electron dose is likely to be reduced by a greater amount due to ground roughness than the photon dose. Therefore, in estimating electron dose-rate factors for ground-surface exposure, it would be reasonable to use the appropriate photon dose-reduction factors for ground roughness, since the resulting electron dose probably would not be underestimated.

3.2.3 *Exposure during boating activities*

The dose-rate factors for immersion in contaminated water in Appendix A.2 assume immersion in an infinite source region and, thus, are appropriate for exposure while swimming. External exposure to contaminated water also may occur during boating activities, but dose-reduction factors in this case have not been considered by the NRC.⁽³⁵⁾

Photon exposures. For photons, a dose-reduction factor of 0.5 during boating activities is a reasonable value that is unlikely to underestimate external dose equivalents. This dose-reduction factor (1) takes into account that the source region is effectively semi-infinite in extent for an exposed individual located at the boundary of the air-water interface and (2) assumes that the shielding of photons provided by the typically thin hull of a boat is negligible. The latter assumption will result in overestimates of external dose equivalents during boating activities for radionuclides that emit mostly low-energy photons.

Electron exposures. For electrons, it is reasonable to assume a dose-reduction factor of zero during boating activities, i.e., that the electron dose-equivalent rate is zero. This recommendation is based on the assumption that the hull of a boat provides complete shielding from electron sources in the water.

Exposure times. The exposure time for boating activities should be estimated on a site-specific basis. For individuals who reside on a boat for all or part of a year, an exposure time of 50% or more would be reasonable. For individuals who engage only in recreational boating activities, an exposure time as high as 5% would be reasonable.

3.2.4 Exposure to contaminated shorelines

The dose-rate factors for exposure to a contaminated ground surface in Appendix A.3 assume that the source region is infinite in extent and, thus, are appropriate for large areas that are contaminated by deposition of radionuclides from the atmosphere or by irrigation with contaminated water. External exposure to a contaminated ground surface also may occur during fishing or hiking along shorelines of finite width that are contaminated by deposition of radionuclides from water.⁽⁴⁰⁾

Photon exposures. For exposure to photons from contaminated shorelines of finite width, the NRC has recommended the following dose-reduction factors for different types of shorelines:⁽³⁵⁾

Photon dose-reduction factors for exposure to contaminated shorelines -

- 0.1 for discharge canal bank;
- 0.2 for river shoreline;
- 0.3 for lake shore;
- 0.5 for ocean shore;
- 1.0 for tidal basin.

These values would be applied in addition to the dose-reduction factor for ground roughness discussed in Section 3.2.2, and they do not include consideration of exposure times.

Electron exposures. Dose-reduction factors for exposure to electrons from contaminated shorelines have not been considered in the literature. Because of the relatively short range of electrons in air, the dose-rate factor from exposure to shorelines of finite width should be about the same as the dose-rate factor for exposure to an infinite ground surface; i.e., the dose-reduction factor for exposure to contaminated shorelines should be essentially unity. However, as discussed in Section 3.2.2, an electron dose-reduction factor for ground roughness, based on an appropriate value for photons, could be taken into account in estimating electron dose-rate factors for exposure to contaminated shorelines.

Exposure times. In estimating external dose equivalents from shoreline exposure, the NRC has recommended exposure times for use in lieu of site-specific data.⁽³⁵⁾ The values for an adult are 12 hours per year for maximally exposed individuals and 8 hours per year for average individuals in population groups. However, if the dose assessment takes into account other age groups, then the recommended exposure times are considerably higher; i.e., for teenagers, the recommended values are 67 hours per year for maximally exposed individuals and 47 hours per year for average individuals in population groups.⁽³⁵⁾

3.2.5 *Guidance on application of dose-reduction factors*

Dose-reduction factors for indoor residence, ground roughness, exposure during boating activities, and exposure to contaminated shorelines have not been used in calculating the dose-rate factors for external exposure to photons and electrons in Appendix A. However, dose-reduction factors may be applied to these results at the discretion of each DOE site in estimating external dose equivalents to members of the public. Any use of dose-reduction factors should be fully documented; i.e., specific information should be given regarding (1) the reduction in external dose equivalents from photons or electrons that is assumed for a particular exposure situation and (2) the fraction of the time during which such dose reductions are assumed to occur.

Use of the dose-reduction factors discussed in this report is particularly warranted whenever annual dose equivalents estimated without use of these factors approach or exceed applicable limits. Otherwise, it may be unimportant that not considering the dose-reduction factors is likely to result in overestimates of external dose equivalents for members of the public, because the various dose-reduction factors often will be considerably less than the magnitude of uncertainties in measured or calculated concentrations of radionuclides in the environment.

If dose-reduction factors are applied to a particular exposure situation, then it should be borne in mind that the values for photons and electrons generally are different. However, this difference is important only in estimating external dose equivalents to the skin, because skin is

the only organ for which the total dose may result from photon and electron irradiations. A separate accounting of photon and electron dose-reduction factors for skin is facilitated by the listings of photon and electron dose-rate factors for skin in Appendix A. In estimating external dose equivalents to any organ except skin or in estimating effective dose equivalents from external exposure to photons, only the dose-reduction factors for photons would be considered.

3.3 External Dose-Rate Factors for Sources in Soil

The photon dose-reduction factor for ground roughness discussed in Section 3.2.2 does not describe the shielding provided by soil as radionuclides penetrate into the ground over time, e.g., by natural infiltration or plowing of soils. Consideration of external exposure to sources in soil may be important in estimating dose equivalents to maximally exposed individuals, particularly during long-term releases to the environment or if the soil is plowed regularly, or in estimating collective dose equivalents during the environmental residence time of the released radionuclides. In these cases, an assumption that deposited radionuclides remain on the ground surface usually would result in considerable overestimates of external dose equivalents.

3.3.1 *Photon dose-rate factors*

Photon dose-rate factors in air above ground from monoenergetic sources that are distributed uniformly in slab sources in soil at various depths below the ground surface have been calculated by Kocher and Sjoreen.⁽⁴¹⁾ The dose-rate factors for particular radionuclides then may be obtained from the known photon spectra⁽⁷⁾ according to eq. (14). The assumption of uniformly contaminated slab sources is appropriate for frequently plowed soils or for use with linear compartment models that describe downward migration of radionuclides in soil [e.g., see ref. (42)]. Only sources within about 1 m of the ground surface need to be considered, because depths of soil greater than 1 m provide essentially

complete shielding of photons from radioactive decay for an exposed individual standing on the ground surface.

Kocher and Sjoreen⁽⁴¹⁾ also have calculated photon dose-rate factors in air above ground for monoenergetic sources that are distributed exponentially with depth in soil. Such a source distribution may be appropriate for the case of natural infiltration of radionuclides into soil during a chronic deposition onto the ground surface.

The photon dose-rate factors in air above ground for particular radionuclides distributed in soil, calculated as described above, can be converted to effective dose-rate factors for an exposed individual standing on the ground by using (1) the ratios of photon dose-equivalent rates in body organs to absorbed dose rate in air as a function of emitted photon energy listed in the function subprogram FAC in Appendix C [i.e., the quantity G_{γ}^k defined with eq. (3)], and (2) the organ-specific weighting factors for the effective dose equivalent given in Table 1 (see Section 2.3). However, for all radionuclides that emit significant intensities of photons with energies greater than a few hundred keV, which are of greatest concern in estimating external dose equivalents from exposure to contaminated soil, it is an excellent approximation to assume that the ratio of effective dose-rate factor to the dose-rate factor in air is 0.7.

3.3.2 *Electron dose-rate factors*

External exposure to electrons from radionuclides distributed with depth in soil generally can be neglected, because a few cm (and often only a few mm) of soil provides complete shielding of electrons from radioactive decay for a receptor location 1 m above ground.⁽²⁶⁾ Thus, calculations of electron dose equivalents from sources deposited on the ground need to consider only those sources that remain on or very near the surface.

3.4 External Dose-Rate Factors for Radioactive Decay Chains

In applying the dose-rate factors for external exposure in Appendix A to estimates of dose equivalents to members of the public, it is important to understand that the values for each radionuclide do not include any possible contributions from radioactive daughter products. Rather, the tabulations contain separate entries for all such daughter products. For example, the photon dose-rate factors listed for ^{137}Cs are zero, because all photons result from the decay of the $^{137\text{m}}\text{Ba}$ daughter,⁽⁷⁾ and a separate listing of the photon dose-rate factors for the daughter is provided. The parent-daughter relationships, including half-lives, modes of decay, and decay branching fractions, for all radionuclides considered in this report are shown in Appendix B.

In the particular case of ^{137}Cs decay to $^{137\text{m}}\text{Ba}$ noted above, it generally is reasonable to assume that the activity of $^{137\text{m}}\text{Ba}$ is in secular equilibrium with the activity of ^{137}Cs at any location in the environment and at any time, due to the short half-life of the daughter and the similarity in environmental behavior of the parent and daughter. Thus, the dose-rate factors for $^{137\text{m}}\text{Ba}$ can be multiplied by the known branching fraction⁽⁷⁾ of 0.946 for decay of ^{137}Cs to $^{137\text{m}}\text{Ba}$ and added to the corresponding dose-rate factors for ^{137}Cs . A similar assumption is reasonable for other decay chains involving short-lived daughter products and parent and daughter radionuclides that exhibit similar environmental behavior (e.g., ^{106}Ru decay to ^{106}Rh).

In many potentially important cases, however, it may not be reasonable to assume secular equilibrium in the environment between a radionuclide and its radioactive daughter products. Examples include the complex decay chains involving radionuclides in the actinide series and their radioactive daughter products, in which parent and daughter radionuclides may exhibit significant differences in environmental behavior, decay chains involving noble gases and radionuclides that can deposit on the ground surface (e.g., ^{88}Kr decay to ^{88}Rb), and decay chains in which the parent and daughter radionuclides are reasonably long-lived and have similar half-lives (e.g., ^{95}Zr decay to ^{95}Nb). In these cases, the dose-rate factors for a parent and its daughters can be combined only after proper consideration of the equations describing production and

decay of daughter radionuclides over time⁽³¹⁾ and differences in environmental behavior of the parent and daughters.

In estimating external dose equivalents to members of the public, contributions from radioactive daughters produced following a release of a parent radionuclide to the environment generally must be considered when the half-lives of the daughters are comparable to or less than (1) the half-life of the parent and (2) the time period of concern for the dose assessment (e.g., any one-year period during the operating lifetime of a facility). Specific examples of decay chains in which contributions from radioactive daughters produced in the environment generally must be considered in estimating external dose equivalents are given in the previous two paragraphs. It should be emphasized that contributions from such daughters that occur with the parent in releases to the environment also must be taken into account.

However, in estimating external dose equivalents to members of the public during the operating lifetime of a facility (e.g., over a period of a few decades), contributions from radioactive daughters produced following a release of a parent radionuclide to the environment generally can be neglected if the half-life of the daughter (1) is much longer than the half-life of the parent (i.e., by about three orders of magnitude or more, depending on the half-life of the parent and the relative magnitudes of the external dose-rate factors for the parent and daughter) or (2) is much longer than the time period of concern for the dose assessment, regardless of the half-life of the parent. An example of the first situation would be a release of ^{99}Mo with a half-life of 66.02 hours and/or $^{99\text{m}}\text{Tc}$ with a half-life of 6.02 hours, both of which decay to ^{99}Tc with a half-life of 2.13×10^5 years. An example of the second situation would be a release of ^{234}U with a half-life of 2.445×10^5 years, which decays to ^{230}Th with a half-life of 7.7×10^4 years. In both examples, the activity of the long-lived daughters produced in the environment will be insignificant during the time period of concern for the dose assessment, compared with the activity of the parents released to the environment, and the contributions to external dose equivalents from the daughters can be ignored. (These examples are illustrative only, because the external dose from ^{99}Tc , ^{234}U , and ^{230}Th always will be insignificant compared with the dose from internal exposures.) It again should be

emphasized, however, that long-lived daughter products also may occur with the parent in releases to the environment, in which case the daughters must be considered in estimating external dose equivalents during the operating lifetime of a facility.

For purposes other than estimating external dose equivalents to members of the public during the operating lifetime of a facility, the contributions from radioactive daughters produced following a release of a parent radionuclide to the environment may need to be taken into account, regardless of the half-lives of the daughters relative to either the half-life of the parent or the duration of releases. For example, if the collective dose equivalent in the exposed population is to be calculated over the residence time in the environment of the released radionuclides and their daughters, e.g., as part of an analysis to determine if releases are ALARA (As Low As Reasonably Achievable), then in principle the contributions from all daughters should be taken into account until radioactive decay is complete. The contributions from the daughters may be more important than those from the parents in determining collective dose equivalents over the environmental residence time of all radionuclides, even when maximum annual dose equivalents to individuals, which occur during the release period, are determined primarily by exposure to the parents. In practice, however, the collective dose equivalent may be calculated only over the operating lifetime of a facility; or calculations beyond the operating lifetime may be truncated by specifying either a time cutoff (e.g., 10,000 years) or a minimum annual dose equivalent to individuals (e.g., 1 mrem) for inclusion in the collective dose. With such procedures, contributions to external dose equivalents from long-lived daughters produced in the environment then could be neglected in many cases.

The discussions in the previous two paragraphs illustrate the difficulty in formulating firm guidelines regarding situations where contributions from long-lived daughters produced in the environment either must be taken into account or always can be neglected in calculating external dose equivalents to members of the public. Practical experience in calculating annual dose equivalents to maximally exposed individuals and collective dose equivalents in exposed populations for expected releases of radionuclides from operating facilities will be the most

useful means of developing appropriate guidelines. However, the guidelines that may be developed from practical experience also will depend on general procedures that are established for performing dose assessments. An important example discussed above is whether collective dose equivalents are to be calculated only during the operating lifetime of a facility or, in addition, for an extended period of time thereafter.

REFERENCES

1. D. C. Kocher, *Dose-Rate Conversion Factors for External Exposure to Photons and Electrons*, NUREG/CR-1918, ORNL/NUREG-79, Oak Ridge National Laboratory (1981).
2. D. C. Kocher, "Dose-Rate Conversion Factors for External Exposure to Photons and Electrons," *Health Phys.* 45, 665 (1983).
3. International Commission on Radiological Protection, "Recommendations of the International Commission on Radiological Protection," ICRP Publication 26, *Ann. ICRP* 1, No. 3 (1977).
4. International Commission on Radiological Protection, "A Compilation of the Major Concepts and Quantities in Use by ICRP," ICRP Publication 42, *Ann. ICRP* 14, No. 4 (1984).
5. International Commission on Radiological Protection, *Report of the Task Group on Reference Man*, ICRP Publication 23, Pergamon Press, Oxford, U.K. (1975).
6. J. T. Whitton, "New Values for Epidermal Thickness and Their Importance," *Health Phys.* 24, 1 (1973).
7. D. C. Kocher, *Radioactive Decay Data Tables*, DOE/TIC-11026, U.S. Department of Energy (1981).
8. W. S. Snyder, M. R. Ford, G. G. Warner, and H. L. Fisher, Jr., "Estimates of Absorbed Fractions for Monoenergetic Photon Sources Uniformly Distributed in Various Organs of a Heterogeneous Phantom," MIRD Pamphlet No. 5, *J. Nucl. Med. Suppl.* 3 (1969).
9. K. O'Brien and R. Sanna, "The Effect of the Male-Female Body-Size Difference on Absorbed Dose-Rate Distributions in Humans from Natural Gamma Rays," *Health Phys.* 34, 107 (1978).
10. K. O'Brien, "Human Dose from Radiation of Terrestrial Origin," p. 1163 in *Natural Radiation Environment III*, Vol. 2, CONF-780422, U.S. Department of Energy (1980).
11. G. D. Kerr, "A Review of Organ Doses from Isotropic Fields of γ -Rays," *Health Phys.* 39, 3 (1980).
12. L. T. Dillman, "Absorbed Gamma Dose Rate for Immersion in a Semi-Infinite Radioactive Cloud," *Health Phys.* 27, 571 (1974).
13. J. C. Ryman, R. E. Faw, and K. Shultis, "Air-Ground Interface Effects on γ -Ray Submersion Dose," *Health Phys.* 41, 759 (1981).
14. K. F. Eckerman, G. D. Kerr, and R. Raridon, "Organ Doses from Isotropic Cloud Sources of Gamma Rays," *Health Phys.* 39, 1054 (1980).

15. P. Jacob, H. G. Paretzke, H. Rosenbaum, and M. Zankl, "Effective Dose Equivalents for Photon Exposures from Plane Sources on the Ground," *Radiat. Protect. Dosim.* 14, 299 (1986).
16. M. J. Berger, "Energy Deposition in Water by Photons from Point Isotropic Sources," *J. Nucl. Med. Suppl.* 1, 15 (1968).
17. J. H. Hubbell, *Photon Cross Sections, Attenuation Coefficients, and Energy Absorption Coefficients from 10 keV to 100 GeV*, NSRDS-NBS 29, National Bureau of Standards (1969).
18. U.S. Department of Health, Education, and Welfare, *Radiological Health Handbook* (1970).
19. G. G. Killough and L. R. McKay, *A Methodology for Calculating Radiation Doses from Radioactivity Released to the Environment*, ORNL-4992, Oak Ridge National Laboratory (1976).
20. R. Loevinger and M. Berman, "A Schema for Absorbed-Dose Calculations for Biologically-Distributed Radionuclides," *J. Nucl. Med. Suppl.* 1, 7 (1968).
21. D. K. Trubey, *A Survey of Empirical Functions Used to Fit Gamma-Ray Buildup Factors*, ORNL-RSIC-10, Oak Ridge National Laboratory (1966).
22. A. B. Chilton, "Broad Beam Attenuation," p. 202 in *Engineering Compendium on Radiation Shielding*, Vol. I, edited by R. G. Jaeger, Springer-Verlag, New York (1968).
23. F. H. Clark, "Gamma-Ray Buildup Factors for Sand, Air and Wood (Cellulose)," *Nucl. Appl.* 6, 588 (1969).
24. W. Gautschi and W. F. Cahill, "Exponential Integral and Related Functions," p. 227 in *Handbook of Mathematical Functions*, edited by M. Abramowitz and I. A. Stegun, Dover Press, New York (1965).
25. M. J. Berger, "Beta-Ray Dose in Tissue-Equivalent Material Immersed in a Radioactive Cloud," *Health Phys.* 26, 1 (1974).
26. National Academy of Sciences-National Research Council, *Studies in Penetration of Charged Particles in Matter*, NAS-NRC Publication 1133 (1964).
27. M. J. Berger, *Improved Point Kernels for Electron and Beta-Ray Dosimetry*, NBSIR 73-107, National Bureau of Standards (1973).
28. C. S. Wu and S. A. Moskowsky, *Beta Decay*, Interscience, New York (1966).
29. N. B. Gove and M. J. Martin, "Log-f Tables for Beta Decay," *Nucl. Data Tables* 10, 205 (1971).

30. L. T. Dillman, *EDISTR - A Computer Program to Obtain a Nuclear Decay Data Base for Radiation Dosimetry*, ORNL/TM-6689, Oak Ridge National Laboratory (1980).
31. R. D. Evans, *The Atomic Nucleus*, Addison-Wesley, Reading, MA (1952).
32. P. J. Davis, "Gamma Function and Related Functions," p. 253 in *Handbook of Mathematical Functions*, edited by M. Abramowitz and I. A. Stegun, Dover Press, New York (1965).
33. L. T. Dillman and T. D. Jones, "Internal Dosimetry of Spontaneously Fissioning Nuclides," *Health Phys.* 29, 111 (1975).
34. F. R. O'Donnell, D. C. Kocher, O. W. Burke, and F. H. Clark, *CONDOS II - A Tool for Estimating Radiation Doses from Radionuclide-Containing Consumer Products*, NUREG/CR-2068, ORNL/NUREG/TM-454, Oak Ridge National Laboratory (1981).
35. U.S. Nuclear Regulatory Commission, *Regulatory Guide 1.109. Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I* (1977).
36. Z. G. Burson and A. E. Profio, "Structure Shielding in Reactor Accidents," *Health Phys.* 33, 287 (1977).
37. D. T. Oakley, *Natural Radiation Exposure in the United States*, ORP/SID 72-1, U.S. Environmental Protection Agency (1972).
38. National Council on Radiation Protection and Measurements, *Natural Background Radiation in the United States*, NCRP Report No. 45 (1975).
39. D. C. Kocher, "Effects of Indoor Residence on Radiation Doses from Routine Releases of Radionuclides to the Atmosphere," *Nucl. Technol.* 48, 171 (1980).
40. J. K. Soldat, N. M. Robinson, and D. A. Baker, *Models and Computer Codes for Evaluating Environmental Radiation Doses*, BNWL-1754, Pacific Northwest Laboratory (1974).
41. D. C. Kocher and A. L. Sjoreen, "Dose-Rate Conversion Factors for External Exposure to Photon Emitters in Soil," *Health Phys.* 48, 193 (1985).
42. A. L. Sjoreen, D. C. Kocher, G. G. Killough, and C. W. Miller, *MLSOIL and DFSOIL - Computer Codes to Estimate Effective Ground Surface Concentrations for Dose Computations*, ORNL-5974, Oak Ridge National Laboratory (1984).

APPENDIX A

TABLES OF DOSE-RATE CONVERSION FACTORS FOR
EXTERNAL EXPOSURE TO PHOTONS AND ELECTRONS

This appendix presents the tables of dose-rate conversion factors for external exposure to photons and electrons. Appendix A.1 presents the results for immersion in contaminated air, Appendix A.2 the results for immersion in contaminated water, and Appendix A.3 the results for exposure to a contaminated ground surface.

The tables of dose-rate factors for each of the three exposure modes are described briefly as follows.

- Each radionuclide is identified by its name and half-life; the notation "M" with the radionuclide name denotes a metastable excited state of the isotope. The units for the half-lives are denoted as follows: S = seconds; M = minutes; H = hours; D = days; and Y = years.
- For all body organs except skin, the dose-rate factor applies to photons only.
- The entry labeled "EFFECTIVE" is the effective dose-rate factor for external exposure to photons, which is a weighted sum of photon dose-rate factors for 11 specific body organs, excluding skin. The weighting factors applied to each organ are listed in Table 1 (see Section 2.3).
- For skin, separate dose-rate factors are given for photons and electrons, and the entry labeled "TOTAL" is the sum of the two. The dose-rate factor for electrons applies to a depth in tissue below the body surface of 7 mg/cm^2 . Again, the photon and electron dose-rate factors for skin are not included in the effective dose-rate factor.

- The dose-rate factors for all three exposure modes assume exposure for 100% of the time. However, as discussed in Section 2.1.2, the values for immersion in contaminated water in Appendix A.2 should be reduced by a substantial amount to reflect a more realistic exposure time for members of the public. Reduction of the dose-rate factors for this exposure mode by a factor of 100 is recommended in lieu of site-specific information.
- The dose-rate factors for each radionuclide do not include possible contributions from radioactive daughter products. The treatment of dose-rate factors for daughter products in estimating external dose equivalents to members of the public is discussed in Section 3.4, and the parent-daughter relationships for the radionuclides considered in this report are shown in Appendix B.
- The dose-rate factors for the three exposure modes do not take into account the effects of indoor residence, ground roughness, exposure during boating activities, and exposure to contaminated shorelines. Dose-reduction factors for these situations are discussed in Section 3.2. These dose-reduction factors may be applied to specific external exposure situations, at the discretion of the user, to provide more realistic estimates of external dose equivalents to members of the public.

Dose-rate factors for external exposure above ground to radionuclides that are distributed with depth in soil are not presented in this appendix. However, methods for their calculation are described in Section 3.3.

The tables of external dose-rate factors listed in this appendix are available in computer-readable form from the Engineering Physics Information Center, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37831. Requests for these data should refer to the code DOSFACTER-DOE and to this report by title and number.

A.1 Dose-Rate Factors for Immersion in Contaminated Air

The following tables give the dose-rate conversion factors for external exposure to photons and electrons for immersion in a semi-infinite, uniformly contaminated atmospheric cloud. Dose-reduction factors which can be applied to these results to take into account external exposure to a contaminated atmospheric cloud during indoor residence are discussed in Section 3.2.1.

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
H-3	12.28 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE-7	53.44 D	2.14E+02	2.02E+02	2.25E+02	2.71E+02	1.98E+02	1.78E+02	2.10E+02	1.94E+02	2.10E+02
BE-10	1.6E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C-11	20.48 M	4.39E+03	4.17E+03	4.65E+03	5.54E+03	4.08E+03	3.67E+03	4.33E+03	4.00E+03	4.33E+03
C-14	5.73E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N-13	9.97 M	4.40E+03	4.17E+03	4.65E+03	5.54E+03	4.08E+03	3.67E+03	4.33E+03	4.00E+03	4.33E+03
N-16	7.13 S	2.44E+04	2.47E+04	2.62E+04	3.15E+04	2.43E+04	2.33E+04	2.60E+04	2.44E+04	2.76E+04
O-15	122.24 S	4.40E+03	4.18E+03	4.66E+03	5.55E+03	4.08E+03	3.67E+03	4.33E+03	4.00E+03	4.33E+03
F-18	109.74 M	4.26E+03	4.05E+03	4.51E+03	5.37E+03	3.95E+03	3.56E+03	4.20E+03	3.87E+03	4.19E+03
NA-22	2.602 Y	9.52E+03	9.29E+03	1.04E+04	1.19E+04	9.15E+03	8.35E+03	9.73E+03	8.97E+03	9.72E+03
NA-24	15.00 H	1.97E+04	2.02E+04	2.25E+04	2.54E+04	2.02E+04	1.89E+04	2.15E+04	1.99E+04	2.18E+04
MG-27	9.458 M	4.02E+03	3.90E+03	4.39E+03	4.91E+03	3.85E+03	3.49E+03	4.10E+03	3.77E+03	4.08E+03
MG-28	20.91 H	5.95E+03	5.87E+03	6.59E+03	7.46E+03	5.80E+03	5.32E+03	6.17E+03	5.69E+03	6.18E+03
AL-26	7.2E5 Y	1.21E+04	1.22E+04	1.36E+04	1.54E+04	1.21E+04	1.11E+04	1.28E+04	1.18E+04	1.29E+04
AL-28	2.240 M	8.21E+03	8.41E+03	9.44E+03	1.05E+04	8.38E+03	7.79E+03	8.91E+03	8.22E+03	8.94E+03
SI-31	157.3 M	3.87E+00	3.85E+00	4.34E+00	4.80E+00	3.81E+00	3.51E+00	4.06E+03	3.74E+00	4.05E+00
SI-32	3.3E2 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P-32	14.29 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P-33	25.4 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S-35	87.44 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL-36	3.01E5 Y	3.05E-06	5.50E-13	2.43E-07	2.39E-04	3.97E-07	5.12E-09	7.54E-09	1.25E-06	3.65E-09
CL-38	37.21 M	7.08E+03	7.28E+03	8.15E+03	9.08E+03	7.27E+03	6.78E+03	7.73E+03	7.14E+03	7.78E+03
AR-37	35.02 D	4.86E-04	8.76E-11	3.87E-05	3.81E-02	6.33E-05	8.16E-07	1.20E-06	1.99E-04	5.82E-07
AR-39	269 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AR-41	1.827 H	5.60E+03	5.58E+03	6.29E+03	6.95E+03	5.52E+03	5.09E+03	5.88E+03	5.42E+03	5.87E+03
K-40	1.277E9 Y	6.80E+02	6.84E+02	7.71E+02	8.51E+02	6.78E+02	6.29E+02	7.22E+02	6.66E+02	7.22E+02
K-42	12.36 H	1.21E+03	1.22E+03	1.38E+03	1.52E+03	1.21E+03	1.13E+03	1.29E+03	1.19E+03	1.29E+03
K-43	22.6 H	4.23E+03	4.00E+03	4.45E+03	5.35E+03	3.92E+03	3.53E+03	4.16E+03	3.85E+03	4.16E+03
CA-41	1.03E5 Y	1.13E-03	2.03E-10	9.00E-05	8.84E-02	1.47E-04	1.89E-06	2.79E-06	4.63E-04	1.35E-06
CA-45	162.7 D	8.76E-09	8.07E-13	9.39E-10	4.19E-07	1.43E-09	7.56E-11	1.15E-11	4.36E-09	1.09E-10
CA-47	4.536 D	4.64E+03	4.61E+03	5.20E+03	5.76E+03	4.56E+03	4.20E+03	4.86E+03	4.47E+03	4.85E+03
CA-49	8.719 M	1.59E+04	1.64E+04	1.80E+04	2.07E+04	1.64E+04	1.55E+04	1.74E+04	1.62E+04	1.79E+04
SC-44	3.927 H	9.34E+03	9.06E+03	1.02E+04	1.16E+04	8.92E+03	8.11E+03	9.48E+03	8.74E+03	9.47E+03
SC-46	83.80 D	8.99E+03	8.79E+03	9.90E+03	1.10E+04	8.69E+03	7.92E+03	9.25E+03	8.50E+03	9.22E+03
SC-46M	18.72 S	3.79E+02	3.49E+02	3.74E+02	5.98E+02	3.44E+02	3.00E+02	3.68E+02	3.37E+02	3.55E+02
SC-47	3.422 D	4.64E+02	4.25E+02	4.55E+02	7.09E+02	4.18E+02	3.67E+02	4.45E+02	4.12E+02	4.33E+02
SC-48	43.67 H	1.49E+04	1.47E+04	1.65E+04	1.83E+04	1.45E+04	1.33E+04	1.55E+04	1.42E+04	1.54E+04
SC-49	57.4 M	4.78E+00	4.88E+00	5.48E+00	6.07E+00	4.86E+00	4.52E+00	5.17E+00	4.77E+00	5.18E+00
TI-44	47.3 Y	4.46E+02	4.76E+02	4.72E+02	9.51E+02	4.23E+02	3.78E+02	4.53E+02	4.03E+02	4.92E+02
TI-45	3.08 H	3.75E+03	3.56E+03	3.97E+03	4.73E+03	3.48E+03	3.13E+03	3.70E+03	3.41E+03	3.70E+03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
H-3	12.28 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE-7	53.44 D	2.01E+02	2.16E+02	2.52E+02	2.22E+02	1.92E+02	1.73E+02	2.56E+02	1.97E+02	1.99E+02
BE-10	1.6E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C-11	20.48 M	4.15E+03	4.45E+03	5.13E+03	4.56E+03	3.98E+03	3.57E+03	5.21E+03	4.05E+03	4.09E+03
C-14	5.73E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N-13	9.97 M	4.15E+03	4.45E+03	5.13E+03	4.56E+03	3.99E+03	3.57E+03	5.21E+03	4.05E+03	4.09E+03
N-16	7.13 S	2.46E+04	2.53E+04	2.65E+04	2.74E+04	2.22E+04	2.27E+04	2.69E+04	2.41E+04	2.51E+04
O-15	122.24 S	4.15E+03	4.46E+03	5.13E+03	4.56E+03	3.99E+03	3.57E+03	5.21E+03	4.06E+03	4.10E+03
F-18	109.74 M	4.02E+03	4.32E+03	4.97E+03	4.42E+03	3.86E+03	3.46E+03	5.05E+03	3.93E+03	3.97E+03
NA-22	2.602 Y	9.26E+03	9.86E+03	1.08E+04	1.00E+04	8.85E+03	8.00E+03	1.09E+04	8.99E+03	9.09E+03
NA-24	15.00 H	2.03E+04	2.13E+04	2.19E+04	2.17E+04	1.83E+04	1.78E+04	2.22E+04	1.95E+04	2.00E+04
MG-27	9.450 H	3.88E+03	4.13E+03	4.46E+03	4.19E+03	3.76E+03	3.35E+03	4.53E+03	3.76E+03	3.83E+03
MG-28	20.91 H	5.85E+03	6.21E+03	6.66E+03	6.28E+03	5.57E+03	5.06E+03	6.77E+03	5.66E+03	5.74E+03
AL-26	7.2E5 Y	1.22E+04	1.29E+04	1.37E+04	1.31E+04	1.13E+04	1.06E+04	1.40E+04	1.18E+04	1.19E+04
AL-28	2.240 M	8.44E+03	8.88E+03	9.15E+03	8.97E+03	7.76E+03	7.34E+03	9.31E+03	8.10E+03	8.21E+03
SI-31	157.3 M	3.84E+00	4.07E+00	4.28E+00	4.10E+00	3.66E+00	3.33E+00	4.35E+00	3.71E+00	3.76E+00
SI-32	3.3E2 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P-32	14.29 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P-33	25.4 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S-35	87.44 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL-36	3.01E5 Y	2.96E-08	2.41E-06	1.45E-06	7.91E-07	1.19E-06	1.78E-06	3.91E-06	6.88E-07	6.21E-07
CL-38	37.21 M	7.32E+03	7.69E+03	7.89E+03	7.79E+03	6.65E+03	6.38E+03	8.03E+03	7.01E+03	7.15E+03
AR-37	35.02 D	4.72E-06	3.84E-04	2.31E-04	1.26E-04	1.90E-04	2.84E-04	6.24E-04	1.10E-04	9.90E-05
AR-39	269 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AR-41	1.827 H	5.57E+03	5.89E+03	6.19E+03	5.94E+03	5.29E+03	4.82E+03	6.29E+03	5.38E+03	5.44E+03
K-40	1.277E9 Y	6.84E+02	7.22E+02	7.54E+02	7.28E+02	6.43E+02	5.94E+02	7.66E+02	6.60E+02	6.66E+02
K-42	12.36 H	1.22E+03	1.29E+03	1.35E+03	1.30E+03	1.15E+03	1.06E+03	1.37E+03	1.18E+03	1.19E+03
K-43	22.6 H	3.98E+03	4.27E+03	4.94E+03	4.38E+03	3.80E+03	3.43E+03	5.03E+03	3.89E+03	3.93E+03
CA-41	1.03E5 Y	1.10E-05	8.92E-04	5.35E-04	2.93E-04	4.42E-04	6.59E-04	1.45E-03	2.54E-04	2.30E-04
CA-45	162.7 D	3.00E-10	7.92E-09	6.84E-09	2.65E-09	4.08E-09	5.30E-09	1.29E-08	2.76E-09	2.71E-09
CA-47	4.536 D	4.60E+03	4.87E+03	5.14E+03	4.92E+03	4.38E+03	3.98E+03	5.23E+03	4.45E+03	4.50E+03
CA-49	8.719 M	1.65E+04	1.71E+04	1.75E+04	1.77E+04	1.45E+04	1.46E+04	1.78E+04	1.58E+04	1.64E+04
SC-44	3.927 H	9.02E+03	9.62E+03	1.06E+04	9.77E+03	8.65E+03	7.79E+03	1.07E+04	8.76E+03	8.87E+03
SC-46	83.80 D	8.74E+03	9.30E+03	9.93E+03	9.41E+03	8.45E+03	7.56E+03	1.01E+04	8.47E+03	8.62E+03
SC-464	18.72 S	3.49E+02	3.84E+02	5.84E+02	3.52E+02	3.02E+02	2.90E+02	6.00E+02	3.48E+02	3.45E+02
SC-47	3.422 D	4.24E+02	4.65E+02	6.87E+02	4.41E+02	3.68E+02	3.56E+02	7.05E+02	4.24E+02	4.20E+02
SC-48	43.67 H	1.46E+04	1.55E+04	1.65E+04	1.57E+04	1.40E+04	1.26E+04	1.68E+04	1.41E+04	1.44E+04
SC-49	57.4 M	4.90E+00	5.15E+00	5.32E+00	5.20E+00	4.51E+00	4.25E+00	5.41E+00	4.70E+00	4.76E+00
TI-44	47.3 Y	4.71E+02	5.20E+02	9.11E+02	3.31E+02	3.88E+02	3.20E+02	9.36E+02	4.33E+02	4.42E+02
TI-45	3.08 H	3.54E+03	3.80E+03	4.38E+03	3.89E+03	3.40E+03	3.05E+03	4.45E+03	3.46E+03	3.49E+03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
H-3	12.28 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE-7	53.44 D	2.91E+02	2.19E+02	2.69E+02	1.76E+02	2.49E+02	3.31E+02	0.0	3.31E+02
BE-10	1.6E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	1.10E+03	1.10E+03
C-11	20.48 M	5.98E+03	4.52E+03	5.53E+03	3.62E+03	5.11E+03	6.83E+03	2.65E+03	9.48E+03
C-14	5.73E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	2.91E+01	2.91E+01
N-13	9.97 M	5.98E+03	4.52E+03	5.53E+03	3.62E+03	5.11E+03	6.83E+03	3.54E+03	1.04E+04
N-16	7.13 S	3.38E+04	2.75E+04	3.06E+04	2.18E+04	2.93E+04	3.55E+04	2.25E+04	5.80E+04
O-15	122.24 S	5.98E+03	4.53E+03	5.54E+03	3.63E+03	5.12E+03	6.84E+03	5.58E+03	1.24E+04
F-18	109.74 M	5.79E+03	4.39E+03	5.36E+03	3.51E+03	4.95E+03	6.62E+03	1.46E+03	8.08E+03
NA-22	2.602 Y	1.31E+04	1.02E+04	1.23E+04	8.16E+03	1.12E+04	1.50E+04	1.10E+03	1.61E+04
NA-24	15.00 H	2.77E+04	2.19E+04	2.54E+04	1.82E+04	2.39E+04	3.10E+04	4.05E+03	3.50E+04
MG-27	9.458 M	5.47E+03	4.36E+03	5.21E+03	3.38E+03	4.68E+03	6.32E+03	5.29E+03	1.16E+04
MG-28	20.91 H	8.21E+03	6.51E+03	7.76E+03	5.17E+03	7.03E+03	9.46E+03	7.06E+02	1.02E+04
AL-26	7.2E5 Y	1.69E+04	1.32E+04	1.57E+04	1.09E+04	1.45E+04	1.92E+04	2.88E+03	2.21E+04
AL-28	2.240 M	1.15E+04	9.12E+03	1.07E+04	7.62E+03	9.92E+03	1.31E+04	9.87E+03	2.30E+04
SI-31	157.3 M	5.34E+00	4.28E+00	5.07E+00	3.40E+00	4.58E+00	6.14E+00	4.39E+03	4.40E+03
SI-32	3.3E2 Y	0.0	0.0	0.0	0.0	0.0	0.0	9.72E+01	9.72E+01
P-32	14.29 D	0.0	0.0	0.0	0.0	0.0	0.0	5.23E+03	5.23E+03
P-33	25.4 D	0.0	0.0	0.0	0.0	0.0	0.0	1.63E+02	1.63E+02
S-35	87.44 D	0.0	0.0	0.0	0.0	0.0	0.0	3.59E+01	3.59E+01
CL-36	3.01E5 Y	2.21E-05	5.09E-10	1.52E-06	2.22E-10	4.24E-05	5.09E-04	1.50E+03	1.50E+03
CL-38	37.21 M	9.95E+03	7.86E+03	9.18E+03	6.62E+03	8.59E+03	1.13E+04	1.24E+04	2.37E+04
AR-37	35.02 D	3.53E-03	8.12E-08	2.43E-04	3.54E-08	6.76E-03	8.12E-02	0.0	8.12E-02
AR-39	269 Y	0.0	0.0	0.0	0.0	0.0	0.0	1.26E+03	1.26E+03
AR-41	1.827 H	7.74E+03	6.19E+03	7.34E+03	4.94E+03	6.63E+03	8.89E+03	3.30E+03	1.22E+04
K-40	1.277E9 Y	9.45E+02	7.54E+02	8.90E+02	6.11E+02	8.11E+02	1.08E+03	3.28E+03	4.36E+03
K-42	12.36 H	1.69E+03	1.34E+03	1.58E+03	1.10E+03	1.45E+03	1.93E+03	1.15E+04	1.35E+04
K-43	22.6 H	5.73E+03	4.38E+03	5.36E+03	3.48E+03	4.91E+03	6.54E+03	1.97E+03	8.51E+03
CA-41	1.03E5 Y	8.19E-03	1.88E-07	5.64E-04	8.23E-08	1.57E-02	1.88E-01	0.0	1.88E-01
CA-45	162.7 D	6.11E-08	2.77E-11	7.69E-09	1.03E-12	8.17E-08	7.85E-07	1.70E+02	1.70E+02
CA-47	4.536 D	6.40E+03	5.11E+03	6.07E+03	4.07E+03	5.49E+03	7.36E+03	2.30E+03	9.66E+03
CA-49	8.719 M	2.24E+04	1.76E+04	2.01E+04	1.47E+04	1.93E+04	2.45E+04	6.73E+03	3.12E+04
SC-44	3.927 H	1.28E+04	9.98E+03	1.20E+04	7.91E+03	1.09E+04	1.47E+04	4.47E+03	1.91E+04
SC-46	83.80 D	1.23E+04	9.82E+03	1.17E+04	7.65E+03	1.05E+04	1.42E+04	4.04E+02	1.46E+04
SC-46M	18.72 S	5.35E+02	4.12E+02	5.28E+02	3.07E+02	4.73E+02	5.73E+02	1.73E+02	7.45E+02
SC-47	3.422 D	6.43E+02	4.95E+02	6.31E+02	3.74E+02	5.69E+02	6.94E+02	7.98E+02	1.49E+03
SC-48	43.67 H	2.04E+04	1.64E+04	1.95E+04	1.28E+04	1.75E+04	2.36E+04	1.26E+03	2.48E+04
SC-49	57.4 M	6.69E+00	5.31E+00	6.23E+00	4.41E+00	5.76E+00	7.62E+00	6.31E+03	6.32E+03
TI-44	47.3 Y	7.94E+02	6.18E+02	7.88E+02	3.79E+02	6.73E+02	8.60E+02	1.34E-01	8.60E+02
TI-45	3.08 H	5.10E+03	3.86E+03	4.72E+03	3.09E+03	4.36E+03	5.83E+03	2.64E+03	8.47E+03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
TI-51	5.752 M	1.60E+03	1.49E+03	1.64E+03	2.09E+03	1.46E+03	1.31E+03	1.55E+03	1.44E+03	1.55E+03
V-48	15.971 D	1.29E+04	1.26E+04	1.42E+04	1.59E+04	1.25E+04	1.14E+04	1.33E+04	1.22E+04	1.33E+04
V-49	330 D	3.39E-03	6.10E-10	2.70E-04	2.65E-01	4.41E-04	5.69E-06	8.37E-06	1.39E-03	4.06E-06
V-52	3.75 M	6.29E+03	6.33E+03	7.13E+03	7.87E+03	6.27E+03	5.81E+03	6.67E+03	6.15E+03	6.67E+03
CR-49	42.09 M	4.46E+03	4.24E+03	4.70E+03	5.82E+03	4.14E+03	3.71E+03	4.39E+03	4.05E+03	4.39E+03
CR-51	27.704 D	1.36E+02	1.25E+02	1.37E+02	1.80E+02	1.22E+02	1.10E+02	1.29E+02	1.21E+02	1.29E+02
MN-52	5.591 D	1.53E+04	1.50E+04	1.69E+04	1.89E+04	1.48E+04	1.35E+04	1.58E+04	1.45E+04	1.57E+04
MN-52M	21.4 M	1.04E+04	1.03E+04	1.15E+04	1.31E+04	1.01E+04	9.26E+03	1.08E+04	9.92E+03	1.07E+04
MN-53	3.7E6 Y	6.27E-03	1.13E-09	5.00E-04	4.91E-01	8.17E-04	1.05E-05	1.55E-05	2.57E-03	7.52E-06
MN-54	312.7 D	3.76E+03	3.63E+03	4.09E+03	4.59E+03	3.58E+03	3.25E+03	3.81E+03	3.51E+03	3.80E+03
MN-56	2.5785 H	7.84E+03	7.83E+03	8.78E+03	9.81E+03	7.78E+03	7.15E+03	8.27E+03	7.62E+03	8.29E+03
MN-57	1.47 M	3.12E+02	3.00E+02	3.33E+02	4.16E+02	2.95E+02	2.66E+02	3.14E+02	2.89E+02	3.12E+02
FE-52	8.275 H	3.17E+03	2.98E+03	3.29E+03	4.16E+03	2.92E+03	2.61E+03	3.10E+03	2.86E+03	3.08E+03
FE-55	2.7 Y	8.25E-03	1.49E-09	6.58E-04	6.46E-01	1.07E-03	1.39E-05	2.04E-05	3.39E-03	9.89E-06
FE-59	44.63 D	5.24E+03	5.18E+03	5.84E+03	6.47E+03	5.13E+03	4.71E+03	5.46E+03	5.02E+03	5.44E+03
CO-56	78.76 D	1.67E+04	1.67E+04	1.87E+04	2.10E+04	1.66E+04	1.53E+04	1.76E+04	1.53E+04	1.77E+04
CO-57	270.9 D	4.97E+02	4.64E+02	4.95E+02	8.24E+02	4.56E+02	3.95E+02	4.90E+02	4.44E+02	4.71E+02
CO-58	70.80 D	4.35E+03	4.19E+03	4.71E+03	5.35E+03	4.13E+03	3.73E+03	4.39E+03	4.04E+03	4.38E+03
CO-58M	9.15 H	1.46E-02	3.02E-03	2.11E-03	9.47E-01	2.81E-03	1.29E-03	3.80E-03	7.01E-03	5.84E-03
CO-60	5.271 Y	1.10E+04	1.09E+04	1.23E+04	1.36E+04	1.08E+04	9.94E+03	1.15E+04	1.06E+04	1.15E+04
CO-60M	10.47 M	1.73E+01	1.77E+01	1.92E+01	2.63E+01	1.69E+01	1.56E+01	1.81E+01	1.66E+01	1.88E+01
CO-61	1.650 H	3.19E+02	3.32E+02	3.44E+02	5.68E+02	3.04E+02	2.75E+02	3.25E+02	2.94E+02	3.47E+02
NI-56	6.10 D	7.62E+03	7.32E+03	8.17E+03	9.65E+03	7.21E+03	6.52E+03	7.67E+03	7.07E+03	7.64E+03
NI-57	36.08 H	8.47E+03	8.44E+03	9.48E+03	1.07E+04	8.35E+03	7.69E+03	8.88E+03	8.19E+03	8.88E+03
NI-59	7.5E4 Y	1.39E-02	2.50E-09	1.11E-03	1.09E+00	1.80E-03	2.33E-05	3.43E-05	5.69E-03	1.66E-05
NI-63	100.1 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NI-65	2.520 H	2.41E+03	2.40E+03	2.71E+03	3.01E+03	2.38E+03	2.20E+03	2.53E+03	2.34E+03	2.53E+03
CU-61	3.408 H	3.56E+03	3.39E+03	3.78E+03	4.49E+03	3.32E+03	2.99E+03	3.52E+03	3.25E+03	3.52E+03
CU-62	9.74 M	4.34E+03	4.12E+03	4.59E+03	5.47E+03	4.03E+03	3.63E+03	4.28E+03	3.95E+03	4.28E+03
CU-64	12.701 H	8.16E+02	7.76E+02	8.65E+02	1.03E+03	7.59E+02	6.83E+02	8.05E+02	7.44E+02	8.05E+02
CU-67	61.88 D	4.80E+02	4.44E+02	4.73E+02	7.39E+02	4.32E+02	3.82E+02	4.60E+02	4.26E+02	4.55E+02
ZN-62	9.26 H	1.93E+03	1.84E+03	2.04E+03	2.46E+03	1.79E+03	1.61E+03	1.91E+03	1.76E+03	1.91E+03
ZN-65	244.4 D	2.58E+03	2.53E+03	2.86E+03	3.17E+03	2.51E+03	2.29E+03	2.67E+03	2.45E+03	2.66E+03
ZN-69	55.6 M	2.58E-02	2.42E-02	2.67E-02	3.32E-02	2.36E-02	2.12E-02	2.50E-02	2.32E-02	2.50E-02
ZN-69M	13.76 H	1.79E+03	1.68E+03	1.86E+03	2.29E+03	1.64E+03	1.48E+03	1.74E+03	1.62E+03	1.74E+03
GA-66	9.40 H	1.17E+04	1.18E+04	1.31E+04	1.50E+04	1.17E+04	1.09E+04	1.25E+04	1.15E+04	1.26E+04
GA-67	3.261 D	6.02E+02	5.63E+02	6.04E+02	8.99E+02	5.46E+02	4.85E+02	5.81E+02	5.37E+02	5.78E+02
GA-68	68.0 M	4.10E+03	3.90E+03	4.35E+03	5.16E+03	3.81E+03	3.43E+03	4.05E+03	3.74E+03	4.04E+03
GA-72	14.1 H	1.27E+04	1.27E+04	1.42E+04	1.60E+04	1.26E+04	1.16E+04	1.34E+04	1.24E+04	1.35E+04
GE-68	288 D	3.28E-02	7.42E-09	2.63E-03	2.54E+00	4.29E-03	5.73E-05	7.74E-05	1.35E-02	4.16E-05

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
TI-51	5.752 M	1.49E+03	1.60E+03	1.95E+03	1.65E+03	1.38E+03	1.28E+03	1.98E+03	1.46E+03	1.47E+03
V-48	15.971 D	1.26E+04	1.34E+04	1.44E+04	1.36E+04	1.21E+04	1.09E+04	1.46E+04	1.22E+04	1.24E+04
V-49	330 D	3.29E-05	2.68E-03	1.61E-03	8.79E-04	1.33E-03	1.98E-03	4.35E-03	7.64E-04	6.90E-04
V-52	3.75 M	6.32E+03	6.68E+03	6.98E+03	6.73E+03	5.95E+03	5.49E+03	7.09E+03	6.10E+03	6.16E+03
CR-49	42.09 M	4.22E+03	4.54E+03	5.42E+03	4.55E+03	4.01E+03	3.60E+03	5.51E+03	4.12E+03	4.16E+03
CR-51	27.704 D	1.25E+02	1.35E+02	1.69E+02	1.39E+02	1.15E+02	1.08E+02	1.72E+02	1.23E+02	1.23E+02
MN-52	5.591 D	1.49E+04	1.59E+04	1.70E+04	1.61E+04	1.43E+04	1.29E+04	1.73E+04	1.45E+04	1.47E+04
MN-52M	21.4 M	1.02E+04	1.09E+04	1.18E+04	1.10E+04	9.71E+03	8.85E+03	1.20E+04	9.92E+03	1.00E+04
MN-53	3.7E6 Y	6.10E-05	4.96E-03	2.98E-03	1.63E-03	2.46E-03	3.66E-03	8.05E-03	1.41E-03	1.28E-03
MN-54	312.7 D	3.61E+03	3.85E+03	4.18E+03	3.91E+03	3.51E+03	3.12E+03	4.25E+03	3.50E+03	3.57E+03
MN-56	2.5785 H	7.83E+03	8.29E+03	8.72E+03	8.40E+03	7.35E+03	6.79E+03	8.87E+03	7.54E+03	7.69E+03
MN-57	1.47 M	2.99E+02	3.21E+02	3.83E+02	3.17E+02	2.80E+02	2.55E+02	3.91E+02	2.91E+02	2.94E+02
FE-52	8.275 H	2.97E+03	3.20E+03	3.89E+03	3.23E+03	2.79E+03	2.54E+03	3.96E+03	2.91E+03	2.93E+03
FE-55	2.7 Y	8.02E-05	6.52E-03	3.92E-03	2.14E-03	3.23E-03	4.82E-03	1.06E-02	1.86E-03	1.68E-03
FE-59	44.63 D	5.16E+03	5.48E+03	5.80E+03	5.53E+03	4.94E+03	4.47E+03	5.89E+03	4.99E+03	5.06E+03
CO-56	78.76 D	1.67E+04	1.76E+04	1.85E+04	1.79E+04	1.55E+04	1.45E+04	1.88E+04	1.61E+04	1.64E+04
CO-57	270.9 D	4.63E+02	5.12E+02	8.04E+02	4.47E+02	4.00E+02	3.77E+02	8.27E+02	4.61E+02	4.58E+02
CO-58	70.80 D	4.17E+03	4.45E+03	4.88E+03	4.53E+03	4.04E+03	3.59E+03	4.96E+03	4.05E+03	4.12E+03
CO-58M	9.15 H	2.13E-03	1.29E-02	1.12E-02	4.30E-03	7.07E-03	8.62E-03	2.12E-02	4.71E-03	4.76E-03
CO-60	5.271 Y	1.09E+04	1.15E+04	1.21E+04	1.16E+04	1.04E+04	9.42E+03	1.23E+04	1.05E+04	1.06E+04
CO-60M	10.47 M	1.76E+01	1.88E+01	2.25E+01	1.72E+01	1.62E+01	1.44E+01	2.29E+01	1.67E+01	1.70E+01
CO-61	1.650 H	3.29E+02	3.57E+02	5.27E+02	2.77E+02	2.90E+02	2.44E+02	5.40E+02	3.06E+02	3.13E+02
NI-56	6.10 D	7.29E+03	7.80E+03	8.85E+03	7.88E+03	6.94E+03	6.28E+03	9.01E+03	7.09E+03	7.19E+03
NI-57	36.08 H	8.43E+03	8.93E+03	9.54E+03	9.03E+03	7.93E+03	7.30E+03	9.69E+03	8.15E+03	8.24E+03
NI-59	7.5E4 Y	1.35E-04	1.10E-02	6.58E-03	3.60E-03	5.43E-03	8.10E-03	1.78E-02	3.13E-03	2.83E-03
NI-63	100.1 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NI-65	2.520 H	2.40E+03	2.54E+03	2.68E+03	2.57E+03	2.27E+03	2.08E+03	2.72E+03	2.32E+03	2.35E+03
CU-61	3.408 H	3.37E+03	3.61E+03	4.15E+03	3.69E+03	3.23E+03	2.90E+03	4.21E+03	3.29E+03	3.32E+03
CU-62	9.74 M	4.10E+03	4.40E+03	5.06E+03	4.50E+03	3.94E+03	3.53E+03	5.14E+03	4.00E+03	4.04E+03
CU-64	12.701 H	7.72E+02	8.28E+02	9.50E+02	8.47E+02	7.41E+02	6.64E+02	9.65E+02	7.53E+02	7.61E+02
CU-67	61.88 D	4.43E+02	4.85E+02	7.09E+02	4.56E+02	3.85E+02	3.69E+02	7.26E+02	4.39E+02	4.36E+02
ZN-62	9.26 H	1.83E+03	1.96E+03	2.26E+03	1.99E+03	1.75E+03	1.57E+03	2.29E+03	1.78E+03	1.80E+03
ZN-65	244.4 D	2.52E+03	2.68E+03	2.85E+03	2.71E+03	2.43E+03	2.18E+03	2.89E+03	2.44E+03	2.48E+03
ZN-69	55.6 M	2.41E-02	2.59E-02	3.09E-02	2.67E-02	2.27E-02	2.08E-02	3.14E-02	2.36E-02	2.37E-02
ZN-69M	13.76 H	1.67E+03	1.80E+03	2.13E+03	1.85E+03	1.59E+03	1.44E+03	2.16E+03	1.64E+03	1.65E+03
GA-66	9.40 H	1.18E+04	1.24E+04	1.31E+04	1.28E+04	1.08E+04	1.04E+04	1.33E+04	1.14E+04	1.17E+04
GA-67	3.261 D	5.60E+02	6.11E+02	8.54E+02	5.81E+02	4.99E+02	4.68E+02	8.74E+02	5.52E+02	5.52E+02
GA-68	68.0 M	3.88E+03	4.16E+03	4.77E+03	4.25E+03	3.72E+03	3.34E+03	4.84E+03	3.78E+03	3.82E+03
GA-72	14.1 H	1.27E+04	1.34E+04	1.41E+04	1.36E+04	1.18E+04	1.10E+04	1.44E+04	1.22E+04	1.25E+04
GE-68	288 D	3.28E-04	2.60E-02	1.58E-02	8.54E-03	1.29E-02	1.92E-02	4.22E-02	7.45E-03	6.75E-03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
TI-51	5.752 M	2.16E+03	1.65E+03	2.03E+03	1.31E+03	1.87E+03	2.43E+03	6.67E+03	9.11E+03
V-48	15.971 D	1.77E+04	1.40E+04	1.67E+04	1.11E+04	1.51E+04	2.03E+04	9.32E+02	2.13E+04
V-49	330 D	2.46E-02	5.66E-07	1.69E-03	2.47E-07	4.71E-02	5.66E-01	0.0	5.66E-01
V-52	3.75 M	8.74E+03	6.98E+03	8.25E+03	5.64E+03	7.50E+03	1.00E+04	8.40E+03	1.84E+04
CR-49	42.09 M	6.13E+03	4.65E+03	5.72E+03	3.68E+03	5.25E+03	6.97E+03	4.45E+03	1.14E+04
CR-51	27.704 D	1.82E+02	1.37E+02	1.71E+02	1.10E+02	1.58E+02	2.05E+02	0.0	2.05E+02
MN-52	5.591 D	2.10E+04	1.66E+04	1.98E+04	1.32E+04	1.79E+04	2.41E+04	4.22E+02	2.45E+04
MN-52M	21.4 M	1.44E+04	1.12E+04	1.35E+04	9.06E+03	1.23E+04	1.65E+04	8.96E+03	2.54E+04
MN-53	3.7E6 Y	4.55E-02	1.05E-06	3.14E-03	4.58E-07	8.72E-02	1.05E+00	0.0	1.05E+00
MN-54	312.7 D	5.11E+03	4.05E+03	4.86E+03	3.14E+03	4.37E+03	5.91E+03	0.0	5.91E+03
MN-56	2.5785 H	1.08E+04	8.59E+03	1.02E+04	6.96E+03	9.31E+03	1.24E+04	6.39E+03	1.88E+04
MN-57	1.47 M	4.31E+02	3.36E+02	4.10E+02	2.62E+02	3.71E+02	4.92E+02	8.68E+03	9.17E+03
FE-52	8.275 H	4.32E+03	3.28E+03	4.05E+03	2.60E+03	3.72E+03	4.88E+03	1.30E+03	6.17E+03
FE-55	2.7 Y	5.99E-02	1.38E-06	4.13E-03	6.02E-07	1.15E-01	1.38E+00	0.0	1.38E+00
FE-59	44.63 D	7.20E+03	5.77E+03	6.86E+03	4.55E+03	6.17E+03	8.30E+03	4.65E+02	8.76E+03
CO-56	78.76 D	2.31E+04	1.83E+04	2.15E+04	1.48E+04	1.99E+04	2.62E+04	8.93E+02	2.71E+04
CO-57	270.9 D	7.22E+02	5.57E+02	7.16E+02	4.03E+02	6.36E+02	7.75E+02	1.12E+01	7.86E+02
CO-58	70.80 D	5.91E+03	4.65E+03	5.60E+03	3.63E+03	5.05E+03	6.83E+03	1.63E+02	6.99E+03
CO-58M	9.15 H	9.93E-02	2.79E-03	1.34E-02	5.29E-04	1.73E-01	2.00E+00	0.0	2.00E+00
CO-60	5.271 Y	1.51E+04	1.21E+04	1.44E+04	9.63E+03	1.30E+04	1.74E+04	2.93E+02	1.77E+04
CO-60M	10.47 M	2.60E+01	2.04E+01	2.46E+01	1.51E+01	2.21E+01	3.17E+01	1.05E+01	4.22E+01
CO-61	1.650 H	5.22E+02	4.08E+02	5.08E+02	2.70E+02	4.41E+02	5.84E+02	3.28E+03	3.86E+03
NI-56	6.10 D	1.04E+04	8.14E+03	9.85E+03	6.38E+03	8.92E+03	1.19E+04	8.73E+00	1.19E+04
NI-57	36.08 H	1.17E+04	9.25E+03	1.10E+04	7.51E+03	1.01E+04	1.34E+04	9.34E+02	1.43E+04
NI-59	7.5E4 Y	1.01E-01	2.32E-06	6.93E-03	1.01E-06	1.93E-01	2.32E+00	0.0	2.32E+00
NI-63	100.1 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NI-65	2.520 H	3.33E+03	2.66E+03	3.15E+03	2.13E+03	2.86E+03	3.82E+03	4.72E+03	8.54E+03
CU-61	3.408 H	4.84E+03	3.69E+03	4.51E+03	2.95E+03	4.15E+03	5.54E+03	2.23E+03	7.77E+03
CU-62	9.74 M	5.90E+03	4.47E+03	5.47E+03	3.58E+03	5.05E+03	6.75E+03	1.03E+04	1.70E+04
CU-64	12.701 H	1.11E+03	8.42E+02	1.03E+03	6.74E+02	9.49E+02	1.27E+03	6.93E+02	1.96E+03
CU-67	61.88 D	6.74E+02	5.17E+02	6.57E+02	3.88E+02	5.92E+02	7.33E+02	6.45E+02	1.38E+03
ZN-62	9.26 H	2.64E+03	2.01E+03	2.46E+03	1.59E+03	2.26E+03	3.04E+03	1.20E+02	3.16E+03
ZN-65	244.4 D	3.53E+03	2.83E+03	3.37E+03	2.22E+03	3.02E+03	4.08E+03	8.38E+00	4.08E+03
ZN-69	55.6 M	3.49E-02	2.63E-02	3.24E-02	2.11E-02	3.00E-02	3.96E-02	2.10E+03	2.10E+03
ZN-69M	13.76 H	2.42E+03	1.83E+03	2.25E+03	1.47E+03	2.08E+03	2.75E+03	1.53E+02	2.91E+03
GA-66	9.40 H	1.63E+04	1.28E+04	1.50E+04	1.05E+04	1.41E+04	1.83E+04	7.80E+03	2.61E+04
GA-67	3.261 D	8.46E+02	6.46E+02	8.14E+02	4.89E+02	7.37E+02	9.36E+02	1.39E+01	9.50E+02
GA-68	68.0 M	5.58E+03	4.23E+03	5.17E+03	3.39E+03	4.77E+03	6.38E+03	5.67E+03	1.21E+04
GA-72	14.1 H	1.76E+04	1.39E+04	1.64E+04	1.13E+04	1.51E+04	2.00E+04	3.62E+03	2.36E+04
GE-68	288 D	2.38E-01	5.95E-06	1.66E-02	2.36E-06	4.52E-01	5.41E+00	0.0	5.41E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
GE-71	11.8 D	3.32E-02	7.51E-09	2.66E-03	2.57E+00	4.34E-03	5.79E-05	7.83E-05	1.37E-02	4.21E-05
GE-77	11.30 H	4.67E+03	4.47E+03	4.95E+03	6.02E+03	4.39E+03	3.98E+03	4.66E+03	4.32E+03	4.65E+03
AS-72	26.0 H	7.89E+03	7.60E+03	8.50E+03	9.83E+03	7.47E+03	6.76E+03	7.94E+03	7.32E+03	7.93E+03
AS-73	80.30 D	1.23E+01	1.45E+01	1.25E+01	4.05E+01	1.10E+01	1.05E+01	1.25E+01	1.10E+01	1.62E+01
AS-74	17.77 D	3.33E+03	3.18E+03	3.55E+03	4.16E+03	3.11E+03	2.80E+03	3.30E+03	3.05E+03	3.30E+03
AS-76	26.32 H	1.89E+03	1.83E+03	2.05E+03	2.36E+03	1.80E+03	1.63E+03	1.91E+03	1.76E+03	1.91E+03
AS-77	38.8 H	3.70E+01	3.44E+01	3.75E+01	5.02E+01	3.35E+01	3.00E+01	3.55E+01	3.31E+01	3.55E+01
SE-73	7.15 H	4.64E+03	4.40E+03	4.86E+03	6.07E+03	4.28E+03	3.85E+03	4.54E+03	4.20E+03	4.56E+03
SE-75	119.78 D	1.65E+03	1.52E+03	1.65E+03	2.36E+03	1.49E+03	1.32E+03	1.58E+03	1.47E+03	1.56E+03
SE-79	6.5E4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BR-77	57.04 H	1.37E+03	1.29E+03	1.42E+03	1.77E+03	1.26E+03	1.13E+03	1.34E+03	1.24E+03	1.33E+03
BR-80	17.4 H	3.27E+02	3.12E+02	3.49E+02	4.07E+02	3.06E+02	2.75E+02	3.25E+02	2.99E+02	3.24E+02
BR-80M	4.42 H	1.49E+01	2.21E+01	1.13E+01	7.32E+01	1.06E+01	1.19E+01	1.69E+01	1.27E+01	3.02E+01
BR-82	35.30 H	1.17E+04	1.14E+04	1.28E+04	1.45E+04	1.12E+04	1.02E+04	1.19E+04	1.10E+04	1.19E+04
BR-83	2.39 H	3.22E+01	3.06E+01	3.42E+01	4.05E+01	3.00E+01	2.69E+01	3.18E+01	2.93E+01	3.18E+01
BR-84	31.80 M	8.52E+03	8.62E+03	9.58E+03	1.09E+04	8.59E+03	8.00E+03	9.13E+03	8.46E+03	9.26E+03
BR-85	172 S	2.99E+02	2.91E+02	3.27E+02	3.67E+02	2.88E+02	2.62E+02	3.06E+02	2.82E+02	3.06E+02
KR-79	35.04 H	1.09E+03	1.03E+03	1.14E+03	1.41E+03	1.01E+03	9.08E+02	1.07E+03	9.92E+02	1.07E+03
KR-81	2.1E5 Y	4.29E+01	3.93E+01	4.26E+01	6.36E+01	3.83E+01	3.43E+01	4.05E+01	3.81E+01	4.05E+01
KR-83M	1.83 H	5.94E-02	1.56E-02	1.23E-02	2.31E+00	1.49E-02	8.31E-03	1.24E-02	3.36E-02	2.54E-02
KR-85	10.72 Y	9.62E+00	9.13E+00	1.02E+01	1.21E+01	8.93E+00	8.03E+00	9.48E+00	8.75E+00	9.47E+00
KR-85M	4.48 H	6.72E+02	6.17E+02	6.64E+02	1.00E+03	6.07E+02	5.34E+02	6.45E+02	5.97E+02	6.30E+02
KR-87	76.3 M	3.73E+03	3.74E+03	4.15E+03	4.79E+03	3.72E+03	3.44E+03	3.95E+03	3.66E+03	3.98E+03
KR-88	2.84 H	9.36E+03	9.57E+03	1.07E+04	1.20E+04	9.55E+03	8.89E+03	1.02E+04	9.39E+03	1.02E+04
KR-89	3.16 M	8.51E+03	8.54E+03	9.50E+03	1.08E+04	8.48E+03	7.86E+03	9.01E+03	8.34E+03	9.10E+03
KR-90	32.32 S	5.67E+03	5.61E+03	6.28E+03	7.18E+03	5.55E+03	5.09E+03	5.90E+03	5.44E+03	5.90E+03
RB-81	4.58 H	2.61E+03	2.46E+03	2.71E+03	3.41E+03	2.40E+03	2.15E+03	2.55E+03	2.36E+03	2.54E+03
RB-82	1.25 M	4.74E+03	4.51E+03	5.03E+03	5.95E+03	4.41E+03	3.97E+03	4.68E+03	4.32E+03	4.68E+03
RB-83	86.2 D	2.16E+03	2.05E+03	2.29E+03	2.71E+03	2.00E+03	1.80E+03	2.13E+03	1.96E+03	2.13E+03
RB-84	32.9 D	3.99E+03	3.85E+03	4.32E+03	4.92E+03	3.79E+03	3.43E+03	4.03E+03	3.71E+03	4.02E+03
RB-86	18.66 D	4.22E+02	4.14E+02	4.67E+02	5.17E+02	4.10E+02	3.75E+02	4.37E+02	4.01E+02	4.35E+02
RB-87	4.73E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RB-88	17.8 M	2.98E+03	3.03E+03	3.39E+03	3.78E+03	3.02E+03	2.80E+03	3.21E+03	2.96E+03	3.23E+03
RB-89	15.44 M	9.55E+03	9.58E+03	1.07E+04	1.20E+04	9.52E+03	8.79E+03	1.01E+04	9.35E+03	1.02E+04
RB-90	157 S	1.07E+04	1.08E+04	1.19E+04	1.38E+04	1.08E+04	1.02E+04	1.15E+04	1.07E+04	1.19E+04
RB-90M	258 S	1.55E+04	1.57E+04	1.74E+04	1.98E+04	1.56E+04	1.45E+04	1.66E+04	1.54E+04	1.69E+04
SR-82	25.0 D	2.19E-01	3.92E-04	2.81E-02	8.24E+00	4.08E-02	4.33E-03	8.29E-04	1.18E-01	9.39E-03
SR-85	64.84 D	2.20E+03	2.09E+03	2.33E+03	2.78E+03	2.04E+03	1.84E+03	2.17E+03	2.00E+03	2.17E+03
SR-85M	67.66 M	9.26E+02	8.45E+02	9.08E+02	1.31E+03	8.25E+02	7.36E+02	8.73E+02	8.20E+02	8.69E+02
SR-87M	2.805 H	1.37E+03	1.28E+03	1.41E+03	1.78E+03	1.25E+03	1.13E+03	1.33E+03	1.23E+03	1.33E+03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
GE-71	11.8 D	3.32E-04	2.63E-02	1.59E-02	8.64E-03	1.30E-02	1.94E-02	4.27E-02	7.54E-03	6.83E-03
GE-77	11.30 H	4.45E+03	4.76E+03	5.53E+03	4.85E+03	4.18E+03	3.84E+03	5.63E+03	4.35E+03	4.38E+03
AS-72	26.0 H	7.56E+03	8.08E+03	8.99E+03	8.24E+03	7.26E+03	6.52E+03	9.14E+03	7.35E+03	7.46E+03
AS-73	80.30 D	1.39E+01	1.55E+01	2.80E+01	7.76E+00	1.13E+01	8.35E+00	2.88E+01	1.19E+01	1.25E+01
AS-74	17.77 D	3.16E+03	3.38E+03	3.84E+03	3.46E+03	3.05E+03	2.72E+03	3.90E+03	3.08E+03	3.12E+03
AS-76	26.32 H	1.82E+03	1.94E+03	2.15E+03	1.98E+03	1.75E+03	1.57E+03	2.19E+03	1.77E+03	1.79E+03
AS-77	38.8 H	3.42E+01	3.70E+01	4.71E+01	3.75E+01	3.14E+01	2.94E+01	4.80E+01	3.37E+01	3.38E+01
SE-73	7.15 H	4.38E+03	4.71E+03	5.64E+03	4.75E+03	4.14E+03	3.74E+03	5.73E+03	4.27E+03	4.31E+03
SE-75	119.78 D	1.52E+03	1.65E+03	2.24E+03	1.63E+03	1.36E+03	1.29E+03	2.29E+03	1.50E+03	1.50E+03
SE-79	6.5E4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BR-77	57.04 H	1.28E+03	1.38E+03	1.64E+03	1.40E+03	1.21E+03	1.10E+03	1.67E+03	1.25E+03	1.26E+03
BR-80	17.4 H	3.10E+02	3.32E+02	3.75E+02	3.39E+02	2.99E+02	2.67E+02	3.81E+02	3.02E+02	3.06E+02
BR-80M	4.42 H	1.72E+01	1.97E+01	3.45E+01	7.90E+00	1.43E+01	9.48E+00	3.53E+01	1.35E+01	1.50E+01
BR-82	35.30 H	1.13E+04	1.21E+04	1.31E+04	1.22E+04	1.09E+04	9.77E+03	1.34E+04	1.10E+04	1.11E+04
BR-83	2.39 H	3.04E+01	3.27E+01	3.74E+01	3.34E+01	2.93E+01	2.62E+01	3.80E+01	2.97E+01	3.00E+01
BR-84	31.80 H	8.64E+03	9.07E+03	9.44E+03	9.29E+03	7.90E+03	7.57E+03	9.59E+03	8.32E+03	8.55E+03
BR-85	172 S	2.90E+02	3.09E+02	3.32E+02	3.13E+02	2.79E+02	2.50E+02	3.37E+02	2.81E+02	2.86E+02
KR-79	35.04 H	1.03E+03	1.10E+03	1.30E+03	1.13E+03	9.70E+02	8.83E+02	1.32E+03	1.00E+03	1.01E+03
KR-81	2.1E5 Y	3.91E+01	4.24E+01	5.48E+01	4.36E+01	3.54E+01	3.38E+01	5.59E+01	3.88E+01	3.87E+01
KR-83M	1.83 H	1.37E-02	5.88E-02	6.44E-02	2.03E-02	3.36E-02	3.62E-02	9.78E-02	2.52E-02	2.63E-02
KR-85	10.72 Y	9.08E+00	9.75E+00	1.12E+01	9.97E+00	8.73E+00	7.81E+00	1.14E+01	8.87E+00	8.96E+00
KR-85M	4.48 H	6.16E+02	6.73E+02	9.66E+02	6.46E+02	5.42E+02	5.19E+02	9.90E+02	6.14E+02	6.09E+02
KR-87	76.3 H	3.75E+03	3.95E+03	4.22E+03	4.04E+03	3.42E+03	3.27E+03	4.29E+03	3.61E+03	3.69E+03
KR-88	2.84 H	9.61E+03	1.01E+04	1.05E+04	1.03E+04	8.72E+03	8.38E+03	1.07E+04	9.22E+03	9.43E+03
KR-89	3.16 M	8.55E+03	9.01E+03	9.54E+03	9.19E+03	7.87E+03	7.46E+03	9.69E+03	8.25E+03	8.42E+03
KR-90	32.32 S	5.60E+03	5.94E+03	6.45E+03	5.99E+03	5.26E+03	4.84E+03	6.56E+03	5.42E+03	5.49E+03
RB-81	4.58 H	2.44E+03	2.63E+03	3.17E+03	2.67E+03	2.30E+03	2.10E+03	3.22E+03	2.40E+03	2.41E+03
RB-82	1.25 M	4.48E+03	4.81E+03	5.50E+03	4.91E+03	4.31E+03	3.86E+03	5.59E+03	4.37E+03	4.42E+03
RB-83	86.2 D	2.04E+03	2.19E+03	2.50E+03	2.24E+03	1.96E+03	1.75E+03	2.54E+03	1.99E+03	2.01E+03
RB-84	32.9 D	3.82E+03	4.09E+03	4.49E+03	4.15E+03	3.70E+03	3.30E+03	4.57E+03	3.71E+03	3.78E+03
RB-86	18.66 D	4.12E+02	4.38E+02	4.66E+02	4.43E+02	3.98E+02	3.57E+02	4.74E+02	3.99E+02	4.06E+02
RB-87	4.73E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RB-88	17.8 M	3.04E+03	3.20E+03	3.32E+03	3.24E+03	2.80E+03	2.64E+03	3.37E+03	2.92E+03	2.97E+03
RB-89	15.44 M	9.58E+03	1.01E+04	1.06E+04	1.03E+04	8.95E+03	8.33E+03	1.08E+04	9.23E+03	9.42E+03
RB-90	157 S	1.09E+04	1.13E+04	1.17E+04	1.18E+04	9.71E+03	9.69E+03	1.19E+04	1.05E+04	1.09E+04
RB-90M	258 S	1.57E+04	1.65E+04	1.72E+04	1.69E+04	1.44E+04	1.38E+04	1.75E+04	1.51E+04	1.56E+04
SR-82	25.0 D	1.38E-02	2.09E-01	2.08E-01	7.04E-02	1.12E-01	1.33E-01	3.42E-01	7.98E-02	8.16E-02
SR-85	64.84 D	2.08E+03	2.23E+03	2.57E+03	2.28E+03	2.00E+03	1.79E+03	2.61E+03	2.03E+03	2.05E+03
SR-85M	67.66 M	8.42E+02	9.15E+02	1.24E+03	9.23E+02	7.47E+02	7.22E+02	1.27E+03	8.38E+02	8.32E+02
SR-87M	2.805 H	1.28E+03	1.37E+03	1.66E+03	1.42E+03	1.20E+03	1.10E+03	1.69E+03	1.26E+03	1.26E+03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
GE-71	11.8 D	2.40E-01	6.02E-06	1.68E-02	2.39E-06	4.57E-01	5.47E+00	0.0	5.47E+00
GE-77	11.30 H	6.36E+03	4.94E+03	6.01E+03	3.92E+03	5.48E+03	7.23E+03	4.87E+03	1.21E+04
AS-72	26.0 H	1.08E+04	8.33E+03	1.01E+04	6.61E+03	9.20E+03	1.23E+04	8.19E+03	2.05E+04
AS-73	80.30 D	2.75E+01	1.94E+01	2.53E+01	9.87E+00	2.29E+01	4.58E+01	0.0	4.58E+01
AS-74	17.77 D	4.53E+03	3.47E+03	4.22E+03	2.75E+03	3.87E+03	5.20E+03	1.88E+03	7.08E+03
AS-76	26.32 H	2.58E+03	2.00E+03	2.42E+03	1.60E+03	2.21E+03	2.96E+03	8.43E+03	1.14E+04
AS-77	38.8 H	5.02E+01	3.81E+01	4.75E+01	3.01E+01	4.36E+01	5.62E+01	1.34E+03	1.40E+03
SE-73	7.15 H	6.37E+03	4.82E+03	5.93E+03	3.82E+03	5.46E+03	7.24E+03	2.76E+03	1.00E+04
SE-75	119.78 D	2.26E+03	1.72E+03	2.16E+03	1.34E+03	1.98E+03	2.50E+03	1.70E+01	2.52E+03
SE-79	6.5E4 Y	0.0	0.0	0.0	0.0	0.0	0.0	3.93E+01	3.93E+01
BR-77	57.04 H	1.85E+03	1.41E+03	1.74E+03	1.12E+03	1.60E+03	2.11E+03	1.30E+01	2.13E+03
BR-80	17.4 M	4.44E+02	3.41E+02	4.15E+02	2.70E+02	3.79E+02	5.10E+02	5.54E+03	6.05E+03
BR-80M	4.42 H	4.82E+01	2.77E+01	3.79E+01	1.02E+01	3.64E+01	8.29E+01	0.0	8.29E+01
BR-82	35.30 H	1.60E+04	1.26E+04	1.51E+04	9.91E+03	1.37E+04	1.84E+04	5.97E+02	1.90E+04
BR-83	2.39 H	4.38E+01	3.33E+01	4.06E+01	2.66E+01	3.74E+01	5.01E+01	2.10E+03	2.15E+03
BR-84	31.80 M	1.19E+04	9.40E+03	1.09E+04	7.69E+03	1.02E+04	1.33E+04	1.00E+04	2.34E+04
BR-85	172 S	4.07E+02	3.24E+02	3.87E+02	2.54E+02	3.49E+02	4.70E+02	7.87E+03	8.34E+03
KR-79	35.04 H	1.48E+03	1.13E+03	1.39E+03	8.98E+02	1.27E+03	1.69E+03	1.16E+02	1.81E+03
KR-81	2.1E5 Y	5.82E+01	4.35E+01	5.45E+01	3.46E+01	5.12E+01	7.43E+01	0.0	7.43E+01
KR-83M	1.83 H	3.78E-01	1.90E-02	7.49E-02	5.70E-03	4.69E-01	4.28E+00	0.0	4.28E+00
KR-85	10.72 Y	1.31E+01	9.91E+00	1.21E+01	7.93E+00	1.12E+01	1.50E+01	1.57E+03	1.58E+03
KR-85M	4.48 H	9.28E+02	7.11E+02	9.03E+02	5.43E+02	8.17E+02	1.01E+03	1.61E+03	2.62E+03
KR-87	76.3 M	5.18E+03	4.04E+03	4.77E+03	3.35E+03	4.47E+03	5.83E+03	1.06E+04	1.65E+04
KR-88	2.84 H	1.31E+04	1.03E+04	1.21E+04	8.65E+03	1.13E+04	1.48E+04	2.49E+03	1.73E+04
KR-89	3.16 M	1.18E+04	9.31E+03	1.09E+04	7.61E+03	1.02E+04	1.33E+04	1.10E+04	2.43E+04
KR-90	32.32 S	7.83E+03	6.19E+03	7.37E+03	4.96E+03	6.73E+03	8.94E+03	1.05E+04	1.94E+04
RB-81	4.58 H	3.55E+03	2.69E+03	3.32E+03	2.14E+03	3.05E+03	4.03E+03	1.32E+03	5.35E+03
RB-82	1.25 M	6.44E+03	4.90E+03	5.98E+03	3.91E+03	5.51E+03	7.37E+03	1.13E+04	1.87E+04
RB-83	86.2 D	2.93E+03	2.23E+03	2.72E+03	1.78E+03	2.51E+03	3.37E+03	0.0	3.37E+03
RB-84	32.9 D	5.43E+03	4.26E+03	5.13E+03	3.34E+03	4.64E+03	6.26E+03	1.19E+03	7.45E+03
RB-86	18.66 D	5.78E+02	4.64E+02	5.52E+02	3.62E+02	4.95E+02	6.67E+02	5.09E+03	5.76E+03
RB-87	4.73E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	1.86E+02	1.86E+02
RB-88	17.8 M	4.16E+03	3.30E+03	3.87E+03	2.72E+03	3.58E+03	4.72E+03	1.72E+04	2.19E+04
RB-89	15.44 M	1.32E+04	1.05E+04	1.24E+04	8.52E+03	1.14E+04	1.51E+04	8.03E+03	2.31E+04
RB-90	157 S	1.49E+04	1.18E+04	1.35E+04	9.63E+03	1.29E+04	1.63E+04	1.62E+04	3.25E+04
RB-90M	258 S	2.16E+04	1.71E+04	1.99E+04	1.40E+04	1.86E+04	2.42E+04	1.12E+04	3.55E+04
SR-82	25.0 D	1.49E+00	2.76E-03	2.45E-01	7.76E-05	1.70E+00	1.46E+01	0.0	1.46E+01
SR-85	64.84 D	2.99E+03	2.27E+03	2.77E+03	1.81E+03	2.56E+03	3.44E+03	2.25E+01	3.46E+03
SR-85M	67.66 M	1.25E+03	9.52E+02	1.20E+03	7.45E+02	1.10E+03	1.38E+03	3.08E+01	1.41E+03
SR-87M	2.805 H	1.85E+03	1.40E+03	1.72E+03	1.12E+03	1.60E+03	2.10E+03	4.44E+02	2.54E+03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
SR-89	50.55 D	6.17E-01	5.98E-01	6.73E-01	7.52E-01	5.91E-01	5.36E-01	6.29E-01	5.78E-01	6.27E-01
SR-90	28.6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR-91	9.5 H	3.08E+03	2.99E+03	3.36E+03	3.77E+03	2.95E+03	2.68E+03	3.14E+03	2.89E+03	3.13E+03
SR-92	2.71 H	5.84E+03	5.83E+03	6.57E+03	7.28E+03	5.77E+03	5.34E+03	6.15E+03	5.67E+03	6.14E+03
SR-93	7.3 M	1.01E+04	9.93E+03	1.11E+04	1.26E+04	9.82E+03	8.99E+03	1.04E+04	9.63E+03	1.05E+04
Y-86	14.74 H	1.62E+04	1.59E+04	1.79E+04	2.02E+04	1.58E+04	1.44E+04	1.68E+04	1.55E+04	1.68E+04
Y-87	80.3 H	1.96E+03	1.86E+03	2.07E+03	2.50E+03	1.82E+03	1.63E+03	1.93E+03	1.78E+03	1.93E+03
Y-88	106.60 D	1.24E+04	1.25E+04	1.41E+04	1.56E+04	1.25E+04	1.15E+04	1.33E+04	1.22E+04	1.33E+04
Y-90	64.1 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-90M	3.19 H	2.72E+03	2.55E+03	2.80E+03	3.60E+03	2.49E+03	2.23E+03	2.64E+03	2.45E+03	2.63E+03
Y-91	58.51 D	1.59E+01	1.57E+01	1.77E+01	1.96E+01	1.56E+01	1.43E+01	1.66E+01	1.53E+01	1.65E+01
Y-91M	49.71 M	2.31E+03	2.20E+03	2.45E+03	2.88E+03	2.15E+03	1.93E+03	2.28E+03	2.10E+03	2.28E+03
Y-92	3.54 H	1.12E+03	1.10E+03	1.24E+03	1.38E+03	1.09E+03	9.92E+02	1.16E+03	1.06E+03	1.15E+03
Y-93	10.1 H	4.05E+02	4.01E+02	4.47E+02	5.18E+02	3.97E+02	3.65E+02	4.22E+02	3.90E+02	4.23E+02
ZR-86	16.5 H	1.17E+03	1.08E+03	1.16E+03	1.64E+03	1.05E+03	9.40E+02	1.11E+03	1.04E+03	1.11E+03
ZR-88	83.4 D	1.65E+03	1.54E+03	1.69E+03	2.14E+03	1.50E+03	1.35E+03	1.59E+03	1.48E+03	1.59E+03
ZR-89	78.43 H	5.16E+03	4.99E+03	5.61E+03	6.35E+03	4.92E+03	4.46E+03	5.24E+03	4.82E+03	5.22E+03
ZR-93	1.53E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR-95	64.02 D	3.29E+03	3.16E+03	3.55E+03	4.03E+03	3.11E+03	2.81E+03	3.31E+03	3.04E+03	3.30E+03
ZR-97	16.90 H	7.99E+02	7.82E+02	8.77E+02	1.00E+03	7.72E+02	7.05E+02	8.21E+02	7.57E+02	8.20E+02
NB-90	14.60 H	1.95E+04	1.97E+04	2.20E+04	2.50E+04	1.96E+04	1.81E+04	2.09E+04	1.93E+04	2.10E+04
NB-91	1E4 Y	7.77E+00	6.87E+00	7.74E+00	2.28E+01	6.83E+00	6.06E+00	7.13E+00	6.90E+00	7.23E+00
NB-91M	61 D	1.88E+02	1.86E+02	2.09E+02	2.45E+02	1.84E+02	1.69E+02	1.96E+02	1.80E+02	1.95E+02
NB-92	3.6E7 Y	6.66E+03	6.42E+03	7.21E+03	8.21E+03	6.33E+03	5.73E+03	6.73E+03	6.19E+03	6.71E+03
NB-92M	10.15 D	4.34E+03	4.22E+03	4.75E+03	5.30E+03	4.17E+03	3.79E+03	4.44E+03	4.08E+03	4.42E+03
NB-93M	14.6 Y	1.24E-01	7.54E-03	2.40E-02	2.77E+00	3.16E-02	1.06E-02	1.00E-02	7.78E-02	4.07E-02
NB-94	2.03E4 Y	7.06E+03	6.81E+03	7.65E+03	8.64E+03	6.71E+03	6.07E+03	7.14E+03	6.56E+03	7.12E+03
NB-94M	6.26 M	1.91E+01	1.81E+01	2.04E+01	3.34E+01	1.79E+01	1.62E+01	1.90E+01	1.77E+01	1.91E+01
NB-95	35.06 D	3.43E+03	3.30E+03	3.70E+03	4.19E+03	3.25E+03	2.94E+03	3.45E+03	3.18E+03	3.45E+03
NB-95M	86.6 H	2.56E+02	2.33E+02	2.50E+02	3.67E+02	2.27E+02	2.03E+02	2.40E+02	2.26E+02	2.40E+02
NB-96	23.35 H	1.10E+04	1.06E+04	1.19E+04	1.35E+04	1.05E+04	9.50E+03	1.11E+04	1.02E+04	1.11E+04
NB-97	72.1 M	2.94E+03	2.82E+03	3.16E+03	3.63E+03	2.77E+03	2.50E+03	2.94E+03	2.71E+03	2.94E+03
NB-97M	60 S	3.26E+03	3.13E+03	3.52E+03	3.99E+03	3.08E+03	2.78E+03	3.28E+03	3.01E+03	3.27E+03
MO-91	15.49 M	4.22E+03	4.01E+03	4.47E+03	5.32E+03	3.92E+03	3.53E+03	4.16E+03	3.85E+03	4.16E+03
MO-93	3.5E3 Y	6.92E-01	4.22E-02	1.34E-01	1.55E+01	1.77E-01	5.95E-02	5.60E-02	4.36E-01	2.28E-01
MO-99	66.02 H	6.85E+02	6.55E+02	7.32E+02	8.64E+02	6.45E+02	5.81E+02	6.86E+02	6.31E+02	6.83E+02
MO-101	14.61 M	6.71E+03	6.63E+03	7.43E+03	8.44E+03	6.56E+03	6.01E+03	6.98E+03	6.43E+03	6.98E+03
TC-95	20.0 H	3.52E+03	3.39E+03	3.81E+03	4.32E+03	3.34E+03	3.02E+03	3.55E+03	3.27E+03	3.54E+03
TC-95M	61 D	2.93E+03	2.79E+03	3.11E+03	3.74E+03	2.75E+03	2.48E+03	2.92E+03	2.70E+03	2.91E+03
TC-96	4.28 D	1.12E+04	1.08E+04	1.22E+04	1.37E+04	1.07E+04	9.67E+03	1.14E+04	1.04E+04	1.13E+04

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
SR-89	50.55 D	5.95E-01	6.34E-01	6.82E-01	6.43E-01	5.77E-01	5.14E-01	6.94E-01	5.76E-01	5.88E-01
SR-90	28.6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR-91	9.5 H	2.97E+03	3.17E+03	3.42E+03	3.21E+03	2.87E+03	2.57E+03	3.48E+03	2.88E+03	2.93E+03
SR-92	2.71 H	5.82E+03	6.16E+03	6.47E+03	6.22E+03	5.51E+03	5.05E+03	6.58E+03	5.63E+03	5.68E+03
SR-93	7.3 M	9.91E+03	1.05E+04	1.14E+04	1.07E+04	9.37E+03	8.58E+03	1.15E+04	9.59E+03	9.75E+03
Y-86	14.74 H	1.59E+04	1.69E+04	1.81E+04	1.71E+04	1.51E+04	1.38E+04	1.84E+04	1.54E+04	1.56E+04
Y-87	80.3 H	1.85E+03	1.99E+03	2.31E+03	2.04E+03	1.77E+03	1.59E+03	2.34E+03	1.81E+03	1.82E+03
Y-88	106.60 D	1.25E+04	1.32E+04	1.38E+04	1.34E+04	1.17E+04	1.09E+04	1.41E+04	1.21E+04	1.23E+04
Y-90	64.1 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-90M	3.19 H	2.53E+03	2.73E+03	3.36E+03	2.78E+03	2.36E+03	2.18E+03	3.42E+03	2.49E+03	2.50E+03
Y-91	58.51 D	1.57E+01	1.66E+01	1.75E+01	1.68E+01	1.50E+01	1.36E+01	1.78E+01	1.52E+01	1.54E+01
Y-91M	49.71 M	2.18E+03	2.34E+03	2.66E+03	2.39E+03	2.10E+03	1.88E+03	2.70E+03	2.13E+03	2.15E+03
Y-92	3.54 H	1.09E+03	1.16E+03	1.25E+03	1.18E+03	1.05E+03	9.47E+02	1.27E+03	1.06E+03	1.08E+03
Y-93	10.1 H	4.01E+02	4.25E+02	4.65E+02	4.32E+02	3.72E+02	3.48E+02	4.73E+02	3.88E+02	3.93E+02
ZR-86	16.5 H	1.07E+03	1.16E+03	1.51E+03	1.18E+03	9.69E+02	9.23E+02	1.54E+03	1.06E+03	1.06E+03
ZR-88	83.4 D	1.53E+03	1.65E+03	1.98E+03	1.70E+03	1.44E+03	1.32E+03	2.02E+03	1.50E+03	1.51E+03
ZR-89	78.43 H	4.97E+03	5.30E+03	5.77E+03	5.38E+03	4.81E+03	4.28E+03	5.87E+03	4.82E+03	4.91E+03
ZR-93	1.53E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR-95	64.02 D	3.14E+03	3.35E+03	3.68E+03	3.41E+03	3.05E+03	2.71E+03	3.74E+03	3.05E+03	3.11E+03
ZR-97	16.90 H	7.80E+02	8.30E+02	9.04E+02	8.42E+02	7.41E+02	6.75E+02	9.19E+02	7.56E+02	7.66E+02
NB-90	14.60 H	1.98E+04	2.08E+04	2.20E+04	2.11E+04	1.81E+04	1.72E+04	2.24E+04	1.90E+04	1.94E+04
NB-91	1E4 Y	6.90E+00	7.89E+00	9.10E+00	7.68E+00	6.88E+00	6.20E+00	9.49E+00	6.90E+00	6.99E+00
NB-91M	61 D	1.85E+02	1.97E+02	2.09E+02	1.98E+02	1.77E+02	1.60E+02	2.13E+02	1.79E+02	1.82E+02
NB-92	3.6E7 Y	6.39E+03	6.82E+03	7.48E+03	6.93E+03	6.18E+03	5.51E+03	7.60E+03	6.20E+03	6.31E+03
NB-92M	10.15 D	4.19E+03	4.47E+03	4.79E+03	4.53E+03	4.06E+03	3.62E+03	4.87E+03	4.06E+03	4.14E+03
NB-93M	14.6 Y	2.33E-02	1.33E-01	1.65E-01	4.48E-02	7.85E-02	7.57E-02	2.18E-01	5.99E-02	6.56E-02
NB-94	2.03E4 Y	6.76E+03	7.22E+03	7.88E+03	7.34E+03	6.57E+03	5.84E+03	8.01E+03	6.56E+03	6.69E+03
NB-94M	6.26 M	1.80E+01	1.97E+01	2.14E+01	1.96E+01	1.77E+01	1.58E+01	2.19E+01	1.76E+01	1.80E+01
NB-95	35.06 D	3.28E+03	3.50E+03	3.83E+03	3.56E+03	3.19E+03	2.83E+03	3.89E+03	3.18E+03	3.24E+03
NB-95M	86.6 H	2.32E+02	2.52E+02	3.38E+02	2.56E+02	2.07E+02	2.00E+02	3.45E+02	2.31E+02	2.29E+02
NB-96	23.35 H	1.06E+04	1.13E+04	1.23E+04	1.14E+04	1.02E+04	9.12E+03	1.25E+04	1.03E+04	1.04E+04
NB-97	72.1 M	2.80E+03	3.00E+03	3.33E+03	3.05E+03	2.72E+03	2.41E+03	3.38E+03	2.72E+03	2.77E+03
NB-97M	60 S	3.11E+03	3.32E+03	3.65E+03	3.38E+03	3.02E+03	2.68E+03	3.71E+03	3.02E+03	3.08E+03
MO-91	15.49 M	3.99E+03	4.28E+03	4.92E+03	4.38E+03	3.83E+03	3.44E+03	5.00E+03	3.89E+03	3.94E+03
MO-93	3.5E3 Y	1.31E-01	7.43E-01	9.26E-01	2.51E-01	4.40E-01	4.24E-01	1.22E+00	3.36E-01	3.67E-01
MO-99	66.02 H	6.51E+02	6.98E+02	7.94E+02	7.06E+02	6.26E+02	5.60E+02	8.08E+02	6.34E+02	6.44E+02
MO-101	14.61 M	6.62E+03	7.03E+03	7.57E+03	7.11E+03	6.24E+03	5.73E+03	7.70E+03	6.40E+03	6.49E+03
TC-95	20.0 H	3.37E+03	3.60E+03	3.93E+03	3.66E+03	3.27E+03	2.90E+03	3.99E+03	3.27E+03	3.33E+03
TC-95M	61 D	2.78E+03	2.98E+03	3.43E+03	3.02E+03	2.65E+03	2.39E+03	3.49E+03	2.71E+03	2.75E+03
TC-96	4.28 D	1.08E+04	1.15E+04	1.25E+04	1.17E+04	1.05E+04	9.29E+03	1.27E+04	1.04E+04	1.06E+04

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
SR-89	50.55 D	8.38E-01	6.69E-01	8.01E-01	5.18E-01	7.17E-01	9.70E-01	4.38E+03	4.38E+03
SR-90	28.6 Y	0.0	0.0	0.0	0.0	0.0	0.0	1.11E+03	1.11E+03
SR-91	9.5 H	4.19E+03	3.33E+03	3.99E+03	2.60E+03	3.59E+03	4.84E+03	4.94E+03	9.78E+03
SR-92	2.71 H	8.08E+03	6.45E+03	7.64E+03	5.18E+03	6.93E+03	9.27E+03	1.11E+03	1.04E+04
SR-93	7.3 M	1.39E+04	1.09E+04	1.30E+04	8.75E+03	1.19E+04	1.59E+04	7.02E+03	2.29E+04
Y-86	14.74 H	2.22E+04	1.75E+04	2.09E+04	1.41E+04	1.91E+04	2.55E+04	1.69E+03	2.72E+04
Y-87	80.3 H	2.67E+03	2.01E+03	2.47E+03	1.62E+03	2.29E+03	3.06E+03	9.58E+00	3.07E+03
Y-88	106.60 D	1.73E+04	1.37E+04	1.61E+04	1.12E+04	1.48E+04	1.97E+04	5.31E+00	1.97E+04
Y-90	64.1 H	0.0	0.0	0.0	0.0	0.0	0.0	7.38E+03	7.38E+03
Y-90M	3.19 H	3.70E+03	2.80E+03	3.46E+03	2.22E+03	3.19E+03	4.17E+03	3.16E+02	4.49E+03
Y-91	58.51 D	2.18E+01	1.75E+01	2.08E+01	1.38E+01	1.87E+01	2.52E+01	4.55E+03	4.57E+03
Y-91M	49.71 M	3.13E+03	2.39E+03	2.92E+03	1.90E+03	2.68E+03	3.59E+03	1.95E+02	3.79E+03
Y-92	3.54 H	1.54E+03	1.22E+03	1.46E+03	9.61E+02	1.32E+03	1.77E+03	1.18E+04	1.35E+04
Y-93	10.1 H	5.59E+02	4.40E+02	5.25E+02	3.57E+02	4.82E+02	6.36E+02	9.42E+03	1.01E+04
ZR-86	16.5 H	1.59E+03	1.20E+03	1.51E+03	9.45E+02	1.39E+03	1.81E+03	5.33E+01	1.86E+03
ZR-88	83.4 D	2.22E+03	1.67E+03	2.06E+03	1.34E+03	1.92E+03	2.53E+03	6.91E+01	2.60E+03
ZR-89	78.43 H	7.03E+03	5.55E+03	6.67E+03	4.33E+03	6.01E+03	8.12E+03	6.83E+02	8.81E+03
ZR-93	1.53E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR-95	64.02 D	4.46E+03	3.50E+03	4.22E+03	2.73E+03	3.81E+03	5.15E+03	4.46E+02	5.60E+03
ZR-97	16.90 H	1.10E+03	8.62E+02	1.03E+03	6.88E+02	9.41E+02	1.26E+03	5.26E+03	6.52E+03
NB-90	14.60 H	2.72E+04	2.14E+04	2.52E+04	1.77E+04	2.34E+04	3.08E+04	2.75E+03	3.36E+04
NB-91	1E4 Y	1.33E+01	7.47E+00	9.95E+00	5.96E+00	1.16E+01	3.32E+01	4.98E-01	3.37E+01
NB-91M	61 D	2.62E+02	2.07E+02	2.47E+02	1.63E+02	2.25E+02	3.17E+02	6.87E+01	3.86E+02
NB-92	3.6E7 Y	9.06E+03	7.12E+03	8.57E+03	5.57E+03	7.75E+03	1.05E+04	1.04E+01	1.05E+04
NB-92M	10.15 D	5.90E+03	4.72E+03	5.64E+03	3.66E+03	5.05E+03	6.85E+03	0.0	6.85E+03
NB-93M	14.6 Y	7.84E-01	1.31E-02	2.13E-01	6.80E-04	6.76E-01	4.29E+00	0.0	4.29E+00
NB-94	2.03E4 Y	9.59E+03	7.57E+03	9.10E+03	5.88E+03	8.20E+03	1.11E+04	6.79E+02	1.18E+04
NB-94M	6.26 M	2.84E+01	2.03E+01	2.50E+01	1.56E+01	2.42E+01	4.57E+01	1.48E+01	6.05E+01
NB-95	35.06 D	4.65E+03	3.66E+03	4.41E+03	2.85E+03	3.97E+03	5.37E+03	3.14E+01	5.40E+03
NB-95M	86.6 H	3.46E+02	2.61E+02	3.29E+02	2.05E+02	3.04E+02	3.96E+02	1.02E+03	1.41E+03
NB-96	23.35 H	1.49E+04	1.18E+04	1.42E+04	9.23E+03	1.28E+04	1.72E+04	1.53E+03	1.88E+04
NB-97	72.1 M	3.99E+03	3.10E+03	3.75E+03	2.44E+03	3.41E+03	4.60E+03	3.33E+03	7.93E+03
NB-97M	60 S	4.42E+03	3.47E+03	4.18E+03	2.70E+03	3.78E+03	5.10E+03	1.08E+02	5.21E+03
MO-91	15.49 M	5.74E+03	4.35E+03	5.32E+03	3.49E+03	4.91E+03	6.56E+03	1.17E+04	1.83E+04
MO-93	3.5E3 Y	4.39E+00	7.32E-02	1.19E+00	3.81E-03	3.78E+00	2.40E+01	0.0	2.40E+01
MO-99	66.02 H	9.32E+02	7.30E+02	8.85E+02	5.67E+02	7.99E+02	1.07E+03	2.72E+03	3.79E+03
MO-101	14.61 M	9.25E+03	7.30E+03	8.70E+03	5.86E+03	7.94E+03	1.06E+04	3.79E+03	1.44E+04
TC-95	20.0 H	4.78E+03	3.77E+03	4.53E+03	2.93E+03	4.08E+03	5.54E+03	6.80E+00	5.55E+03
TC-95M	61 D	3.99E+03	3.11E+03	3.78E+03	2.43E+03	3.43E+03	4.58E+03	3.96E+01	4.62E+03
TC-96	4.28 D	1.52E+04	1.21E+04	1.45E+04	9.37E+03	1.30E+04	1.76E+04	7.13E+00	1.76E+04

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
TC-96M	51.5 M	1.84E+02	1.79E+02	2.01E+02	2.37E+02	1.76E+02	1.60E+02	1.88E+02	1.73E+02	1.87E+02
TC-97	2.6E6 Y	9.28E-01	1.08E-01	2.00E-01	1.84E+01	2.57E-01	1.09E-01	1.61E-01	6.04E-01	4.63E-01
TC-97M	89 D	2.08E+00	1.33E+00	1.42E+00	1.78E+01	1.37E+00	1.09E+00	1.47E+00	1.66E+00	1.80E+00
TC-98	4.2E6 Y	6.20E+03	5.95E+03	6.68E+03	7.63E+03	5.85E+03	5.28E+03	6.22E+03	5.72E+03	6.21E+03
TC-99	2.13E5 Y	1.90E-03	1.90E-03	1.96E-03	3.62E-03	1.79E-03	1.56E-03	1.92E-03	1.71E-03	1.93E-03
TC-99M	6.02 H	5.30E+02	4.89E+02	5.24E+02	8.42E+02	4.82E+02	4.20E+02	5.15E+02	4.72E+02	4.96E+02
TC-101	14.2 M	1.48E+03	1.37E+03	1.50E+03	1.96E+03	1.34E+03	1.20E+03	1.42E+03	1.33E+03	1.42E+03
RU-97	2.9 D	9.78E+02	8.95E+02	9.62E+02	1.39E+03	8.72E+02	7.80E+02	9.23E+02	8.68E+02	9.22E+02
RU-103	39.35 D	2.08E+03	1.98E+03	2.20E+03	2.63E+03	1.93E+03	1.74E+03	2.05E+03	1.89E+03	2.05E+03
RU-105	4.44 H	3.46E+03	3.31E+03	3.70E+03	4.32E+03	3.25E+03	2.93E+03	3.45E+03	3.18E+03	3.44E+03
RU-106	368.2 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH-103M	56.119 M	2.56E-01	1.49E-01	9.18E-02	3.26E+00	1.02E-01	8.25E-02	2.04E-01	1.86E-01	3.33E-01
RH-105	35.36 H	3.34E+02	3.09E+02	3.37E+02	4.45E+02	3.01E+02	2.70E+02	3.18E+02	2.98E+02	3.18E+02
RH-105M	45 S	1.12E+02	1.03E+02	1.10E+02	1.97E+02	1.01E+02	8.79E+01	1.09E+02	9.93E+01	1.05E+02
RH-106	29.92 S	9.05E+02	8.66E+02	9.69E+02	1.13E+03	8.50E+02	7.67E+02	9.03E+02	8.32E+02	9.02E+02
PD-103	16.961 D	2.48E+00	1.34E+00	1.07E+00	2.87E+01	1.12E+00	8.80E-01	1.96E+03	1.84E+00	2.88E+00
PD-107	6.5E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD-109	13.453 H	2.97E+00	2.82E+00	3.14E+00	3.74E+00	2.75E+00	2.47E+00	2.92E+03	2.70E+00	2.92E+00
AG-106M	8.46 D	1.23E+04	1.20E+04	1.34E+04	1.54E+04	1.18E+04	1.07E+04	1.25E+04	1.16E+04	1.25E+04
AG-108	2.37 M	7.64E+01	7.28E+01	8.13E+01	9.57E+01	7.13E+01	6.43E+01	7.58E+01	6.99E+01	7.57E+01
AG-108M	127 Y	7.06E+03	6.73E+03	7.52E+03	8.82E+03	6.60E+03	5.95E+03	7.01E+03	6.47E+03	7.01E+03
AG-109M	39.6 S	1.35E+01	1.31E+01	1.29E+01	4.06E+01	1.18E+01	1.03E+01	1.37E+01	1.19E+01	1.48E+01
AG-110	24.57 S	1.35E+02	1.29E+02	1.45E+02	1.67E+02	1.27E+02	1.15E+02	1.35E+02	1.24E+02	1.35E+02
AG-110M	249.85 D	1.22E+04	1.18E+04	1.33E+04	1.50E+04	1.17E+04	1.06E+04	1.24E+04	1.14E+04	1.24E+04
AG-111	7.46 D	1.13E+02	1.05E+02	1.15E+02	1.50E+02	1.02E+02	9.20E+01	1.08E+02	1.01E+02	1.08E+02
CD-109	464 D	2.94E+00	2.22E+00	1.02E+00	3.34E+01	1.16E+00	1.01E+00	3.23E+00	2.16E+00	4.89E+00
CD-111M	48.7 M	1.19E+03	1.09E+03	1.17E+03	1.71E+03	1.07E+03	9.50E+02	1.13E+03	1.06E+03	1.12E+03
CD-113	9.3E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CD-113M	13.7 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CD-115	53.46 H	8.78E+02	8.33E+02	9.28E+02	1.11E+03	8.14E+02	7.33E+02	8.64E+02	7.99E+02	8.65E+02
CD-115M	44.6 D	9.76E+01	9.56E+01	1.08E+02	1.20E+02	9.45E+01	8.62E+01	1.01E+02	9.25E+01	1.00E+02
CD-117	2.49 H	4.81E+03	4.74E+03	5.31E+03	6.06E+03	4.68E+03	4.29E+03	4.98E+03	4.59E+03	4.97E+03
CD-117M	3.36 H	9.43E+03	9.49E+03	1.06E+04	1.19E+04	9.43E+03	8.70E+03	1.00E+04	9.25E+03	1.01E+04
IN-111	2.83 D	1.66E+03	1.52E+03	1.63E+03	2.42E+03	1.48E+03	1.32E+03	1.57E+03	1.47E+03	1.56E+03
IN-113M	1.658 H	1.10E+03	1.02E+03	1.13E+03	1.43E+03	9.98E+02	8.96E+02	1.06E+03	9.84E+02	1.06E+03
IN-114	71.9 S	1.39E+02	1.33E+02	1.48E+02	1.73E+02	1.30E+02	1.17E+02	1.38E+02	1.27E+02	1.38E+02
IN-114M	49.51 D	3.87E+02	3.64E+02	4.00E+02	5.28E+02	3.56E+02	3.19E+02	3.80E+02	3.51E+02	3.80E+02
IN-115	4.6E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IN-115M	4.36 H	6.80E+02	6.30E+02	6.88E+02	9.15E+02	6.13E+02	5.51E+02	6.51E+02	6.07E+02	6.53E+02
IN-116M	54.15 M	1.10E+04	1.09E+04	1.23E+04	1.37E+04	1.08E+04	9.96E+03	1.15E+04	1.06E+04	1.15E+04

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
TC-96M	51.5 M	1.78E+02	1.90E+02	2.05E+02	1.92E+02	1.72E+02	1.54E+02	2.09E+02	1.72E+02	1.75E+02
TC-97	2.6E6 Y	2.22E-01	1.02E+00	1.33E+00	3.45E-01	6.20E-01	5.69E-01	1.68E+00	4.80E-01	5.31E-01
TC-97M	89 D	1.41E+00	2.28E+00	3.48E+00	1.33E+00	1.60E+00	1.43E+00	3.85E+00	1.61E+00	1.67E+00
TC-98	4.2E6 Y	5.91E+03	6.32E+03	6.99E+03	6.44E+03	5.74E+03	5.10E+03	7.10E+03	5.75E+03	5.85E+03
TC-99	2.13E5 Y	1.89E-03	2.09E-03	3.55E-03	1.53E-03	1.59E-03	1.40E-03	3.65E-03	1.81E-03	1.82E-03
TC-99M	6.02 H	4.88E+02	5.38E+02	8.21E+02	4.91E+02	4.22E+02	4.05E+02	8.43E+02	4.88E+02	4.83E+02
TC-101	14.2 M	1.37E+03	1.47E+03	1.83E+03	1.51E+03	1.26E+03	1.18E+03	1.87E+03	1.35E+03	1.35E+03
RU-97	2.9 D	8.91E+02	9.68E+02	1.30E+03	9.78E+02	7.95E+02	7.66E+02	1.32E+03	8.85E+02	8.81E+02
RU-103	39.35 D	1.96E+03	2.11E+03	2.43E+03	2.16E+03	1.89E+03	1.69E+03	2.47E+03	1.92E+03	1.94E+03
RU-105	4.44 H	3.29E+03	3.52E+03	3.97E+03	3.59E+03	3.17E+03	2.83E+03	4.03E+03	3.20E+03	3.25E+03
RU-106	368.2 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH-103M	56.119 M	1.34E-01	3.05E-01	4.53E-01	1.07E-01	2.01E-01	1.58E-01	5.13E-01	1.66E-01	1.88E-01
RH-105	35.36 H	3.07E+02	3.32E+02	4.17E+02	3.43E+02	2.82E+02	2.65E+02	4.24E+02	3.04E+02	3.03E+02
RH-105M	45 S	1.03E+02	1.15E+02	1.78E+02	1.01E+02	8.93E+01	8.46E+01	1.83E+02	1.03E+02	1.02E+02
RH-106	29.92 S	8.61E+02	9.22E+02	1.04E+03	9.41E+02	8.30E+02	7.42E+02	1.05E+03	8.39E+02	8.50E+02
PD-103	16.961 D	1.29E+00	2.82E+00	3.96E+00	1.29E+00	1.93E+00	1.61E+00	4.49E+00	1.65E+00	1.82E+00
PD-107	6.5E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD-109	13.453 H	2.80E+00	3.00E+00	3.46E+00	3.07E+00	2.69E+00	2.41E+00	3.52E+00	2.73E+00	2.76E+00
AG-106M	8.46 D	1.19E+04	1.27E+04	1.39E+04	1.29E+04	1.14E+04	1.03E+04	1.42E+04	1.16E+04	1.17E+04
AG-108	2.37 M	7.23E+01	7.76E+01	8.76E+01	7.92E+01	6.99E+01	6.23E+01	8.91E+01	7.05E+01	7.15E+01
AG-108M	127 Y	6.69E+03	7.17E+03	8.10E+03	7.31E+03	6.45E+03	5.76E+03	8.23E+03	6.52E+03	6.61E+03
AG-109M	39.6 S	1.28E+01	1.51E+01	2.53E+01	1.02E+01	1.13E+01	9.70E+00	2.62E+01	1.24E+01	1.26E+01
AG-110	24.57 S	1.29E+02	1.38E+02	1.53E+02	1.40E+02	1.25E+02	1.11E+02	1.55E+02	1.25E+02	1.27E+02
AG-110M	249.85 D	1.18E+04	1.25E+04	1.36E+04	1.27E+04	1.14E+04	1.02E+04	1.38E+04	1.14E+04	1.16E+04
AG-111	7.46 D	1.05E+02	1.13E+02	1.41E+02	1.16E+02	9.65E+01	9.03E+01	1.43E+02	1.03E+02	1.03E+02
CD-109	464 D	1.65E+00	3.57E+00	5.40E+00	1.23E+00	2.39E+00	1.80E+00	5.99E+00	1.96E+00	2.24E+00
CD-111M	48.7 M	1.09E+03	1.18E+03	1.60E+03	1.19E+03	9.68E+02	9.32E+02	1.64E+03	1.08E+03	1.08E+03
CD-113	9.3E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CD-113M	13.7 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CD-115	53.46 H	8.28E+02	8.89E+02	1.03E+03	9.10E+02	7.94E+02	7.13E+02	1.04E+03	8.09E+02	8.17E+02
CD-115M	44.6 D	9.52E+01	1.01E+02	1.08E+02	1.02E+02	9.16E+01	8.23E+01	1.10E+02	9.21E+01	9.37E+01
CD-117	2.49 H	4.72E+03	5.02E+03	5.45E+03	5.08E+03	4.46E+03	4.09E+03	5.54E+03	4.58E+03	4.63E+03
CD-117M	3.36 H	9.50E+03	1.00E+04	1.05E+04	1.02E+04	8.84E+03	8.24E+03	1.07E+04	9.14E+03	9.31E+03
IN-111	2.83 D	1.51E+03	1.65E+03	2.27E+03	1.64E+03	1.34E+03	1.29E+03	2.32E+03	1.50E+03	1.49E+03
IN-113M	1.658 H	1.02E+03	1.10E+03	1.32E+03	1.13E+03	9.56E+02	8.78E+02	1.34E+03	1.00E+03	1.00E+03
IN-114	71.9 S	1.32E+02	1.41E+02	1.59E+02	1.44E+02	1.27E+02	1.14E+02	1.61E+02	1.28E+02	1.30E+02
IN-114M	49.51 D	3.61E+02	3.91E+02	4.75E+02	3.92E+02	3.40E+02	3.10E+02	4.84E+02	3.55E+02	3.58E+02
IN-115	4.6E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IN-115M	4.36 H	6.26E+02	6.77E+02	8.40E+02	6.97E+02	5.79E+02	5.41E+02	8.56E+02	6.18E+02	6.19E+02
IN-116M	54.15 M	1.09E+04	1.15E+04	1.22E+04	1.17E+04	1.03E+04	9.45E+03	1.24E+04	1.05E+04	1.07E+04

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
TC-96M	51.5 M	2.54E+02	1.99E+02	2.39E+02	1.55E+02	2.17E+02	3.05E+02	0.0	3.05E+02
TC-97	2.6E6 Y	5.76E+00	1.50E-01	1.74E+00	1.02E-02	4.70E+00	2.76E+01	0.0	2.76E+01
TC-97M	89 D	7.24E+00	1.64E+00	3.65E+00	9.90E-01	5.78E+00	2.48E+01	3.51E+01	5.99E+01
TC-98	4.2E6 Y	8.42E+03	6.58E+03	7.94E+03	5.14E+03	7.19E+03	9.71E+03	4.78E+02	1.02E+04
TC-99	2.13E5 Y	3.07E-03	2.39E-03	3.07E-03	1.58E-03	3.65E-03	3.27E-03	2.24E+02	2.24E+02
TC-99M	6.02 H	7.50E+02	5.78E+02	7.41E+02	4.29E+02	6.63E+02	8.05E+02	3.42E+01	8.40E+02
TC-101	14.2 M	1.99E+03	1.51E+03	1.87E+03	1.20E+03	1.73E+03	2.24E+03	3.37E+03	5.61E+03
RU-97	2.9 D	1.33E+03	1.00E+03	1.26E+03	7.88E+02	1.16E+03	1.49E+03	3.53E+01	1.53E+03
RU-103	39.35 D	2.83E+03	2.14E+03	2.62E+03	1.72E+03	2.42E+03	3.24E+03	1.56E+02	3.39E+03
RU-105	4.44 H	4.70E+03	3.65E+03	4.43E+03	2.87E+03	4.02E+03	5.40E+03	2.79E+03	8.18E+03
RU-106	368.2 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH-103M	56.119 M	1.36E+00	1.60E-01	5.89E-01	3.70E-02	9.99E-01	4.46E+00	0.0	4.46E+00
RH-105	35.36 H	4.49E+02	3.39E+02	4.21E+02	2.71E+02	3.90E+02	5.04E+02	7.45E+02	1.25E+03
RH-105M	45 S	1.65E+02	1.23E+02	1.60E+02	8.96E+01	1.45E+02	1.92E+02	2.18E+02	4.11E+02
RH-106	29.92 S	1.23E+03	9.48E+02	1.15E+03	7.53E+02	1.05E+03	1.41E+03	1.14E+04	1.28E+04
PD-103	16.961 D	1.20E+01	1.36E+00	5.16E+00	4.97E-01	8.89E+00	3.94E+01	0.0	3.94E+01
PD-107	6.5E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD-109	13.453 H	4.03E+00	3.05E+00	3.73E+00	2.45E+00	3.45E+00	4.61E+00	2.44E+03	2.44E+03
AG-106M	8.46 D	1.69E+04	1.32E+04	1.59E+04	1.05E+04	1.44E+04	1.94E+04	2.08E+01	1.94E+04
AG-108	2.37 M	1.04E+02	7.97E+01	9.70E+01	6.30E+01	8.88E+01	1.20E+02	4.54E+03	4.66E+03
AG-108M	127 Y	9.59E+03	7.39E+03	8.99E+03	5.83E+03	8.20E+03	1.10E+04	4.08E+01	1.11E+04
AG-109M	39.6 S	2.76E+01	1.62E+01	2.32E+01	1.01E+01	2.25E+01	4.39E+01	1.88E+01	6.27E+01
AG-110	24.57 S	1.83E+02	1.43E+02	1.72E+02	1.12E+02	1.57E+02	2.11E+02	9.39E+03	9.60E+03
AG-110M	249.85 D	1.66E+04	1.31E+04	1.57E+04	1.03E+04	1.42E+04	1.91E+04	2.67E+02	1.94E+04
AG-111	7.46 D	1.53E+02	1.15E+02	1.43E+02	9.22E+01	1.32E+02	1.72E+02	2.35E+03	2.52E+03
CD-109	464 D	1.56E+01	2.03E+00	7.26E+00	3.23E-01	1.10E+01	4.37E+01	0.0	4.37E+01
CD-111M	48.7 M	1.63E+03	1.23E+03	1.55E+03	9.61E+02	1.42E+03	1.81E+03	3.58E+02	2.17E+03
CD-113	9.3E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	2.82E+02	2.82E+02
CD-113M	13.7 Y	0.0	0.0	0.0	0.0	0.0	0.0	9.89E+02	9.89E+02
CD-115	53.46 H	1.19E+03	9.05E+02	1.11E+03	7.24E+02	1.02E+03	1.37E+03	2.04E+03	3.41E+03
CD-115M	44.6 D	1.34E+02	1.07E+02	1.27E+02	8.34E+01	1.14E+02	1.54E+02	4.50E+03	4.65E+03
CD-117	2.49 H	6.62E+03	5.23E+03	6.25E+03	4.19E+03	5.68E+03	7.57E+03	3.03E+03	1.06E+04
CD-117M	3.36 H	1.31E+04	1.04E+04	1.22E+04	8.48E+03	1.13E+04	1.49E+04	1.15E+03	1.61E+04
IN-111	2.83 D	2.27E+03	1.72E+03	2.17E+03	1.34E+03	1.99E+03	2.53E+03	1.27E+02	2.66E+03
IN-113M	1.658 H	1.48E+03	1.11E+03	1.38E+03	8.93E+02	1.28E+03	1.69E+03	8.76E+02	2.56E+03
IN-114	71.9 S	1.89E+02	1.45E+02	1.76E+02	1.15E+02	1.61E+02	2.17E+02	5.89E+03	6.11E+03
IN-114M	49.51 D	5.34E+02	4.05E+02	5.02E+02	3.15E+02	4.59E+02	6.20E+02	6.35E+02	1.26E+03
IN-115	4.6E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	7.23E+02	7.23E+02
IN-115M	4.36 H	9.22E+02	6.89E+02	8.58E+02	5.51E+02	7.97E+02	1.05E+03	1.07E+03	2.12E+03
IN-116M	54.15 M	1.51E+04	1.21E+04	1.43E+04	9.67E+03	1.30E+04	1.74E+04	1.95E+03	1.93E+04

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/CUBIC M

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
IN-117	43.8 M	2.98E+03	2.81E+03	3.11E+03	3.89E+03	2.75E+03	2.47E+03	2.93E+03	2.70E+03	2.91E+03
IN-117M	116.5 M	3.75E+02	3.45E+02	3.74E+02	5.31E+02	3.37E+02	3.01E+02	3.58E+02	3.34E+02	3.56E+02
SN-113	115.1 D	2.63E+01	2.47E+01	2.31E+01	7.59E+01	2.12E+01	1.92E+01	2.64E+01	2.27E+01	3.01E+01
SN-117M	13.60 D	6.06E+02	5.56E+02	5.92E+02	9.66E+02	5.44E+02	4.77E+02	5.84E+02	5.37E+02	5.72E+02
SN-119M	293.0 D	3.28E+00	3.55E+00	1.43E+00	2.93E+01	1.53E+00	1.55E+00	4.19E+00	2.53E+00	6.69E+00
SN-123	129.2 D	3.08E+01	3.02E+01	3.40E+01	3.77E+01	2.99E+01	2.73E+01	3.18E+01	2.93E+01	3.17E+01
SN-125	9.64 D	1.37E+03	1.35E+03	1.52E+03	1.70E+03	1.34E+03	1.22E+03	1.43E+03	1.31E+03	1.42E+03
SN-126	1.0E5 Y	1.67E+02	1.70E+02	1.71E+02	3.50E+02	1.55E+02	1.37E+02	1.69E+02	1.50E+02	1.77E+02
SB-117	2.80 H	7.10E+02	6.57E+02	7.04E+02	1.10E+03	6.42E+02	5.66E+02	6.88E+02	6.33E+02	6.78E+02
SB-122	2.70 D	1.93E+03	1.85E+03	2.06E+03	2.41E+03	1.81E+03	1.63E+03	1.92E+03	1.77E+03	1.92E+03
SB-124	60.20 D	8.39E+03	8.33E+03	9.35E+03	1.05E+04	8.24E+03	7.57E+03	8.77E+03	8.08E+03	8.77E+03
SB-125	2.77 Y	1.83E+03	1.73E+03	1.92E+03	2.35E+03	1.69E+03	1.52E+03	1.80E+03	1.66E+03	1.80E+03
SB-126	12.4 D	1.22E+04	1.17E+04	1.31E+04	1.51E+04	1.15E+04	1.03E+04	1.22E+04	1.12E+04	1.22E+04
SB-126M	19.0 M	6.93E+03	6.61E+03	7.39E+03	8.61E+03	6.49E+03	5.85E+03	6.89E+03	6.36E+03	6.88E+03
SB-127	3.85 D	2.91E+03	2.78E+03	3.10E+03	3.63E+03	2.73E+03	2.46E+03	2.90E+03	2.67E+03	2.89E+03
SB-129	4.40 H	6.41E+03	6.25E+03	7.02E+03	7.92E+03	6.17E+03	5.62E+03	6.57E+03	6.04E+03	6.55E+03
TE-121	16.8 D	2.43E+03	2.32E+03	2.58E+03	3.09E+03	2.26E+03	2.04E+03	2.41E+03	2.22E+03	2.41E+03
TE-121M	154 D	8.79E+02	8.13E+02	8.72E+02	1.27E+03	7.90E+02	7.09E+02	8.41E+02	7.86E+02	8.45E+02
TE-123	1E13 Y	4.83E+00	5.94E+00	2.33E+00	3.78E+01	2.44E+00	2.63E+00	6.11E+00	3.80E+00	1.06E+01
TE-123M	119.7 D	5.79E+02	5.32E+02	5.65E+02	9.19E+02	5.20E+02	4.56E+02	5.57E+02	5.13E+02	5.48E+02
TE-125M	58 D	1.71E+01	2.22E+01	9.90E+00	1.11E+02	9.92E+00	1.07E+01	2.06E+01	1.39E+01	3.65E+01
TE-127	9.35 H	2.08E+01	1.95E+01	2.15E+01	2.70E+01	1.90E+01	1.71E+01	2.01E+01	1.87E+01	2.01E+01
TE-127M	109 D	5.76E+00	7.22E+00	3.60E+00	3.55E+01	3.53E+00	3.69E+00	6.84E+00	4.72E+00	1.16E+01
TE-129	69.6 M	2.31E+02	2.20E+02	2.43E+02	3.04E+02	2.14E+02	1.93E+02	2.28E+02	2.10E+02	2.30E+02
TE-129M	33.6 D	1.43E+02	1.39E+02	1.52E+02	1.97E+02	1.34E+02	1.21E+02	1.45E+02	1.32E+02	1.48E+02
TE-131	25.0 M	1.82E+03	1.73E+03	1.92E+03	2.41E+03	1.71E+03	1.53E+03	1.82E+03	1.67E+03	1.80E+03
TE-131M	30 H	6.35E+03	6.16E+03	6.91E+03	7.92E+03	6.08E+03	5.53E+03	6.47E+03	5.96E+03	6.46E+03
TE-132	78.2 H	9.03E+02	8.32E+02	8.80E+02	1.35E+03	8.00E+02	7.17E+02	8.54E+02	7.99E+02	8.66E+02
TE-133	12.45 M	4.10E+03	3.96E+03	4.42E+03	5.20E+03	3.90E+03	3.55E+03	4.14E+03	3.84E+03	4.14E+03
TE-133M	55.4 M	9.96E+03	9.70E+03	1.09E+04	1.24E+04	9.58E+03	8.71E+03	1.02E+04	9.38E+03	1.02E+04
TE-134	41.8 M	3.79E+03	3.60E+03	3.99E+03	4.89E+03	3.53E+03	3.17E+03	3.75E+03	3.46E+03	3.75E+03
I-122	3.62 M	4.20E+03	4.01E+03	4.46E+03	5.30E+03	3.92E+03	3.53E+03	4.16E+03	3.84E+03	4.16E+03
I-123	13.13 H	6.46E+02	5.98E+02	6.34E+02	1.03E+03	5.80E+02	5.12E+02	5.74E+02	5.47E+02	6.20E+02
I-124	4.18 D	4.66E+03	4.55E+03	5.09E+03	5.88E+03	4.48E+03	4.08E+03	4.76E+03	4.39E+03	4.77E+03
I-125	60.14 D	1.89E+01	2.49E+01	1.02E+01	1.31E+02	1.04E+01	1.15E+01	2.31E+01	1.51E+01	4.20E+01
I-126	12.93 D	2.00E+03	1.90E+03	2.12E+03	2.52E+03	1.86E+03	1.68E+03	1.98E+03	1.83E+03	1.98E+03
I-128	24.99 M	3.23E+02	3.05E+02	3.38E+02	4.13E+02	2.98E+02	2.68E+02	3.16E+02	2.93E+02	3.16E+02
I-129	1.57E7 Y	1.56E+01	2.18E+01	1.00E+01	8.86E+01	9.77E+00	1.10E+01	1.77E+01	1.29E+01	3.39E+01
I-130	12.36 H	9.42E+03	9.03E+03	1.01E+04	1.17E+04	8.86E+03	8.00E+03	9.42E+03	8.68E+03	9.40E+03
I-131	8.040 D	1.64E+03	1.53E+03	1.69E+03	2.13E+03	1.50E+03	1.35E+03	1.59E+03	1.48E+03	1.59E+03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/CUBIC M

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
IN-117	43.8 M	2.80E+03	3.01E+03	3.63E+03	3.03E+03	2.65E+03	2.40E+03	3.70E+03	2.74E+03	2.76E+03
IN-117M	116.5 M	3.44E+02	3.73E+02	4.94E+02	3.75E+02	3.11E+02	2.95E+02	5.04E+02	3.41E+02	3.40E+02
SN-113	115.1 D	2.29E+01	2.72E+01	3.74E+01	2.37E+01	2.17E+01	1.98E+01	3.88E+01	2.28E+01	2.33E+01
SN-117M	13.60 D	5.53E+02	6.09E+02	9.02E+02	5.72E+02	4.82E+02	4.65E+02	9.25E+02	5.53E+02	5.48E+02
SN-119M	293.0 D	2.43E+00	4.12E+00	6.55E+00	1.46E+00	2.85E+00	2.01E+00	7.02E+00	2.41E+00	2.76E+00
SN-123	129.2 D	3.01E+01	3.19E+01	3.39E+01	3.23E+01	2.90E+01	2.60E+01	3.45E+01	2.91E+01	2.96E+01
SN-125	9.64 D	1.35E+03	1.43E+03	1.52E+03	1.45E+03	1.29E+03	1.17E+03	1.55E+03	1.30E+03	1.33E+03
SN-126	1.0E5 Y	1.68E+02	1.87E+02	3.20E+02	1.30E+02	1.41E+02	1.21E+02	3.29E+02	1.59E+02	1.61E+02
SB-117	2.80 H	6.53E+02	7.16E+02	1.02E+03	6.81E+02	5.79E+02	5.50E+02	1.04E+03	6.49E+02	6.46E+02
SB-122	2.70 D	1.83E+03	1.97E+03	2.22E+03	2.01E+03	1.77E+03	1.58E+03	2.26E+03	1.79E+03	1.81E+03
SB-124	60.20 D	8.32E+03	8.82E+03	9.42E+03	8.94E+03	7.84E+03	7.21E+03	9.58E+03	8.04E+03	8.15E+03
SB-125	2.77 Y	1.72E+03	1.85E+03	2.15E+03	1.88E+03	1.65E+03	1.48E+03	2.18E+03	1.68E+03	1.70E+03
SB-126	12.4 D	1.16E+04	1.24E+04	1.38E+04	1.26E+04	1.12E+04	9.99E+03	1.41E+04	1.13E+04	1.15E+04
SB-126M	19.0 M	6.57E+03	7.04E+03	7.92E+03	7.19E+03	6.34E+03	5.67E+03	8.05E+03	6.40E+03	6.50E+03
SB-127	3.85 D	2.76E+03	2.96E+03	3.34E+03	3.02E+03	2.66E+03	2.38E+03	3.39E+03	2.69E+03	2.73E+03
SB-129	4.40 H	6.22E+03	6.63E+03	7.17E+03	6.72E+03	5.98E+03	5.38E+03	7.29E+03	6.03E+03	6.13E+03
TE-121	16.8 D	2.30E+03	2.47E+03	2.81E+03	2.52E+03	2.22E+03	1.98E+03	2.86E+03	2.24E+03	2.27E+03
TE-121M	154 D	8.08E+02	8.77E+02	1.16E+03	8.77E+02	7.23E+02	6.92E+02	1.19E+03	8.00E+02	7.97E+02
TE-123	1E13 Y	4.08E+00	6.19E+00	1.01E+01	2.21E+00	4.35E+00	2.97E+00	1.06E+01	3.73E+00	4.27E+00
TE-123M	119.7 D	5.29E+02	5.82E+02	8.61E+02	5.46E+02	4.60E+02	4.44E+02	8.84E+02	5.28E+02	5.24E+02
TE-125M	58 D	1.61E+01	2.19E+01	3.64E+01	8.60E+00	1.57E+01	1.08E+01	3.80E+01	1.40E+01	1.58E+01
TE-127	9.35 H	1.94E+01	2.09E+01	2.52E+01	2.14E+01	1.82E+01	1.67E+01	2.56E+01	1.90E+01	1.91E+01
TE-127M	109 D	5.39E+00	7.29E+00	1.20E+01	3.07E+00	5.26E+00	3.69E+00	1.25E+01	4.77E+00	5.32E+00
TE-129	69.6 M	2.18E+02	2.34E+02	2.72E+02	2.38E+02	2.08E+02	1.88E+02	2.77E+02	2.13E+02	2.15E+02
TE-129M	33.6 D	1.37E+02	1.47E+02	1.65E+02	1.47E+02	1.33E+02	1.17E+02	1.68E+02	1.32E+02	1.35E+02
TE-131	25.0 M	1.73E+03	1.86E+03	2.24E+03	1.85E+03	1.62E+03	1.48E+03	2.28E+03	1.69E+03	1.70E+03
TE-131M	30 H	6.14E+03	6.54E+03	7.19E+03	6.62E+03	5.88E+03	5.29E+03	7.31E+03	5.95E+03	6.05E+03
TE-132	78.2 H	8.24E+02	8.99E+02	1.23E+03	8.91E+02	7.31E+02	7.02E+02	1.25E+03	8.16E+02	8.13E+02
TE-133	12.45 M	3.95E+03	4.21E+03	4.73E+03	4.29E+03	3.72E+03	3.42E+03	4.81E+03	3.84E+03	3.88E+03
TE-133M	55.4 M	9.66E+03	1.03E+04	1.12E+04	1.04E+04	9.24E+03	8.34E+03	1.14E+04	9.36E+03	9.52E+03
TE-134	41.8 M	3.58E+03	3.84E+03	4.50E+03	3.89E+03	3.40E+03	3.07E+03	4.58E+03	3.49E+03	3.53E+03
I-122	3.62 M	3.98E+03	4.27E+03	4.88E+03	4.36E+03	3.82E+03	3.43E+03	4.95E+03	3.88E+03	3.93E+03
I-123	13.13 H	5.92E+02	6.51E+02	9.43E+02	6.14E+02	5.22E+02	4.98E+02	9.67E+02	5.89E+02	5.86E+02
I-124	4.18 D	4.53E+03	4.83E+03	5.29E+03	4.91E+03	4.31E+03	3.92E+03	5.38E+03	4.39E+03	4.46E+03
I-125	60.14 D	1.76E+01	2.45E+01	4.06E+01	8.91E+00	1.74E+01	1.16E+01	4.24E+01	1.52E+01	1.73E+01
I-126	12.93 D	1.89E+03	2.03E+03	2.30E+03	2.07E+03	1.82E+03	1.63E+03	2.34E+03	1.84E+03	1.87E+03
I-128	24.99 M	3.03E+02	3.26E+02	3.81E+02	3.34E+02	2.89E+02	2.61E+02	3.87E+02	2.97E+02	2.99E+02
I-129	1.57E7 Y	1.65E+01	2.06E+01	3.51E+01	7.82E+00	1.48E+01	9.77E+00	3.62E+01	1.34E+01	1.51E+01
I-130	12.36 H	8.97E+03	9.60E+03	1.07E+04	9.79E+03	8.67E+03	7.73E+03	1.09E+04	8.73E+03	8.86E+03
I-131	8.040 D	1.52E+03	1.64E+03	1.99E+03	1.69E+03	1.43E+03	1.32E+03	2.02E+03	1.50E+03	1.51E+03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
IN-117	43.8 M	4.06E+03	3.10E+03	3.82E+03	2.44E+03	3.50E+03	4.61E+03	1.55E+03	6.16E+03
IN-117M	116.5 M	5.13E+02	3.86E+02	4.85E+02	3.03E+02	4.47E+02	5.78E+02	3.12E+03	3.69E+03
SN-113	115.1 D	5.29E+01	2.66E+01	4.01E+01	1.81E+01	4.19E+01	8.97E+01	0.0	8.97E+01
SN-117M	13.60 D	8.59E+02	6.47E+02	8.32E+02	4.86E+02	7.54E+02	9.55E+02	4.82E+02	1.44E+03
SN-119M	293.0 D	1.56E+01	3.43E+00	8.56E+00	7.22E-01	1.09E+01	3.62E+01	0.0	3.62E+01
SN-123	129.2 D	4.21E+01	3.38E+01	4.02E+01	2.64E+01	3.60E+01	4.86E+01	3.91E+03	3.96E+03
SN-125	9.64 D	1.88E+03	1.50E+03	1.78E+03	1.19E+03	1.61E+03	2.17E+03	6.36E+03	8.53E+03
SN-126	1.0E5 Y	2.87E+02	2.15E+02	2.80E+02	1.37E+02	2.44E+02	3.25E+02	1.41E+02	4.65E+02
SB-117	2.80 H	1.00E+03	7.56E+02	9.65E+02	5.72E+02	8.76E+02	1.13E+03	8.22E+01	1.21E+03
SB-122	2.70 D	2.63E+03	2.02E+03	2.45E+03	1.60E+03	2.25E+03	3.02E+03	4.19E+03	7.20E+03
SB-124	60.20 D	1.16E+04	9.10E+03	1.08E+04	7.39E+03	9.95E+03	1.33E+04	2.63E+03	1.59E+04
SB-125	2.77 Y	2.50E+03	1.89E+03	2.32E+03	1.50E+03	2.13E+03	2.87E+03	3.36E+02	3.21E+03
SB-126	12.4 D	1.65E+04	1.29E+04	1.56E+04	1.01E+04	1.41E+04	1.90E+04	1.98E+03	2.10E+04
SB-126M	19.0 M	9.40E+03	7.27E+03	8.83E+03	5.73E+03	8.04E+03	1.08E+04	4.43E+03	1.52E+04
SB-127	3.85 D	3.95E+03	3.06E+03	3.71E+03	2.41E+03	3.38E+03	4.54E+03	2.05E+03	6.58E+03
SB-129	4.40 H	8.76E+03	6.93E+03	8.29E+03	5.46E+03	7.50E+03	1.01E+04	2.43E+03	1.25E+04
TE-121	16.8 D	3.33E+03	2.52E+03	3.08E+03	2.00E+03	2.84E+03	3.85E+03	1.89E+01	3.87E+03
TE-121M	154 D	1.21E+03	9.18E+02	1.15E+03	7.11E+02	1.05E+03	1.36E+03	6.94E+01	1.43E+03
TE-123	1E13 Y	2.17E+01	6.10E+00	1.30E+01	1.41E+00	1.51E+01	4.50E+01	0.0	4.50E+01
TE-123M	119.7 D	8.20E+02	6.20E+02	7.96E+02	4.64E+02	7.20E+02	9.07E+02	8.17E+01	9.89E+02
TE-125M	58 D	6.84E+01	2.45E+01	4.46E+01	7.14E+00	4.84E+01	1.28E+02	8.70E+01	2.15E+02
TE-127	9.35 H	2.81E+01	2.12E+01	2.62E+01	1.70E+01	2.42E+01	3.18E+01	1.30E+03	1.33E+03
TE-127M	109 D	2.19E+01	7.98E+00	1.44E+01	2.56E+00	1.56E+01	4.09E+01	4.79E+01	8.88E+01
TE-129	69.6 M	3.19E+02	2.40E+02	2.95E+02	1.90E+02	2.72E+02	3.71E+02	3.81E+03	4.18E+03
TE-129M	33.6 D	2.05E+02	1.53E+02	1.89E+02	1.17E+02	1.72E+02	2.48E+02	1.65E+03	1.90E+03
TE-131	25.0 M	2.50E+03	1.94E+03	2.38E+03	1.51E+03	2.16E+03	2.83E+03	5.32E+03	8.15E+03
TE-131M	30 H	8.68E+03	6.85E+03	8.23E+03	5.37E+03	7.44E+03	9.98E+03	9.54E+02	1.09E+04
TE-132	78.2 H	1.26E+03	9.40E+02	1.19E+03	7.22E+02	1.09E+03	1.42E+03	1.75E+02	1.59E+03
TE-133	12.45 M	5.59E+03	4.37E+03	5.27E+03	3.49E+03	4.81E+03	6.38E+03	6.33E+03	1.27E+04
TE-133M	55.4 M	1.36E+04	1.08E+04	1.29E+04	8.47E+03	1.17E+04	1.57E+04	5.29E+03	2.10E+04
TE-134	41.8 M	5.17E+03	3.99E+03	4.88E+03	3.12E+03	4.44E+03	5.91E+03	5.08E+02	6.42E+03
I-122	3.62 M	5.72E+03	4.35E+03	5.31E+03	3.48E+03	4.89E+03	6.56E+03	8.28E+03	1.48E+04
I-123	13.13 H	9.25E+02	6.90E+02	8.86E+02	5.18E+02	8.05E+02	1.04E+03	6.23E+01	1.10E+03
I-124	4.18 D	6.41E+03	4.97E+03	5.97E+03	3.99E+03	5.49E+03	7.36E+03	1.52E+03	8.88E+03
I-125	60.14 D	7.93E+01	2.72E+01	5.08E+01	7.17E+00	5.57E+01	1.51E+02	0.0	1.51E+02
I-126	12.93 D	2.72E+03	2.09E+03	2.55E+03	1.65E+03	2.33E+03	3.14E+03	8.74E+02	4.01E+03
I-128	24.99 M	4.39E+02	3.31E+02	4.07E+02	2.65E+02	3.76E+02	5.02E+02	5.83E+03	6.34E+03
I-129	1.57E7 Y	5.85E+01	2.61E+01	4.15E+01	8.16E+00	4.17E+01	9.79E+01	1.78E+01	1.16E+02
I-130	12.36 H	1.28E+04	9.93E+03	1.20E+04	7.82E+03	1.09E+04	1.47E+04	1.82E+03	1.65E+04
I-131	8.040 D	2.22E+03	1.68E+03	2.07E+03	1.34E+03	1.91E+03	2.51E+03	1.01E+03	3.52E+03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
I-132	2.30 H	1.02E+04	9.87E+03	1.11E+04	1.26E+04	9.72E+03	8.81E+03	1.03E+04	9.52E+03	1.03E+04
I-133	20.8 H	2.64E+03	2.52E+03	2.82E+03	3.30E+03	2.47E+03	2.23E+03	2.63E+03	2.42E+03	2.63E+03
I-134	52.6 H	1.18E+04	1.15E+04	1.29E+04	1.45E+04	1.13E+04	1.03E+04	1.21E+04	1.11E+04	1.20E+04
I-135	6.61 H	7.03E+03	7.01E+03	7.89E+03	8.78E+03	6.95E+03	6.40E+03	7.39E+03	6.81E+03	7.39E+03
I-136	83 S	1.17E+04	1.19E+04	1.33E+04	1.49E+04	1.18E+04	1.10E+04	1.26E+04	1.16E+04	1.27E+04
XE-122	20.1 H	2.40E+02	2.28E+02	2.38E+02	3.86E+02	2.14E+02	1.92E+02	2.33E+02	2.14E+02	2.44E+02
XE-123	2.14 H	2.68E+03	2.59E+03	2.87E+03	3.54E+03	2.54E+03	2.30E+03	2.71E+03	2.50E+03	2.71E+03
XE-125	16.8 H	1.04E+03	9.70E+02	1.04E+03	1.53E+03	9.35E+02	8.39E+02	1.00E+03	9.30E+02	1.01E+03
XE-127	36.406 D	1.10E+03	1.01E+03	1.08E+03	1.62E+03	9.77E+02	8.73E+02	1.04E+03	9.72E+02	1.05E+03
XE-129M	8.89 D	6.53E+01	7.16E+01	5.46E+01	2.07E+02	5.10E+01	4.92E+01	6.63E+01	5.62E+01	9.31E+01
XE-131M	11.84 D	2.32E+01	2.55E+01	1.90E+01	7.87E+01	1.79E+01	1.72E+01	2.38E+01	1.99E+01	3.38E+01
XE-133	5.245 D	1.13E+02	1.20E+02	1.15E+02	2.63E+02	1.04E+02	9.31E+01	1.16E+02	1.01E+02	1.31E+02
XE-133M	2.19 D	1.13E+02	1.08E+02	1.07E+02	2.05E+02	9.76E+01	8.87E+01	1.08E+02	9.94E+01	1.19E+02
XE-135	9.11 H	1.06E+03	9.76E+02	1.06E+03	1.46E+03	9.51E+02	8.53E+02	1.01E+03	9.45E+02	1.01E+03
XE-135M	15.36 M	1.85E+03	1.76E+03	1.96E+03	2.33E+03	1.71E+03	1.54E+03	1.82E+03	1.68E+03	1.82E+03
XE-137	3.83 M	8.16E+02	7.83E+02	8.72E+02	1.04E+03	7.68E+02	6.97E+02	8.16E+02	7.55E+02	8.16E+02
XE-138	14.13 M	5.22E+03	5.25E+03	5.86E+03	6.71E+03	5.22E+03	4.82E+03	5.55E+03	5.13E+03	5.57E+03
CS-126	1.64 M	4.87E+03	4.63E+03	5.16E+03	6.16E+03	4.53E+03	4.08E+03	4.81E+03	4.44E+03	4.81E+03
CS-129	32.06 H	1.10E+03	1.03E+03	1.12E+03	1.51E+03	9.95E+02	8.97E+02	1.06E+03	9.85E+02	1.09E+03
CS-131	9.688 D	1.28E+01	1.75E+01	7.56E+00	7.87E+01	7.52E+00	8.54E+00	1.44E+01	1.05E+01	2.86E+01
CS-132	6.475 D	3.08E+03	2.96E+03	3.30E+03	3.86E+03	2.89E+03	2.61E+03	3.08E+03	2.83E+03	3.09E+03
CS-134	2.062 Y	6.90E+03	6.63E+03	7.43E+03	8.50E+03	6.52E+03	5.89E+03	6.93E+03	6.38E+03	6.91E+03
CS-134M	2.90 H	7.49E+01	7.28E+01	7.21E+01	1.49E+02	6.67E+01	5.88E+01	7.44E+01	6.64E+01	7.88E+01
CS-135	2.3E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS-136	13.16 D	9.63E+03	9.34E+03	1.05E+04	1.20E+04	9.21E+03	8.36E+03	9.80E+03	9.02E+03	9.77E+03
CS-137	30.17 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS-138	32.2 M	1.07E+04	1.07E+04	1.20E+04	1.35E+04	1.06E+04	9.82E+03	1.13E+04	1.04E+04	1.13E+04
CS-139	9.40 M	1.39E+03	1.41E+03	1.58E+03	1.76E+03	1.40E+03	1.30E+03	1.49E+03	1.38E+03	1.50E+03
BA-131	11.8 D	1.92E+03	1.82E+03	1.99E+03	2.62E+03	1.76E+03	1.58E+03	1.88E+03	1.74E+03	1.89E+03
BA-133	10.5 Y	1.52E+03	1.43E+03	1.54E+03	2.18E+03	1.37E+03	1.23E+03	1.46E+03	1.36E+03	1.50E+03
BA-133M	38.9 H	2.27E+02	2.15E+02	2.21E+02	3.59E+02	2.00E+02	1.81E+02	2.17E+02	2.01E+02	2.30E+02
BA-135M	28.7 H	1.98E+02	1.88E+02	1.92E+02	3.21E+02	1.73E+02	1.58E+02	1.89E+02	1.75E+02	2.03E+02
BA-137M	2.552 M	2.64E+03	2.52E+03	2.83E+03	3.26E+03	2.48E+03	2.24E+03	2.64E+03	2.43E+03	2.63E+03
BA-139	83.1 M	1.48E+02	1.37E+02	1.48E+02	2.20E+02	1.35E+02	1.20E+02	1.44E+02	1.33E+02	1.42E+02
BA-140	12.789 D	8.04E+02	7.61E+02	8.42E+02	1.04E+03	7.42E+02	6.67E+02	7.89E+02	7.29E+02	7.90E+02
BA-141	18.27 M	3.90E+03	3.75E+03	4.16E+03	5.04E+03	3.69E+03	3.35E+03	3.92E+03	3.63E+03	3.91E+03
BA-142	10.70 M	3.98E+03	3.87E+03	4.33E+03	5.00E+03	3.81E+03	3.47E+03	4.06E+03	3.74E+03	4.05E+03
LA-140	40.22 H	1.03E+04	1.03E+04	1.16E+04	1.30E+04	1.02E+04	9.43E+03	1.09E+04	1.00E+04	1.09E+04
LA-141	3.94 H	1.87E+02	1.88E+02	2.12E+02	2.34E+02	1.86E+02	1.72E+02	1.98E+02	1.83E+02	1.98E+02
LA-142	95.4 M	1.30E+04	1.32E+04	1.47E+04	1.67E+04	1.32E+04	1.23E+04	1.40E+04	1.30E+04	1.42E+04

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
I-132	2.30 H	9.81E+03	1.05E+04	1.15E+04	1.06E+04	9.48E+03	8.47E+03	1.16E+04	9.52E+03	9.69E+03
I-133	20.8 H	2.51E+03	2.69E+03	3.04E+03	2.74E+03	2.42E+03	2.16E+03	3.08E+03	2.45E+03	2.48E+03
I-134	52.6 H	1.14E+04	1.22E+04	1.32E+04	1.23E+04	1.10E+04	9.87E+03	1.34E+04	1.11E+04	1.13E+04
I-135	6.61 H	7.00E+03	7.41E+03	7.82E+03	7.49E+03	6.61E+03	6.07E+03	7.95E+03	6.76E+03	6.85E+03
I-136	83 S	1.19E+04	1.25E+04	1.30E+04	1.27E+04	1.10E+04	1.04E+04	1.32E+04	1.15E+04	1.17E+04
XE-122	20.1 H	2.22E+02	2.43E+02	3.17E+02	2.37E+02	2.05E+02	1.88E+02	3.23E+02	2.18E+02	2.19E+02
XE-123	2.14 H	2.58E+03	2.76E+03	3.21E+03	2.77E+03	2.42E+03	2.22E+03	3.27E+03	2.51E+03	2.54E+03
XE-125	16.8 H	9.60E+02	1.04E+03	1.38E+03	1.03E+03	8.67E+02	8.18E+02	1.41E+03	9.47E+02	9.47E+02
XE-127	36.406 D	1.00E+03	1.09E+03	1.49E+03	1.08E+03	8.94E+02	8.54E+02	1.52E+03	9.93E+02	9.90E+02
XE-129M	8.89 D	6.26E+01	7.29E+01	1.12E+02	5.18E+01	5.58E+01	4.68E+01	1.15E+02	5.77E+01	6.02E+01
XE-131M	11.84 D	2.21E+01	2.61E+01	4.10E+01	1.77E+01	1.98E+01	1.64E+01	4.23E+01	2.04E+01	2.14E+01
XE-133	5.245 D	1.16E+02	1.30E+02	2.24E+02	8.49E+01	9.74E+01	8.12E+01	2.30E+02	1.08E+02	1.10E+02
XE-133M	2.19 D	1.04E+02	1.15E+02	1.58E+02	1.08E+02	9.27E+01	8.68E+01	1.62E+02	1.02E+02	1.02E+02
XE-135	9.11 H	9.72E+02	1.05E+03	1.37E+03	1.07E+03	8.76E+02	8.37E+02	1.40E+03	9.63E+02	9.60E+02
XE-135M	15.36 H	1.74E+03	1.87E+03	2.15E+03	1.91E+03	1.68E+03	1.50E+03	2.18E+03	1.70E+03	1.72E+03
XE-137	3.83 H	7.80E+02	8.35E+02	9.50E+02	8.54E+02	7.39E+02	6.74E+02	9.65E+02	7.61E+02	7.68E+02
XE-138	14.13 H	5.27E+03	5.56E+03	5.95E+03	5.64E+03	4.83E+03	4.57E+03	6.05E+03	5.07E+03	5.15E+03
CS-126	1.64 H	4.61E+03	4.94E+03	5.68E+03	5.05E+03	4.40E+03	3.97E+03	5.77E+03	4.50E+03	4.54E+03
CS-129	32.06 H	1.02E+03	1.10E+03	1.34E+03	1.12E+03	9.60E+02	8.77E+02	1.37E+03	1.00E+03	1.01E+03
CS-131	9.688 D	1.30E+01	1.68E+01	2.83E+01	6.22E+00	1.21E+01	7.93E+00	2.94E+01	1.07E+01	1.21E+01
CS-132	6.475 D	2.93E+03	3.14E+03	3.50E+03	3.19E+03	2.84E+03	2.52E+03	3.56E+03	2.85E+03	2.90E+03
CS-134	2.062 Y	6.58E+03	7.04E+03	7.78E+03	7.17E+03	6.38E+03	5.68E+03	7.91E+03	6.40E+03	6.51E+03
CS-134M	2.90 H	7.04E+01	7.87E+01	1.24E+02	6.51E+01	6.10E+01	5.60E+01	1.28E+02	6.88E+01	6.91E+01
CS-135	2.3E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS-136	13.16 D	9.29E+03	9.91E+03	1.09E+04	1.00E+04	8.92E+03	8.01E+03	1.11E+04	9.01E+03	9.16E+03
CS-137	30.17 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS-138	32.2 M	1.07E+04	1.13E+04	1.19E+04	1.15E+04	9.99E+03	9.31E+03	1.21E+04	1.03E+04	1.05E+04
CS-139	9.40 H	1.41E+03	1.49E+03	1.55E+03	1.51E+03	1.31E+03	1.23E+03	1.57E+03	1.36E+03	1.38E+03
BA-131	11.8 D	1.80E+03	1.95E+03	2.39E+03	1.95E+03	1.69E+03	1.54E+03	2.43E+03	1.76E+03	1.78E+03
BA-133	10.5 Y	1.42E+03	1.53E+03	1.97E+03	1.52E+03	1.30E+03	1.20E+03	2.01E+03	1.39E+03	1.39E+03
BA-133M	38.9 H	2.09E+02	2.28E+02	3.02E+02	2.24E+02	1.89E+02	1.77E+02	3.08E+02	2.05E+02	2.06E+02
BA-135M	28.7 H	1.83E+02	2.00E+02	2.67E+02	1.94E+02	1.65E+02	1.54E+02	2.72E+02	1.79E+02	1.79E+02
BA-137M	2.552 M	2.51E+03	2.68E+03	2.99E+03	2.74E+03	2.43E+03	2.16E+03	3.04E+03	2.44E+03	2.48E+03
BA-139	83.1 H	1.37E+02	1.49E+02	2.08E+02	1.43E+02	1.21E+02	1.16E+02	2.13E+02	1.36E+02	1.35E+02
BA-140	12.789 D	7.56E+02	8.13E+02	9.59E+02	8.27E+02	7.19E+02	6.49E+02	9.75E+02	7.39E+02	7.46E+02
BA-141	18.27 M	3.74E+03	4.00E+03	4.61E+03	4.06E+03	3.50E+03	3.23E+03	4.70E+03	3.65E+03	3.68E+03
BA-142	10.70 H	3.85E+03	4.10E+03	4.53E+03	4.14E+03	3.67E+03	3.32E+03	4.61E+03	3.74E+03	3.79E+03
LA-140	40.22 H	1.03E+04	1.09E+04	1.16E+04	1.11E+04	9.67E+03	8.95E+03	1.18E+04	9.96E+03	1.01E+04
LA-141	3.94 H	1.88E+02	1.98E+02	2.07E+02	2.00E+02	1.77E+02	1.63E+02	2.11E+02	1.81E+02	1.83E+02
LA-142	95.4 M	1.33E+04	1.40E+04	1.45E+04	1.42E+04	1.21E+04	1.16E+04	1.47E+04	1.28E+04	1.31E+04

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
I-132	2.30 H	1.39E+04	1.09E+04	1.31E+04	8.57E+03	1.19E+04	1.60E+04	3.52E+03	1.95E+04
I-133	20.8 H	3.59E+03	2.76E+03	3.35E+03	2.19E+03	3.07E+03	4.12E+03	2.85E+03	6.97E+03
I-134	52.6 M	1.61E+04	1.28E+04	1.53E+04	1.00E+04	1.38E+04	1.85E+04	4.52E+03	2.31E+04
I-135	6.61 H	9.72E+03	7.74E+03	9.17E+03	6.22E+03	8.34E+03	1.11E+04	2.52E+03	1.37E+04
I-136	83 S	1.64E+04	1.30E+04	1.52E+04	1.06E+04	1.41E+04	1.85E+04	1.67E+04	3.52E+04
XE-122	20.1 H	3.58E+02	2.52E+02	3.24E+02	1.90E+02	3.02E+02	4.34E+02	6.74E+00	4.41E+02
XE-123	2.14 H	3.71E+03	2.86E+03	3.49E+03	2.27E+03	3.19E+03	4.24E+03	1.21E+03	5.44E+03
XE-125	16.8 H	1.46E+03	1.09E+03	1.38E+03	8.39E+02	1.26E+03	1.66E+03	8.53E+01	1.75E+03
XE-127	36.406 D	1.53E+03	1.14E+03	1.45E+03	8.79E+02	1.33E+03	1.72E+03	9.50E+01	1.82E+03
XE-129M	8.89 D	1.52E+02	8.33E+01	1.20E+02	4.47E+01	1.17E+02	2.25E+02	7.37E+02	9.62E+02
XE-131M	11.84 D	5.62E+01	2.97E+01	4.41E+01	1.54E+01	4.29E+01	8.54E+01	4.75E+02	5.61E+02
XE-133	5.245 D	2.12E+02	1.53E+02	2.01E+02	9.23E+01	1.76E+02	2.49E+02	3.33E+02	5.81E+02
XE-133M	2.19 D	1.78E+02	1.21E+02	1.59E+02	8.76E+01	1.49E+02	2.21E+02	9.87E+02	1.21E+03
XE-135	9.11 H	1.43E+03	1.09E+03	1.36E+03	8.59E+02	1.25E+03	1.60E+03	2.04E+03	3.64E+03
XE-135M	15.36 M	2.52E+03	1.91E+03	2.33E+03	1.52E+03	2.15E+03	2.89E+03	6.83E+02	3.57E+03
XE-137	3.83 M	1.11E+03	8.52E+02	1.03E+03	6.87E+02	9.55E+02	1.27E+03	1.45E+04	1.58E+04
XE-138	14.13 M	7.26E+03	5.70E+03	6.75E+03	4.73E+03	6.27E+03	8.23E+03	4.66E+03	1.29E+04
CS-126	1.64 M	6.63E+03	5.03E+03	6.15E+03	4.03E+03	5.67E+03	7.57E+03	1.08E+04	1.84E+04
CS-129	32.06 H	1.53E+03	1.13E+03	1.41E+03	8.90E+02	1.31E+03	1.78E+03	2.17E+01	1.80E+03
CS-131	9.688 D	5.07E+01	2.06E+01	3.46E+01	5.85E+00	3.57E+01	8.83E+01	0.0	8.83E+01
CS-132	6.475 D	4.21E+03	3.26E+03	3.95E+03	2.55E+03	3.59E+03	4.89E+03	4.78E+01	4.93E+03
CS-134	2.062 Y	9.37E+03	7.32E+03	8.83E+03	5.74E+03	8.01E+03	1.08E+04	8.86E+02	1.17E+04
CS-134M	2.90 H	1.23E+02	8.71E+01	1.15E+02	5.88E+01	1.04E+02	1.46E+02	1.91E+02	3.37E+02
CS-135	2.3E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	6.95E+01	6.95E+01
CS-136	13.16 D	1.31E+04	1.04E+04	1.25E+04	8.12E+03	1.13E+04	1.51E+04	4.52E+02	1.56E+04
CS-137	30.17 Y	0.0	0.0	0.0	0.0	0.0	0.0	8.75E+02	8.75E+02
CS-138	32.2 M	1.48E+04	1.17E+04	1.39E+04	9.55E+03	1.27E+04	1.69E+04	9.75E+03	2.66E+04
CS-139	9.40 M	1.94E+03	1.54E+03	1.81E+03	1.26E+03	1.67E+03	2.21E+03	1.35E+04	1.57E+04
BA-131	11.8 D	2.67E+03	2.01E+03	2.49E+03	1.57E+03	2.29E+03	3.06E+03	7.69E+01	3.13E+03
BA-133	10.5 Y	2.14E+03	1.59E+03	1.99E+03	1.23E+03	1.84E+03	2.45E+03	5.16E+01	2.50E+03
BA-133M	38.9 H	3.33E+02	2.40E+02	3.06E+02	1.80E+02	2.83E+02	3.94E+02	1.20E+03	1.59E+03
BA-135M	28.7 H	2.95E+02	2.11E+02	2.69E+02	1.57E+02	2.50E+02	3.51E+02	1.17E+03	1.52E+03
BA-137M	2.552 M	3.58E+03	2.78E+03	3.37E+03	2.18E+03	3.06E+03	4.13E+03	4.71E+02	4.60E+03
BA-139	83.1 M	2.06E+02	1.58E+02	1.99E+02	1.21E+02	1.80E+02	2.26E+02	6.97E+03	7.20E+03
BA-140	12.789 D	1.10E+03	8.31E+02	1.02E+03	6.60E+02	9.41E+02	1.26E+03	1.76E+03	3.02E+03
BA-141	18.27 M	5.33E+03	4.15E+03	5.03E+03	3.30E+03	4.59E+03	6.06E+03	6.57E+03	1.26E+04
BA-142	10.70 M	5.45E+03	4.32E+03	5.18E+03	3.38E+03	4.67E+03	6.26E+03	3.22E+03	9.48E+03
LA-140	40.22 H	1.43E+04	1.13E+04	1.34E+04	9.19E+03	1.23E+04	1.64E+04	3.87E+03	2.02E+04
LA-141	3.94 H	2.59E+02	2.07E+02	2.45E+02	1.67E+02	2.23E+02	2.97E+02	7.40E+03	7.70E+03
LA-142	95.4 M	1.82E+04	1.43E+04	1.67E+04	1.19E+04	1.57E+04	2.05E+04	6.58E+03	2.70E+04

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/ICUBIC M

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
CE-139	137.66 D	5.93E+02	5.54E+02	5.75E+02	9.73E+02	5.28E+02	4.68E+02	5.71E+02	5.25E+02	5.80E+02
CE-141	32.50 D	3.06E+02	2.85E+02	3.00E+02	4.97E+02	2.76E+02	2.42E+02	2.97E+02	2.71E+02	2.93E+02
CE-143	33.0 H	1.10E+03	1.05E+03	1.13E+03	1.52E+03	1.00E+03	9.07E+02	1.07E+03	9.93E+02	1.10E+03
CE-144	284.3 D	6.87E+01	6.60E+01	6.75E+01	1.22E+02	6.22E+01	5.47E+01	6.78E+01	6.11E+01	6.88E+01
PR-142	19.13 H	2.59E+02	2.62E+02	2.95E+02	3.26E+02	2.60E+02	2.42E+02	2.77E+02	2.56E+02	2.77E+02
PR-143	13.56 D	3.98E-05	3.83E-05	4.30E-05	4.88E-05	3.77E-05	3.40E-05	4.01E-05	3.68E-05	4.00E-05
PR-144	17.28 M	1.49E+02	1.51E+02	1.68E+02	1.89E+02	1.50E+02	1.38E+02	1.59E+02	1.47E+02	1.60E+02
PR-144M	7.2 M	1.12E+01	1.67E+01	8.58E+00	5.00E+01	8.04E+00	9.07E+00	1.28E+01	9.61E+00	2.29E+01
ND-147	10.98 D	5.35E+02	5.22E+02	5.56E+02	7.95E+02	4.93E+02	4.44E+02	5.31E+02	4.84E+02	5.48E+02
ND-149	1.73 H	1.60E+03	1.51E+03	1.63E+03	2.21E+03	1.46E+03	1.31E+03	1.55E+03	1.44E+03	1.56E+03
PM-143	265 D	1.30E+03	1.27E+03	1.40E+03	1.69E+03	1.23E+03	1.11E+03	1.31E+03	1.20E+03	1.34E+03
PM-144	363 D	6.75E+03	6.47E+03	7.22E+03	8.46E+03	6.33E+03	5.71E+03	6.73E+03	6.20E+03	6.75E+03
PM-145	17.7 Y	3.85E+01	5.44E+01	3.24E+01	1.49E+02	2.98E+01	3.19E+01	4.30E+01	3.35E+01	7.05E+01
PM-146	2020 D	3.25E+03	3.11E+03	3.46E+03	4.11E+03	3.04E+03	2.74E+03	3.24E+03	2.98E+03	3.25E+03
PM-147	2.6234 Y	1.42E-02	1.33E-02	1.42E-02	2.37E-02	1.31E-02	1.13E-02	1.40E-02	1.27E-02	1.35E-02
PM-148	5.37 D	2.52E+03	2.49E+03	2.80E+03	3.14E+03	2.46E+03	2.25E+03	2.62E+03	2.41E+03	2.61E+03
PM-148M	41.3 D	8.76E+03	8.38E+03	9.37E+03	1.09E+04	8.23E+03	7.42E+03	8.74E+03	8.06E+03	8.73E+03
PM-149	53.08 H	5.01E+01	4.66E+01	5.09E+01	6.66E+01	4.54E+01	4.08E+01	4.81E+01	4.50E+01	4.82E+01
PM-151	28.40 H	1.42E+03	1.34E+03	1.46E+03	1.92E+03	1.30E+03	1.17E+03	1.38E+03	1.28E+03	1.39E+03
SM-147	1.069E11 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM-151	90 Y	1.07E-03	5.74E-04	3.24E-04	1.57E-02	3.81E-04	2.90E-04	9.46E-04	7.59E-04	1.45E-03
SM-153	46.7 H	1.71E+02	1.81E+02	1.68E+02	3.74E+02	1.54E+02	1.39E+02	1.75E+02	1.52E+02	1.96E+02
EU-152	13.6 Y	4.98E+03	4.88E+03	5.44E+03	6.36E+03	4.79E+03	4.38E+03	5.11E+03	4.71E+03	5.13E+03
EU-152M	9.32 H	1.38E+03	1.34E+03	1.50E+03	1.74E+03	1.32E+03	1.20E+03	1.41E+03	1.29E+03	1.41E+03
EU-154	8.8 Y	5.51E+03	5.40E+03	6.05E+03	6.93E+03	5.32E+03	4.86E+03	5.67E+03	5.22E+03	5.66E+03
EU-155	4.96 Y	2.01E+02	2.04E+02	2.04E+02	4.01E+02	1.86E+02	1.64E+02	2.04E+02	1.80E+02	2.12E+02
EU-156	15.19 D	6.16E+03	6.17E+03	6.92E+03	7.76E+03	6.12E+03	5.64E+03	6.52E+03	6.01E+03	6.53E+03
GD-152	1.1E14 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GD-153	241.6 D	2.88E+02	3.12E+02	2.81E+02	6.61E+02	2.58E+02	2.35E+02	2.97E+02	2.57E+02	3.42E+02
GD-159	18.56 H	1.53E+02	1.47E+02	1.55E+02	2.25E+02	1.38E+02	1.25E+02	1.48E+02	1.37E+02	1.55E+02
GD-162	9.7 M	1.81E+03	1.70E+03	1.88E+03	2.33E+03	1.66E+03	1.49E+03	1.76E+03	1.63E+03	1.76E+03
TB-157	150 Y	6.28E+00	8.58E+00	5.70E+00	2.20E+01	5.15E+00	5.36E+00	6.84E+00	5.52E+00	1.05E+01
TB-160	72.3 D	4.78E+03	4.66E+03	5.21E+03	5.98E+03	4.59E+03	4.18E+03	4.88E+03	4.50E+03	4.88E+03
TB-162	7.76 M	4.86E+03	4.66E+03	5.19E+03	6.15E+03	4.58E+03	4.14E+03	4.87E+03	4.49E+03	4.86E+03
DY-157	8.06 H	1.41E+03	1.33E+03	1.42E+03	1.99E+03	1.27E+03	1.14E+03	1.35E+03	1.26E+03	1.38E+03
DY-165	2.334 H	9.91E+01	9.70E+01	1.04E+02	1.47E+02	9.17E+01	8.28E+01	9.86E+01	9.01E+01	1.02E+02
DY-166	81.6 H	1.00E+02	1.12E+02	1.02E+02	2.35E+02	9.10E+01	8.45E+01	1.03E+02	9.00E+01	1.22E+02
HO-166	26.80 H	1.09E+02	1.12E+02	1.21E+02	1.67E+02	1.07E+02	9.85E+01	1.15E+02	1.05E+02	1.19E+02
HO-166M	1.20E3 Y	7.02E+03	6.71E+03	7.47E+03	8.92E+03	6.58E+03	5.94E+03	7.00E+03	6.45E+03	6.99E+03
ER-169	9.40 D	6.43E-03	6.00E-03	6.35E-03	1.81E-02	5.86E-03	5.05E-03	6.31E-03	5.70E-03	6.09E-03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
CE-139	137.66 D	5.46E+02	6.00E+02	8.84E+02	5.58E+02	4.74E+02	4.53E+02	9.07E+02	5.40E+02	5.38E+02
CE-141	32.50 D	2.82E+02	3.11E+02	4.72E+02	2.82E+02	2.44E+02	2.33E+02	4.85E+02	2.80E+02	2.79E+02
CE-143	33.0 H	1.03E+03	1.11E+03	1.37E+03	1.11E+03	9.63E+02	8.79E+02	1.39E+03	1.01E+03	1.02E+03
CE-144	284.3 D	6.48E+01	7.16E+01	1.13E+02	6.08E+01	5.57E+01	5.17E+01	1.16E+02	6.35E+01	6.35E+01
PR-142	19.13 H	2.62E+02	2.77E+02	2.88E+02	2.79E+02	2.45E+02	2.28E+02	2.92E+02	2.53E+02	2.55E+02
PR-143	13.56 D	3.80E-05	4.06E-05	4.46E-05	4.13E-05	3.70E-05	3.28E-05	4.53E-05	3.69E-05	3.76E-05
PR-144	17.28 H	1.51E+02	1.59E+02	1.67E+02	1.62E+02	1.40E+02	1.31E+02	1.70E+02	1.45E+02	1.48E+02
PR-144M	7.2 M	1.31E+01	1.49E+01	2.62E+01	6.01E+00	1.08E+01	7.17E+00	2.68E+01	1.03E+01	1.14E+01
ND-147	10.98 D	5.13E+02	5.55E+02	7.16E+02	5.22E+02	4.77E+02	4.23E+02	7.31E+02	4.95E+02	5.02E+02
ND-149	1.73 H	1.49E+03	1.61E+03	2.05E+03	1.61E+03	1.38E+03	1.27E+03	2.09E+03	1.47E+03	1.47E+03
PM-143	265 D	1.25E+03	1.34E+03	1.50E+03	1.34E+03	1.21E+03	1.07E+03	1.52E+03	1.21E+03	1.23E+03
PM-144	363 D	6.42E+03	6.88E+03	7.72E+03	6.99E+03	6.21E+03	5.52E+03	7.85E+03	6.24E+03	6.34E+03
PM-145	17.7 Y	4.46E+01	5.01E+01	8.85E+01	2.22E+01	3.65E+01	2.52E+01	9.04E+01	3.59E+01	3.91E+01
PM-146	2020 D	3.09E+03	3.31E+03	3.75E+03	3.36E+03	2.98E+03	2.65E+03	3.81E+03	3.00E+03	3.05E+03
PM-147	2.6234 Y	1.33E-02	1.47E-02	2.33E-02	1.27E-02	1.14E-02	1.08E-02	2.39E-02	1.32E-02	1.31E-02
PM-148	5.37 D	2.48E+03	2.63E+03	2.82E+03	2.67E+03	2.36E+03	2.15E+03	2.87E+03	2.40E+03	2.43E+03
PM-148M	41.3 D	8.33E+03	8.92E+03	1.00E+04	9.09E+03	8.04E+03	7.18E+03	1.02E+04	8.11E+03	8.23E+03
PM-149	53.08 H	4.63E+01	5.00E+01	6.21E+01	5.13E+01	4.27E+01	4.00E+01	6.33E+01	4.57E+01	4.57E+01
PM-151	28.40 H	1.33E+03	1.43E+03	1.77E+03	1.43E+03	1.23E+03	1.13E+03	1.81E+03	1.30E+03	1.31E+03
SM-147	1.069E11 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM-151	90 Y	4.90E-04	1.26E-03	1.83E-03	4.31E-04	8.24E-04	6.54E-04	2.10E-03	6.61E-04	7.53E-04
SM-153	46.7 H	1.73E+02	1.91E+02	3.21E+02	1.35E+02	1.45E+02	1.24E+02	3.30E+02	1.61E+02	1.64E+02
EU-152	13.6 Y	4.85E+03	5.17E+03	5.72E+03	5.19E+03	4.62E+03	4.18E+03	5.82E+03	4.70E+03	4.77E+03
EU-152M	9.32 H	1.33E+03	1.42E+03	1.57E+03	1.43E+03	1.28E+03	1.14E+03	1.60E+03	1.29E+03	1.31E+03
EU-154	8.8 Y	5.37E+03	5.72E+03	6.26E+03	5.75E+03	5.14E+03	4.63E+03	6.37E+03	5.21E+03	5.28E+03
EU-155	4.96 Y	2.00E+02	2.22E+02	3.75E+02	1.61E+02	1.69E+02	1.47E+02	3.85E+02	1.90E+02	1.92E+02
EU-156	15.19 D	6.17E+03	6.53E+03	6.88E+03	6.59E+03	5.78E+03	5.35E+03	7.00E+03	5.94E+03	6.05E+03
GD-152	1.1E14 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GD-153	241.6 D	2.94E+02	3.27E+02	5.56E+02	2.21E+02	2.47E+02	2.08E+02	5.71E+02	2.72E+02	2.78E+02
GD-159	18.56 H	1.45E+02	1.56E+02	2.02E+02	1.51E+02	1.33E+02	1.20E+02	2.05E+02	1.40E+02	1.41E+02
GD-162	9.7 M	1.69E+03	1.82E+03	2.17E+03	1.87E+03	1.60E+03	1.46E+03	2.20E+03	1.66E+03	1.67E+03
TB-157	150 Y	7.41E+00	8.23E+00	1.48E+01	3.64E+00	5.97E+00	4.13E+00	1.51E+01	5.99E+00	6.48E+00
TB-160	72.3 D	4.63E+03	4.94E+03	5.42E+03	4.98E+03	4.44E+03	3.99E+03	5.51E+03	4.49E+03	4.56E+03
TB-162	7.76 M	4.63E+03	5.64E+03	5.64E+03	5.01E+03	4.42E+03	3.98E+03	5.74E+03	4.51E+03	4.57E+03
DY-157	8.06 H	1.31E+03	1.42E+03	1.82E+03	1.42E+03	1.20E+03	1.11E+03	1.85E+03	1.28E+03	1.29E+03
DY-165	2.334 H	9.56E+01	1.03E+02	1.33E+02	9.63E+01	8.89E+01	7.85E+01	1.36E+02	9.19E+01	9.34E+01
DY-166	81.6 H	1.07E+02	1.18E+02	1.98E+02	7.55E+01	8.96E+01	7.20E+01	2.03E+02	9.60E+01	9.93E+01
HO-166	26.80 H	1.11E+02	1.19E+02	1.48E+02	1.07E+02	1.01E+02	9.06E+01	1.51E+02	1.06E+02	1.07E+02
HO-166M	1.20E3 Y	6.67E+03	7.15E+03	8.20E+03	7.22E+03	6.38E+03	5.73E+03	8.35E+03	6.49E+03	6.59E+03
ER-169	9.40 D	5.98E-03	6.71E-03	1.08E-02	5.53E-03	5.17E-03	4.81E-03	1.12E-02	5.93E-03	5.91E-03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
CE-139	137.66 D	8.64E+02	6.45E+02	8.29E+02	4.74E+02	7.50E+02	9.69E+02	7.90E+01	1.05E+03
CE-141	32.50 D	4.41E+02	3.36E+02	4.31E+02	2.46E+02	3.86E+02	4.80E+02	7.11E+02	1.19E+03
CE-143	33.0 H	1.54E+03	1.16E+03	1.44E+03	8.97E+02	1.32E+03	1.76E+03	2.89E+03	4.66E+03
CE-144	284.3 D	1.05E+02	7.94E+01	1.02E+02	5.54E+01	9.09E+01	1.17E+02	2.29E+02	3.45E+02
PR-142	19.13 H	3.61E+02	2.87E+02	3.38E+02	2.36E+02	3.10E+02	4.12E+02	6.41E+03	6.83E+03
PR-143	13.56 D	5.40E-05	4.24E-05	5.11E-05	3.31E-05	4.62E-05	6.24E-05	2.07E+03	2.07E+03
PR-144	17.28 H	2.08E+02	1.64E+02	1.93E+02	1.35E+02	1.79E+02	2.36E+02	9.63E+03	9.87E+03
PR-144M	7.2 H	3.60E+01	2.10E+01	2.88E+01	7.76E+00	2.67E+01	5.20E+01	0.0	5.20E+01
NO-147	10.98 D	7.84E+02	5.90E+02	7.33E+02	4.39E+02	6.65E+02	8.98E+02	1.41E+03	2.30E+03
NO-149	1.73 H	2.21E+03	1.68E+03	2.09E+03	1.31E+03	1.91E+03	2.49E+03	3.27E+03	5.76E+03
PM-143	265 D	1.82E+03	1.41E+03	1.71E+03	1.08E+03	1.54E+03	2.13E+03	7.42E+00	2.14E+03
PM-144	363 D	9.22E+03	7.12E+03	8.64E+03	5.58E+03	7.87E+03	1.06E+04	5.87E+01	1.07E+04
PM-145	17.7 Y	1.10E+02	6.91E+01	9.23E+01	2.86E+01	8.37E+01	1.51E+02	7.39E-03	1.51E+02
PM-146	2020 D	4.45E+03	3.43E+03	4.17E+03	2.69E+03	3.80E+03	5.12E+03	5.81E+02	5.70E+03
PM-147	2.6234 Y	2.08E-02	1.60E-02	2.06E-02	1.15E-02	1.83E-02	2.21E-02	9.58E+01	9.59E+01
PM-148	5.37 D	3.47E+03	2.74E+03	3.27E+03	2.19E+03	2.97E+03	3.98E+03	5.53E+03	9.52E+03
PM-148M	41.3 D	1.19E+04	9.22E+03	1.12E+04	7.26E+03	1.02E+04	1.37E+04	7.80E+02	1.45E+04
PM-149	53.08 H	6.76E+01	5.14E+01	6.38E+01	4.08E+01	5.86E+01	7.61E+01	2.47E+03	2.55E+03
PM-151	28.40 H	1.95E+03	1.49E+03	1.84E+03	1.16E+03	1.88E+03	2.21E+03	1.81E+03	4.02E+03
SM-147	1.069E11 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM-151	90 Y	5.99E-03	5.35E-04	2.47E-03	6.94E-05	4.56E-03	2.30E-02	3.96E-03	2.70E-02
SM-153	46.7 H	3.08E+02	2.27E+02	2.93E+02	1.38E+02	2.57E+02	3.53E+02	1.31E+03	1.66E+03
EU-152	13.6 Y	6.89E+03	5.44E+03	6.53E+03	4.26E+03	5.90E+03	7.92E+03	6.10E+02	8.53E+03
EU-152M	9.32 H	1.90E+03	1.51E+03	1.81E+03	1.16E+03	1.62E+03	2.20E+03	3.67E+03	5.87E+03
EU-154	8.8 Y	7.59E+03	6.03E+03	7.22E+03	4.72E+03	6.50E+03	8.72E+03	1.42E+03	1.01E+04
EU-155	4.96 Y	3.36E+02	2.56E+02	3.30E+02	1.65E+02	2.87E+02	3.68E+02	3.93E+01	4.07E+02
EU-156	15.19 D	8.54E+03	6.78E+03	8.01E+03	5.49E+03	7.34E+03	9.77E+03	2.74E+03	1.25E+04
GD-152	1.1E14 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GD-153	241.6 D	5.38E+02	3.92E+02	5.09E+02	2.32E+02	4.46E+02	6.23E+02	7.48E+00	6.31E+02
GD-159	18.56 H	2.21E+02	1.65E+02	2.05E+02	1.24E+02	1.88E+02	2.53E+02	2.03E+03	2.29E+03
GD-162	9.7 H	2.46E+03	1.85E+03	2.28E+03	1.48E+03	2.11E+03	2.79E+03	2.14E+03	4.93E+03
TB-157	150 Y	1.67E+01	1.12E+01	1.46E+01	4.92E+00	1.29E+01	2.19E+01	0.0	2.19E+01
TB-160	72.3 D	6.55E+03	5.21E+03	6.24E+03	4.05E+03	5.61E+03	7.54E+03	1.35E+03	8.89E+03
TB-162	7.76 H	6.62E+03	5.20E+03	6.30E+03	4.04E+03	5.68E+03	7.59E+03	3.52E+03	1.11E+04
DY-157	8.06 H	1.97E+03	1.47E+03	1.84E+03	1.14E+03	1.69E+03	2.23E+03	2.13E+01	2.25E+03
DY-165	2.334 H	1.46E+02	1.11E+02	1.37E+02	8.14E+01	1.24E+02	1.67E+02	3.11E+03	3.28E+03
DY-166	81.6 H	1.94E+02	1.42E+02	1.83E+02	8.21E+01	1.59E+02	2.26E+02	4.68E+02	6.94E+02
HO-166	26.80 H	1.66E+02	1.30E+02	1.58E+02	9.59E+01	1.41E+02	1.90E+02	5.13E+03	5.32E+03
HO-166M	1.20E3 Y	9.57E+03	7.47E+03	9.07E+03	5.81E+03	8.21E+03	1.10E+04	3.63E+02	1.13E+04
EP-169	9.40 D	1.01E-02	7.31E-03	9.48E-03	5.14E-03	9.58E-03	2.54E-02	3.26E+02	3.26E+02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
ER-171	7.52 H	1.54E+03	1.44E+03	1.55E+03	2.18E+03	1.39E+03	1.25E+03	1.48E+03	1.38E+03	1.49E+03
TM-170	128.6 D	1.50E+01	1.62E+01	1.56E+01	3.39E+01	1.40E+01	1.26E+01	1.53E+01	1.35E+01	1.71E+01
TM-171	1.92 Y	1.53E+00	1.79E+00	1.58E+00	4.07E+00	1.40E+00	1.31E+00	1.57E+00	1.37E+00	1.97E+00
YB-169	31.97 D	1.06E+03	1.05E+03	1.05E+03	1.92E+03	9.55E+02	8.60E+02	1.03E+03	9.43E+02	1.10E+03
YB-175	4.19 D	1.65E+02	1.55E+02	1.68E+02	2.26E+02	1.50E+02	1.34E+02	1.59E+02	1.48E+02	1.60E+02
LU-177	6.71 D	1.41E+02	1.32E+02	1.39E+02	2.20E+02	1.27E+02	1.13E+02	1.35E+02	1.25E+02	1.36E+02
LU-177M	160.10 D	4.09E+03	3.82E+03	4.10E+03	5.91E+03	3.69E+03	3.30E+03	3.92E+03	3.64E+03	3.95E+03
HF-181	42.39 D	2.30E+03	2.17E+03	2.39E+03	3.07E+03	2.12E+03	1.90E+03	2.25E+03	2.08E+03	2.25E+03
TA-182	114.74 D	5.61E+03	5.54E+03	6.20E+03	7.17E+03	5.45E+03	5.00E+03	5.81E+03	5.34E+03	5.82E+03
W-181	120.95 D	9.80E+01	1.13E+02	1.03E+02	2.47E+02	9.10E+01	8.44E+01	1.00E+02	8.83E+01	1.22E+02
W-185	75.1 D	1.09E-01	1.02E-01	1.09E-01	1.80E-01	1.00E-01	8.67E-02	1.08E-01	9.75E-02	1.03E-01
W-187	23.83 H	2.05E+03	1.97E+03	2.18E+03	2.64E+03	1.92E+03	1.73E+03	2.04E+03	1.88E+03	2.05E+03
W-188	69.4 D	7.46E+00	6.88E+00	7.42E+00	1.04E+01	6.68E+00	5.99E+00	7.07E+00	6.63E+00	7.10E+00
RE-182	64.0 H	7.43E+03	7.28E+03	8.05E+03	9.93E+03	7.12E+03	6.49E+03	7.58E+03	6.99E+03	7.62E+03
RE-182M	12.7 H	5.13E+03	5.11E+03	5.69E+03	6.69E+03	5.01E+03	4.59E+03	5.34E+03	4.90E+03	5.37E+03
RE-183	70 D	5.14E+02	5.18E+02	5.20E+02	9.70E+02	4.69E+02	4.22E+02	5.05E+02	4.59E+02	5.42E+02
RE-184	38.0 D	3.89E+03	3.79E+03	4.22E+03	4.97E+03	3.71E+03	3.36E+03	3.95E+03	3.63E+03	3.97E+03
RE-184M	169 D	1.61E+03	1.56E+03	1.70E+03	2.25E+03	1.51E+03	1.36E+03	1.61E+03	1.48E+03	1.63E+03
RE-186	90.64 H	7.66E+01	7.42E+01	7.70E+01	1.35E+02	7.03E+01	6.19E+01	7.54E+01	6.84E+01	7.62E+01
RE-187	4.7E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RE-188	16.98 H	2.47E+02	2.35E+02	2.58E+02	3.45E+02	2.30E+02	2.06E+02	2.45E+02	2.26E+02	2.43E+02
OS-185	93.6 D	3.05E+03	2.94E+03	3.27E+03	3.90E+03	2.87E+03	2.59E+03	3.05E+03	2.80E+03	3.07E+03
OS-186	2.0E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OS-190M	9.9 M	6.86E+03	6.48E+03	7.18E+03	8.82E+03	6.33E+03	5.69E+03	6.72E+03	6.22E+03	6.72E+03
OS-191	15.4 D	2.48E+02	2.49E+02	2.53E+02	4.76E+02	2.30E+02	2.03E+02	2.47E+02	2.22E+02	2.57E+02
OS-191M	13.03 H	1.28E+01	1.42E+01	1.35E+01	3.10E+01	1.20E+01	1.10E+01	1.30E+01	1.15E+01	1.50E+01
OS-193	30.0 H	2.73E+02	2.61E+02	2.83E+02	3.93E+02	2.51E+02	2.25E+02	2.67E+02	2.46E+02	2.70E+02
IR-190	11.78 D	6.00E+03	5.70E+03	6.30E+03	7.82E+03	5.56E+03	5.00E+03	5.90E+03	5.46E+03	5.92E+03
IR-190M	1.2 H	1.63E-02	1.13E-05	1.30E-03	1.27E+00	2.12E-03	2.21E-05	5.27E-05	6.68E-03	4.00E-05
IR-190M	3.2 H	1.32E+02	1.47E+02	1.40E+02	3.09E+02	1.24E+02	1.13E+02	1.34E+02	1.19E+02	1.55E+02
IR-192	74.02 D	3.52E+03	3.29E+03	3.62E+03	4.61E+03	3.21E+03	2.88E+03	3.40E+03	3.16E+03	3.40E+03
IR-193M	11.9 D	9.73E-01	1.06E+00	1.02E+00	3.43E+00	9.07E-01	8.21E-01	9.75E-01	8.72E-01	1.11E+00
IR-194	19.15 H	3.97E+02	3.76E+02	4.16E+02	5.11E+02	3.68E+02	3.33E+02	3.91E+02	3.63E+02	3.91E+02
IR-194M	171 D	1.01E+04	9.61E+03	1.07E+04	1.29E+04	9.40E+03	8.46E+03	9.97E+03	9.23E+03	9.97E+03
PT-191	2.71 D	1.11E+03	1.09E+03	1.16E+03	1.71E+03	1.03E+03	9.25E+02	1.10E+03	1.00E+03	1.13E+03
PT-193	50 Y	1.59E-02	2.86E-09	1.26E-03	1.24E+00	2.06E-03	2.66E-05	3.92E-05	6.50E-03	1.90E-05
PT-193M	4.33 D	3.13E+01	3.41E+01	3.32E+01	7.12E+01	2.96E+01	2.67E+01	3.18E+01	2.83E+01	3.56E+01
PT-195M	4.02 D	2.19E+02	2.32E+02	2.29E+02	4.68E+02	2.06E+02	1.84E+02	2.22E+02	1.97E+02	2.41E+02
PT-197	18.3 H	8.28E+01	8.27E+01	8.50E+01	1.54E+02	7.68E+01	6.82E+01	8.18E+01	7.42E+01	8.50E+01
PT-197M	94.4 M	2.99E+02	2.93E+02	3.07E+02	4.89E+02	2.74E+02	2.47E+02	2.92E+02	2.68E+02	3.04E+02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/CUBIC M

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
ER-171	7.52 H	1.43E+03	1.55E+03	2.04E+03	1.54E+03	1.30E+03	1.21E+03	2.08E+03	1.41E+03	1.41E+03
TM-170	128.6 D	1.59E+01	1.76E+01	3.08E+01	1.10E+01	1.31E+01	1.07E+01	3.17E+01	1.45E+01	1.49E+01
TM-171	1.92 Y	1.72E+00	1.92E+00	3.45E+00	9.97E-01	1.40E+00	1.05E+00	3.54E+00	1.49E+00	1.56E+00
YB-169	31.97 D	1.03E+03	1.13E+03	1.74E+03	9.36E+02	8.86E+02	7.95E+02	1.78E+03	9.84E+02	9.93E+02
YB-175	4.19 D	1.54E+02	1.66E+02	2.11E+02	1.66E+02	1.42E+02	1.31E+02	2.15E+02	1.51E+02	1.51E+02
LU-177	6.71 D	1.31E+02	1.43E+02	2.08E+02	1.34E+02	1.14E+02	1.08E+02	2.13E+02	1.29E+02	1.29E+02
LU-177M	160.10 D	3.80E+03	4.12E+03	5.54E+03	4.03E+03	3.42E+03	3.20E+03	5.65E+03	3.73E+03	3.73E+03
HF-181	42.39 D	2.16E+03	2.33E+03	2.87E+03	2.33E+03	2.03E+03	1.84E+03	2.92E+03	2.11E+03	2.13E+03
TA-182	114.74 D	5.52E+03	5.87E+03	6.47E+03	5.83E+03	5.24E+03	4.73E+03	6.58E+03	5.33E+03	5.41E+03
W-181	120.95 D	1.10E+02	1.21E+02	2.18E+02	6.57E+01	8.88E+01	6.80E+01	2.23E+02	9.59E+01	9.99E+01
W-185	75.1 D	1.02E-01	1.12E-01	1.77E-01	9.84E-02	8.77E-02	8.29E-02	1.82E-01	1.01E-01	1.01E-01
W-187	23.83 H	1.95E+03	2.10E+03	2.44E+03	2.10E+03	1.87E+03	1.66E+03	2.48E+03	1.90E+03	1.93E+03
W-188	69.4 D	6.85E+00	7.42E+00	9.78E+00	7.50E+00	6.16E+00	5.86E+00	9.97E+00	6.77E+00	6.75E+00
RE-182	64.0 H	7.24E+03	7.74E+03	9.03E+03	7.61E+03	6.77E+03	6.16E+03	9.20E+03	7.02E+03	7.09E+03
RE-182M	12.7 H	5.08E+03	5.41E+03	6.02E+03	5.31E+03	4.80E+03	4.33E+03	6.13E+03	4.90E+03	4.97E+03
RE-183	70 D	5.11E+02	5.61E+02	8.94E+02	4.37E+02	4.33E+02	3.81E+02	9.17E+02	4.82E+02	4.88E+02
RE-184	38.0 D	3.76E+03	4.02E+03	4.53E+03	3.99E+03	3.62E+03	3.20E+03	4.61E+03	3.64E+03	3.71E+03
RE-184M	169 D	1.55E+03	1.67E+03	2.07E+03	1.60E+03	1.44E+03	1.29E+03	2.11E+03	1.50E+03	1.52E+03
RE-186	90.64 H	7.37E+01	8.12E+01	1.29E+02	6.68E+01	6.29E+01	5.74E+01	1.33E+02	7.15E+01	7.17E+01
RE-187	4.7E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RE-188	16.98 H	2.34E+02	2.53E+02	3.24E+02	2.45E+02	2.16E+02	1.98E+02	3.31E+02	2.29E+02	2.31E+02
OS-185	93.6 D	2.92E+03	3.13E+03	3.58E+03	3.12E+03	2.81E+03	2.48E+03	3.64E+03	2.83E+03	2.88E+03
OS-186	2.0E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OS-190M	9.9 M	6.44E+03	6.93E+03	8.18E+03	7.05E+03	6.12E+03	5.54E+03	8.32E+03	6.30E+03	6.36E+03
OS-191	15.4 D	2.47E+02	2.72E+02	4.53E+02	2.03E+02	2.07E+02	1.82E+02	4.65E+02	2.34E+02	2.37E+02
OS-191M	13.03 H	1.40E+01	1.54E+01	2.75E+01	8.91E+00	1.14E+01	8.98E+00	2.83E+01	1.25E+01	1.29E+01
OS-193	30.0 H	2.59E+02	2.81E+02	3.68E+02	2.68E+02	2.38E+02	2.15E+02	3.75E+02	2.52E+02	2.54E+02
IR-190	11.78 D	5.67E+03	6.09E+03	7.24E+03	6.13E+03	5.37E+03	4.84E+03	7.37E+03	5.53E+03	5.59E+03
IR-190M	1.2 H	1.66E-04	1.29E-02	7.74E-03	4.22E-03	6.38E-03	9.51E-03	2.09E-02	3.67E-03	3.32E-03
IR-190M	3.2 H	1.44E+02	1.59E+02	2.84E+02	9.19E+01	1.17E+02	9.26E+01	2.92E+02	1.29E+02	1.33E+02
IR-192	74.02 D	3.27E+03	3.53E+03	4.30E+03	3.61E+03	3.06E+03	2.82E+03	4.37E+03	3.22E+03	3.23E+03
IR-193M	11.9 D	1.04E+00	1.16E+00	2.05E+00	6.83E-01	8.55E-01	6.86E-01	2.12E+00	9.39E-01	9.67E-01
IR-194	19.15 H	3.74E+02	4.01E+02	4.72E+02	4.10E+02	3.51E+02	3.23E+02	4.80E+02	3.66E+02	3.69E+02
IR-194M	171 D	9.55E+03	1.03E+04	1.19E+04	1.05E+04	9.11E+03	8.22E+03	1.21E+04	9.34E+03	9.43E+03
PT-191	2.71 D	1.08E+03	1.17E+03	1.59E+03	1.06E+03	9.81E+02	8.67E+02	1.63E+03	1.04E+03	1.05E+03
PT-193	50 Y	1.54E-04	1.25E-02	7.52E-03	4.11E-03	6.21E-03	9.26E-03	2.03E-02	3.57E-03	3.23E-03
PT-193M	4.33 D	3.37E+01	3.72E+01	6.57E+01	2.26E+01	2.76E+01	2.22E+01	6.74E+01	3.05E+01	3.13E+01
PT-195M	4.02 D	2.29E+02	2.53E+02	4.39E+02	1.66E+02	1.89E+02	1.58E+02	4.51E+02	2.11E+02	2.16E+02
PT-197	18.3 H	8.23E+01	9.03E+01	1.47E+02	6.97E+01	6.94E+01	6.14E+01	1.50E+02	7.82E+01	7.89E+01
PT-197M	94.4 H	2.91E+02	3.16E+02	4.56E+02	2.76E+02	2.57E+02	2.29E+02	4.66E+02	2.78E+02	2.81E+02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
EP-171	7.52 H	2.14E+03	1.62E+03	2.02E+03	1.25E+03	1.85E+03	2.39E+03	2.49E+03	4.88E+03
TM-170	128.6 D	2.78E+01	2.10E+01	2.71E+01	1.25E+01	2.33E+01	3.12E+01	2.07E+03	2.10E+03
TM-171	1.92 Y	3.26E+00	2.38E+00	3.09E+00	1.25E+00	2.65E+00	3.80E+00	3.59E-01	4.16E+00
YB-169	31.97 D	1.68E+03	1.26E+03	1.61E+03	8.57E+02	1.43E+03	1.89E+03	1.77E+02	2.07E+03
YB-175	4.19 D	2.27E+02	1.71E+02	2.13E+02	1.34E+02	1.96E+02	2.56E+02	5.57E+02	8.13E+02
LU-177	6.71 D	2.01E+02	1.53E+02	1.95E+02	1.14E+02	1.75E+02	2.21E+02	6.10E+02	8.31E+02
LU-177M	160.10 D	5.70E+03	4.32E+03	5.42E+03	3.31E+03	4.94E+03	6.35E+03	4.84E+02	6.83E+03
HF-181	42.35 D	3.17E+03	2.40E+03	2.96E+03	1.89E+03	2.72E+03	3.58E+03	6.53E+02	4.23E+03
TA-182	114.74 D	7.80E+03	6.23E+03	7.44E+03	4.85E+03	6.68E+03	8.95E+03	5.85E+02	9.53E+03
W-181	120.95 D	2.00E+02	1.50E+02	1.93E+02	8.18E+01	1.65E+02	2.29E+02	0.0	2.29E+02
W-185	75.1 D	1.58E-01	1.22E-01	1.57E-01	8.87E-02	1.40E-01	1.69E-01	5.27E+02	5.27E+02
W-187	23.83 H	2.83E+03	2.18E+03	2.66E+03	1.70E+03	2.41E+03	3.24E+03	1.70E+03	4.94E+03
W-188	69.4 D	1.01E+01	7.69E+00	9.62E+00	6.03E+00	8.84E+00	1.13E+01	3.26E+02	3.37E+02
RE-182	64.0 H	1.04E+04	8.21E+03	9.93E+03	6.35E+03	8.94E+03	1.18E+04	2.66E+02	1.21E+04
RE-182M	12.7 H	7.22E+03	5.74E+03	6.87E+03	4.45E+03	6.17E+03	8.28E+03	1.47E+02	8.42E+03
RE-183	70 D	8.40E+02	6.38E+02	8.13E+02	4.21E+02	7.14E+02	9.36E+02	7.47E+01	1.01E+03
RE-184	38.0 D	5.39E+03	4.27E+03	5.14E+03	3.26E+03	4.60E+03	6.22E+03	7.29E+01	6.29E+03
RE-184M	169 D	2.28E+03	1.78E+03	2.18E+03	1.34E+03	1.96E+03	2.59E+03	8.25E+01	2.68E+03
RE-186	90.64 H	1.18E+02	9.05E+01	1.16E+02	6.26E+01	1.02E+02	1.28E+02	2.22E+03	2.35E+03
RE-187	4.7E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RE-188	16.98 H	3.44E+02	2.68E+02	3.31E+02	2.04E+02	2.98E+02	3.86E+02	5.90E+03	6.29E+03
OS-185	93.6 D	4.21E+03	3.27E+03	3.97E+03	2.53E+03	3.59E+03	4.85E+03	4.12E+01	4.89E+03
OS-186	2.0E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OS-190M	9.9 H	9.32E+03	7.10E+03	8.72E+03	5.63E+03	8.01E+03	1.06E+04	3.83E+02	1.10E+04
OS-191	15.4 D	4.05E+02	3.12E+02	3.99E+02	2.05E+02	3.47E+02	4.43E+02	5.57E+01	4.99E+02
OS-191M	13.03 H	2.47E+01	1.88E+01	2.40E+01	1.08E+01	2.07E+01	2.97E+01	4.14E-01	3.02E+01
OS-193	30.0 H	3.88E+02	2.95E+02	3.67E+02	2.24E+02	3.33E+02	4.36E+02	2.34E+03	2.78E+03
IR-190	11.78 D	8.23E+03	6.29E+03	7.72E+03	4.94E+03	7.05E+03	9.37E+03	2.52E+02	9.62E+03
IR-190M	1.2 H	1.18E-01	1.37E-05	8.16E-03	3.53E-06	2.26E-01	2.72E+00	0.0	2.72E+00
IR-190M	3.2 H	2.54E+02	1.94E+02	2.48E+02	1.12E+02	2.12E+02	2.84E+02	1.85E+01	3.02E+02
IR-192	74.02 D	4.76E+03	3.60E+03	4.45E+03	2.87E+03	4.11E+03	5.38E+03	1.17E+03	6.55E+03
IR-193M	11.9 D	1.92E+00	1.39E+00	1.78E+00	8.14E-01	1.73E+00	4.64E+00	3.42E+00	8.06E+00
IR-194	19.15 H	5.38E+02	4.15E+02	5.07E+02	3.29E+02	4.63E+02	6.11E+02	6.26E+03	6.87E+03
IR-194M	171 D	1.38E+04	1.05E+04	1.29E+04	8.35E+03	1.18E+04	1.57E+04	5.41E+02	1.63E+04
PT-191	2.71 D	1.65E+03	1.26E+03	1.57E+03	9.19E+02	1.41E+03	1.86E+03	9.76E+01	1.96E+03
PT-193	50 Y	1.15E-01	2.65E-06	7.93E-03	1.16E-06	2.20E-01	2.65E+00	0.0	2.65E+00
PT-193M	4.33 D	5.80E+01	4.48E+01	5.70E+01	2.66E+01	4.89E+01	6.65E+01	2.86E+02	3.53E+02
PT-195M	4.02 D	3.88E+02	2.99E+02	3.82E+02	1.84E+02	3.29E+02	4.31E+02	2.65E+02	6.96E+02
PT-197	18.3 H	1.32E+02	1.03E+02	1.30E+02	6.89E+01	1.14E+02	1.46E+02	1.09E+03	1.24E+03
PT-197M	94.4 H	4.53E+02	3.45E+02	4.33E+02	2.46E+02	3.87E+02	5.10E+02	1.67E+03	2.18E+03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/L CUBIC M

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
AU-194	39.5 H	4.74E+03	4.69E+03	5.21E+03	6.20E+03	4.62E+03	4.24E+03	4.91E+03	4.54E+03	4.93E+03
AU-195	183 D	2.52E+02	2.69E+02	2.65E+02	5.47E+02	2.37E+02	2.13E+02	2.55E+02	2.27E+02	2.80E+02
AU-195M	30.6 S	8.34E+02	7.72E+02	8.28E+02	1.19E+03	7.47E+02	6.69E+02	7.91E+02	7.41E+02	7.96E+02
AU-196	6.183 D	1.96E+03	1.85E+03	2.01E+03	2.72E+03	1.79E+03	1.61E+03	1.89E+03	1.76E+03	1.91E+03
AU-198	2.696 D	1.74E+03	1.63E+03	1.80E+03	2.24E+03	1.59E+03	1.43E+03	1.69E+03	1.57E+03	1.69E+03
AU-199	3.139 D	3.63E+02	3.38E+02	3.58E+02	5.73E+02	3.28E+02	2.89E+02	3.49E+02	3.22E+02	3.45E+02
HG-197	64.14 H	2.08E+02	2.23E+02	2.20E+02	4.50E+02	1.97E+02	1.76E+02	2.11E+02	1.88E+02	2.31E+02
HG-197M	23.8 H	3.47E+02	3.34E+02	3.50E+02	5.97E+02	3.19E+02	2.81E+02	3.41E+02	3.10E+02	3.42E+02
HG-203	46.60 D	9.70E+02	8.96E+02	9.67E+02	1.35E+03	8.70E+02	7.80E+02	9.21E+02	8.63E+02	9.23E+02
TL-200	26.1 H	5.69E+03	5.54E+03	6.18E+03	7.30E+03	5.44E+03	4.96E+03	5.78E+03	5.34E+03	5.79E+03
TL-201	73.06 H	3.05E+02	3.13E+02	3.16E+02	6.04E+02	2.85E+02	2.53E+02	3.04E+02	2.74E+02	3.23E+02
TL-202	12.23 D	1.94E+03	1.85E+03	2.02E+03	2.63E+03	1.78E+03	1.60E+03	1.89E+03	1.75E+03	1.91E+03
TL-204	3.779 Y	3.36E+00	3.60E+00	3.57E+00	7.29E+00	3.19E+00	2.85E+00	3.41E+00	3.04E+00	3.73E+00
TL-207	4.77 M	9.80E+00	9.50E+00	1.07E+01	1.20E+01	9.39E+00	8.51E+00	9.99E+00	9.18E+00	9.96E+00
TL-208	3.053 M	1.64E+04	1.67E+04	1.85E+04	2.11E+04	1.66E+04	1.55E+04	1.77E+04	1.64E+04	1.79E+04
TL-209	2.20 M	9.26E+03	9.22E+03	1.03E+04	1.19E+04	9.11E+03	8.39E+03	9.70E+03	8.94E+03	9.69E+03
TL-210	1.30 M	1.26E+04	1.24E+04	1.39E+04	1.58E+04	1.23E+04	1.13E+04	1.31E+04	1.21E+04	1.31E+04
PB-203	52.02 H	1.22E+03	1.16E+03	1.23E+03	1.82E+03	1.11E+03	9.93E+02	1.18E+03	1.09E+03	1.19E+03
PB-204M	66.9 H	9.34E+03	9.00E+03	1.01E+04	1.15E+04	8.87E+03	8.04E+03	9.44E+03	8.69E+03	9.41E+03
PB-205	1.51E7 Y	2.17E-02	1.02E-08	1.79E-03	1.59E+00	2.91E-03	4.56E-05	3.87E-05	9.18E-03	3.57E-05
PB-209	3.253 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB-210	22.26 Y	3.26E+00	4.24E+00	3.06E+00	1.24E+01	2.74E+00	2.77E+00	3.45E+00	2.87E+00	5.01E+00
PB-211	36.1 M	2.25E+02	2.14E+02	2.40E+02	2.81E+02	2.11E+02	1.90E+02	2.24E+02	2.06E+02	2.23E+02
PB-212	10.643 H	6.04E+02	5.64E+02	6.01E+02	9.06E+02	5.43E+02	4.85E+02	5.76E+02	5.37E+02	5.81E+02
PB-214	26.8 M	1.05E+03	9.84E+02	1.07E+03	1.43E+03	9.56E+02	8.58E+02	1.01E+03	9.44E+02	1.02E+03
BI-206	6.243 D	1.45E+04	1.42E+04	1.59E+04	1.83E+04	1.40E+04	1.27E+04	1.49E+04	1.37E+04	1.49E+04
BI-207	33.4 Y	6.76E+03	6.59E+03	7.38E+03	8.52E+03	6.49E+03	5.90E+03	6.90E+03	6.35E+03	6.90E+03
BI-208	3.68E5 Y	1.31E+04	1.36E+04	1.51E+04	1.72E+04	1.36E+04	1.28E+04	1.45E+04	1.34E+04	1.48E+04
BI-210	5.013 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BI-211	2.13 M	2.02E+02	1.88E+02	2.06E+02	2.70E+02	1.83E+02	1.64E+02	1.94E+02	1.81E+02	1.94E+02
BI-212	60.55 M	8.17E+02	8.01E+02	9.00E+02	1.02E+03	7.91E+02	7.22E+02	8.41E+02	7.75E+02	8.41E+02
BI-213	45.65 M	5.97E+02	5.64E+02	6.24E+02	7.70E+02	5.50E+02	4.95E+02	5.83E+02	5.40E+02	5.84E+02
BI-214	19.9 M	6.83E+03	6.81E+03	7.65E+03	8.57E+03	6.75E+03	6.22E+03	7.18E+03	6.62E+03	7.19E+03
PO-209	102 Y	1.51E+01	1.45E+01	1.61E+01	1.98E+01	1.42E+01	1.28E+01	1.51E+01	1.39E+01	1.51E+01
PO-210	138.378 D	3.82E-02	3.69E-02	4.15E-02	4.67E-02	3.64E-02	3.29E-02	3.87E-02	3.56E-02	3.86E-02
PO-211	0.516 S	3.46E+01	3.33E+01	3.74E+01	4.26E+01	3.28E+01	2.97E+01	3.49E+01	3.21E+01	3.48E+01
PO-212	2.98E-7 S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PO-213	4.2E-6 S	1.37E-01	1.32E-01	1.48E-01	1.67E-01	1.30E-01	1.17E-01	1.38E-01	1.27E-01	1.38E-01
PO-214	1.637E-4 S	3.74E-01	3.61E-01	4.06E-01	4.58E-01	3.56E-01	3.22E-01	3.79E-01	3.48E-01	3.77E-01
PO-215	1.778E-3 S	6.41E-01	6.03E-01	6.68E-01	8.20E-01	5.89E-01	5.29E-01	6.24E-01	5.79E-01	6.24E-01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
AU-194	39.5 H	4.69E+03	4.98E+03	5.59E+03	4.99E+03	4.35E+03	4.03E+03	5.68E+03	4.53E+03	4.58E+03
AU-195	183 D	2.66E+02	2.94E+02	5.15E+02	1.86E+02	2.19E+02	1.80E+02	5.29E+02	2.44E+02	2.49E+02
AU-195M	30.6 S	7.68E+02	8.33E+02	1.12E+03	8.30E+02	6.86E+02	6.52E+02	1.14E+03	7.58E+02	7.56E+02
AU-196	6.183 D	1.84E+03	1.99E+03	2.54E+03	1.97E+03	1.69E+03	1.56E+03	2.59E+03	1.80E+03	1.81E+03
AU-198	2.696 D	1.62E+03	1.75E+03	2.09E+03	1.80E+03	1.53E+03	1.40E+03	2.12E+03	1.59E+03	1.60E+03
AU-199	3.139 D	3.37E+02	3.69E+02	5.51E+02	3.39E+02	2.91E+02	2.77E+02	5.65E+02	3.33E+02	3.31E+02
HG-197	64.14 H	2.21E+02	2.43E+02	4.26E+02	1.54E+02	1.81E+02	1.49E+02	4.37E+02	2.02E+02	2.06E+02
HG-197M	23.8 H	3.33E+02	3.66E+02	5.73E+02	3.07E+02	2.86E+02	2.62E+02	5.88E+02	3.24E+02	3.24E+02
HG-203	46.60 D	8.92E+02	9.66E+02	1.27E+03	9.76E+02	8.04E+02	7.63E+02	1.29E+03	8.81E+02	8.79E+02
TL-200	26.1 H	5.52E+03	5.89E+03	6.65E+03	5.90E+03	5.22E+03	4.74E+03	6.76E+03	5.35E+03	5.42E+03
TL-201	73.06 H	3.10E+02	3.42E+02	5.76E+02	2.43E+02	2.59E+02	2.23E+02	5.91E+02	2.91E+02	2.95E+02
TL-202	12.23 D	1.83E+03	1.98E+03	2.45E+03	1.95E+03	1.72E+03	1.55E+03	2.50E+03	1.79E+03	1.80E+03
TL-204	3.779 Y	3.57E+00	3.94E+00	6.92E+00	2.48E+00	2.93E+00	2.40E+00	7.11E+00	3.27E+00	3.34E+00
TL-207	4.77 M	9.45E+00	1.01E+01	1.09E+01	1.02E+01	9.17E+00	8.15E+00	1.10E+01	9.15E+00	9.34E+00
TL-208	3.053 M	1.68E+04	1.76E+04	1.83E+04	1.80E+04	1.51E+04	1.47E+04	1.86E+04	1.61E+04	1.65E+04
TL-209	2.20 M	9.22E+03	9.78E+03	1.07E+04	9.81E+03	8.61E+03	7.96E+03	1.08E+04	8.91E+03	9.00E+03
TL-210	1.30 M	1.24E+04	1.32E+04	1.42E+04	1.34E+04	1.17E+04	1.08E+04	1.44E+04	1.20E+04	1.22E+04
PB-203	52.02 H	1.15E+03	1.25E+03	1.72E+03	1.19E+03	1.03E+03	9.51E+02	1.76E+03	1.12E+03	1.12E+03
PB-204M	66.9 M	8.95E+03	9.56E+03	1.05E+04	9.71E+03	8.64E+03	7.72E+03	1.07E+04	8.69E+03	8.85E+03
PB-205	1.51E7 Y	2.52E-04	1.75E-02	1.11E-02	5.77E-03	8.69E-03	1.28E-02	2.85E-02	5.14E-03	4.70E-03
PB-209	3.253 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB-210	22.26 Y	3.79E+00	4.23E+00	7.61E+00	1.93E+00	3.06E+00	2.16E+00	7.81E+00	3.12E+00	3.35E+00
PB-211	36.1 M	2.13E+02	2.28E+02	2.58E+02	2.33E+02	2.05E+02	1.84E+02	2.62E+02	2.08E+02	2.11E+02
PB-212	10.643 H	5.62E+02	6.11E+02	8.58E+02	5.84E+02	4.95E+02	4.67E+02	8.78E+02	5.52E+02	5.51E+02
PB-214	26.8 M	9.79E+02	1.06E+03	1.34E+03	1.07E+03	9.00E+02	8.36E+02	1.37E+03	9.62E+02	9.64E+02
BI-206	6.243 D	1.42E+04	1.51E+04	1.66E+04	1.52E+04	1.35E+04	1.22E+04	1.69E+04	1.37E+04	1.39E+04
BI-207	33.4 Y	6.56E+03	7.00E+03	7.74E+03	7.02E+03	6.28E+03	5.63E+03	7.88E+03	6.35E+03	6.45E+03
BI-208	3.68E5 Y	1.37E+04	1.43E+04	1.47E+04	1.46E+04	1.21E+04	1.20E+04	1.49E+04	1.31E+04	1.35E+04
BI-210	5.013 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BI-211	2.13 M	1.87E+02	2.02E+02	2.52E+02	2.06E+02	1.73E+02	1.61E+02	2.57E+02	1.84E+02	1.85E+02
BI-212	60.55 M	7.98E+02	8.49E+02	9.15E+02	8.60E+02	7.63E+02	6.90E+02	9.30E+02	7.73E+02	7.85E+02
BI-213	45.65 M	5.61E+02	6.03E+02	7.15E+02	6.15E+02	5.31E+02	4.82E+02	7.27E+02	5.49E+02	5.53E+02
BI-214	19.9 M	6.81E+03	7.21E+03	7.63E+03	7.30E+03	6.40E+03	5.90E+03	7.75E+03	6.57E+03	6.67E+03
PO-209	102 Y	1.44E+01	1.55E+01	1.82E+01	1.54E+01	1.36E+01	1.23E+01	1.86E+01	1.40E+01	1.42E+01
PO-210	138.378 D	3.66E-02	3.91E-02	4.26E-02	3.97E-02	3.56E-02	3.16E-02	4.33E-02	3.66E-02	3.63E-02
PO-211	0.516 S	3.31E+01	3.54E+01	3.89E+01	3.60E+01	3.21E+01	2.85E+01	3.95E+01	3.21E+01	3.27E+01
PO-212	2.98E-7 S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PO-213	4.2E-6 S	1.31E-01	1.40E-01	1.53E-01	1.42E-01	1.27E-01	1.13E-01	1.55E-01	1.27E-01	1.29E-01
PO-214	1.637E-4 S	3.59E-01	3.83E-01	4.17E-01	3.89E-01	3.49E-01	3.09E-01	4.24E-01	3.48E-01	3.55E-01
PO-215	1.778E-3 S	6.00E-01	6.45E-01	7.62E-01	6.64E-01	5.69E-01	5.17E-01	7.74E-01	5.88E-01	5.92E-01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
AU-194	39.5 H	6.61E+03	5.18E+03	6.21E+03	4.16E+03	5.69E+03	7.51E+03	1.77E+02	7.69E+03
AU-195	183 D	4.53E+02	3.50E+02	4.47E+02	2.12E+02	3.83E+02	5.01E+02	1.02E+01	5.11E+02
AU-195M	30.6 S	1.14E+03	8.69E+02	1.09E+03	6.75E+02	9.97E+02	1.27E+03	2.96E+02	1.57E+03
AU-196	6.183 D	2.72E+03	2.06E+03	2.56E+03	1.61E+03	2.35E+03	3.07E+03	1.48E+02	3.21E+03
AU-198	2.696 D	2.35E+03	1.78E+03	2.19E+03	1.43E+03	2.03E+03	2.67E+03	2.14E+03	4.81E+03
AU-199	3.139 D	5.17E+02	3.97E+02	5.06E+02	2.94E+02	4.53E+02	5.61E+02	4.01E+02	9.63E+02
HG-197	64.14 H	3.73E+02	2.90E+02	3.69E+02	1.77E+02	3.16E+02	4.11E+02	1.95E+00	4.13E+02
HG-197M	23.8 H	5.24E+02	4.04E+02	5.15E+02	2.85E+02	4.55E+02	5.73E+02	6.19E+02	1.19E+03
HG-203	46.60 D	1.32E+03	9.99E+02	1.25E+03	7.85E+02	1.15E+03	1.47E+03	3.34E+02	1.80E+03
TL-200	26.1 H	7.85E+03	6.16E+03	7.43E+03	4.85E+03	6.73E+03	8.98E+03	1.63E+02	9.14E+03
TL-201	73.06 H	5.11E+02	3.96E+02	5.05E+02	2.55E+02	4.37E+02	5.60E+02	3.17E+01	5.91E+02
TL-202	12.23 D	2.70E+03	2.04E+03	2.52E+03	1.59E+03	2.31E+03	3.06E+03	8.83E+01	3.15E+03
TL-204	3.779 Y	6.04E+00	4.70E+00	5.98E+00	2.86E+00	5.12E+00	6.65E+00	1.62E+03	1.63E+03
TL-207	4.77 M	1.33E+01	1.06E+01	1.27E+01	8.23E+00	1.14E+01	1.54E+01	3.57E+03	3.58E+03
TL-208	3.053 M	2.29E+04	1.79E+04	2.09E+04	1.50E+04	1.98E+04	2.56E+04	4.32E+03	3.00E+04
TL-209	2.20 M	1.29E+04	1.01E+04	1.21E+04	8.21E+03	1.11E+04	1.47E+04	5.10E+03	1.98E+04
TL-210	1.30 M	1.73E+04	1.37E+04	1.63E+04	1.10E+04	1.49E+04	1.98E+04	5.19E+03	2.50E+04
PB-203	52.02 H	1.74E+03	1.32E+03	1.66E+03	9.99E+02	1.50E+03	1.93E+03	2.67E+02	2.20E+03
PB-204M	66.9 M	1.27E+04	1.00E+04	1.21E+04	7.81E+03	1.09E+04	1.46E+04	7.32E+02	1.54E+04
PB-205	1.51E7 Y	1.57E-01	5.59E-06	1.18E-02	1.47E-06	2.86E-01	3.34E+00	0.0	3.34E+00
PB-209	3.253 H	0.0	0.0	0.0	0.0	0.0	0.0	1.09E+03	1.09E+03
PB-210	22.26 Y	8.32E+00	5.59E+00	7.30E+00	2.56E+00	6.70E+00	1.40E+01	0.0	1.40E+01
PB-211	36.1 M	3.05E+02	2.37E+02	2.87E+02	1.86E+02	2.61E+02	3.50E+02	3.24E+03	3.59E+03
PB-212	10.643 H	8.49E+02	6.48E+02	8.17E+02	4.90E+02	7.40E+02	9.37E+02	6.36E+02	1.57E+03
PB-214	26.8 M	1.44E+03	1.09E+03	1.36E+03	8.59E+02	1.25E+03	1.62E+03	1.63E+03	3.25E+03
BI-206	6.243 D	2.00E+04	1.57E+04	1.89E+04	1.24E+04	1.71E+04	2.30E+04	6.19E+02	2.36E+04
BI-207	33.4 Y	9.30E+03	7.33E+03	8.80E+03	5.74E+03	7.96E+03	1.07E+04	8.05E+02	1.15E+04
BI-208	3.68E5 Y	1.86E+04	1.46E+04	1.68E+04	1.24E+04	1.61E+04	2.06E+04	3.34E+01	2.07E+04
BI-210	5.013 D	0.0	0.0	0.0	0.0	0.0	0.0	2.69E+03	2.69E+03
BI-211	2.13 M	2.74E+02	2.07E+02	2.57E+02	1.65E+02	2.37E+02	3.09E+02	5.91E+01	3.68E+02
BI-212	60.55 M	1.12E+03	8.85E+02	1.06E+03	7.02E+02	9.60E+02	1.29E+03	3.52E+03	4.81E+03
BI-213	45.65 M	8.12E+02	6.15E+02	7.56E+02	4.91E+02	6.97E+02	9.23E+02	3.09E+03	4.01E+03
BI-214	19.9 M	9.45E+03	7.47E+03	8.85E+03	6.05E+03	8.11E+03	1.08E+04	4.86E+03	1.57E+04
PO-209	102 Y	2.08E+01	1.64E+01	1.99E+01	1.26E+01	1.79E+01	2.37E+01	1.00E+00	2.47E+01
PO-210	138.378 D	5.19E-02	4.11E-02	4.93E-02	3.19E-02	4.44E-02	6.00E-02	0.0	6.00E-02
PO-211	0.516 S	4.70E+01	3.69E+01	4.44E+01	2.88E+01	4.02E+01	5.42E+01	0.0	5.42E+01
PO-212	2.98E-7 S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PO-213	4.2E-6 S	1.86E-01	1.46E-01	1.76E-01	1.14E-01	1.59E-01	2.14E-01	0.0	2.14E-01
PO-214	1.637E-4 S	5.08E-01	4.02E-01	4.83E-01	3.12E-01	4.34E-01	5.88E-01	0.0	5.88E-01
PO-215	1.778E-3 S	8.68E-01	6.54E-01	8.05E-01	5.26E-01	7.45E-01	9.87E-01	0.0	9.87E-01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC MI)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
PO-216	0.146 S	6.51E-02	6.28E-02	7.06E-02	7.96E-02	6.20E-02	5.61E-02	6.59E-02	6.06E-02	6.57E-02
PO-218	3.05 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AT-211	7.214 H	1.29E+02	1.33E+02	1.36E+02	2.55E+02	1.22E+02	1.08E+02	1.31E+02	1.17E+02	1.36E+02
AT-217	0.0323 S	1.04E+00	9.93E-01	1.11E+00	1.29E+00	9.74E-01	8.77E-01	1.03E+00	9.53E-01	1.03E+00
RN-218	0.035 S	3.32E+00	3.17E+00	3.54E+00	4.11E+00	3.11E+00	2.80E+00	3.30E+00	3.04E+00	3.29E+00
RN-219	3.96 S	2.45E+02	2.28E+02	2.48E+02	3.29E+02	2.22E+02	1.99E+02	2.35E+02	2.19E+02	2.35E+02
RN-220	55.61 S	2.27E+00	2.16E+00	2.41E+00	2.84E+00	2.11E+00	1.90E+00	2.24E+00	2.07E+00	2.24E+00
RN-222	3.8235 D	1.68E+00	1.59E+00	1.77E+00	2.11E+00	1.56E+00	1.40E+00	1.65E+00	1.53E+00	1.65E+00
FR-221	4.8 M	1.30E+02	1.19E+02	1.27E+02	1.89E+02	1.16E+02	1.03E+02	1.23E+02	1.15E+02	1.23E+02
FR-223	21.8 M	1.69E+02	1.70E+02	1.72E+02	3.09E+02	1.54E+02	1.39E+02	1.67E+02	1.52E+02	1.79E+02
RA-222	38.0 S	3.94E+01	3.65E+01	3.98E+01	5.26E+01	3.56E+01	3.19E+01	3.76E+01	3.52E+01	3.77E+01
RA-223	11.434 D	5.38E+02	5.10E+02	5.44E+02	8.34E+02	4.91E+02	4.35E+02	5.22E+02	4.80E+02	5.23E+02
RA-224	3.62 D	4.26E+01	3.91E+01	4.20E+01	6.01E+01	3.80E+01	3.40E+01	4.03E+01	3.78E+01	4.02E+01
RA-225	14.8 D	1.51E+01	2.21E+01	1.24E+01	6.15E+01	1.15E+01	1.27E+01	1.70E+01	1.31E+01	2.87E+01
RA-226	1600 Y	2.82E+01	2.59E+01	2.76E+01	4.24E+01	2.52E+01	2.23E+01	2.68E+01	2.49E+01	2.65E+01
RA-228	5.75 Y	2.30E-08	4.15E-15	1.84E-09	1.80E-06	3.00E-09	3.87E-11	5.69E-11	9.45E-09	2.76E-11
AC-225	10.0 D	5.19E+01	4.95E+01	5.21E+01	9.02E+01	4.76E+01	4.17E+01	5.10E+01	4.63E+01	5.05E+01
AC-227	21.773 Y	4.64E-01	4.33E-01	4.60E-01	9.38E-01	4.25E-01	3.66E-01	4.57E-01	4.13E-01	4.40E-01
AC-228	6.13 H	4.12E+03	4.01E+03	4.49E+03	5.14E+03	3.96E+03	3.60E+03	4.21E+03	3.88E+03	4.20E+03
TH-226	30.9 M	3.10E+01	2.91E+01	3.09E+01	5.10E+01	2.83E+01	2.48E+01	3.03E+01	2.77E+01	2.97E+01
TH-227	18.718 D	4.34E+02	4.03E+02	4.31E+02	6.31E+02	3.89E+02	3.48E+02	4.13E+02	3.86E+02	4.16E+02
TH-228	1.9132 Y	7.40E+00	7.12E+00	7.45E+00	1.37E+01	6.78E+00	5.98E+00	7.23E+00	6.60E+00	7.28E+00
TH-229	7.34E3 Y	3.24E+02	3.13E+02	3.27E+02	5.80E+02	2.99E+02	2.61E+02	3.20E+02	2.90E+02	3.20E+02
TH-230	7.7E4 Y	1.27E+00	1.28E+00	1.29E+00	3.38E+00	1.16E+00	1.04E+00	1.24E+00	1.13E+00	1.33E+00
TH-231	25.52 H	3.88E+01	3.89E+01	3.92E+01	9.16E+01	3.57E+01	3.13E+01	3.92E+01	3.47E+01	4.08E+01
TH-232	1.405E10 Y	5.22E-01	5.33E-01	5.19E-01	2.00E+00	4.69E-01	4.20E-01	5.06E-01	4.61E-01	5.61E-01
TH-233	22.3 M	1.42E+02	1.35E+02	1.49E+02	1.93E+02	1.31E+02	1.18E+02	1.40E+02	1.29E+02	1.40E+02
TH-234	24.10 D	2.69E+01	2.74E+01	2.77E+01	5.48E+01	2.51E+01	2.21E+01	2.71E+01	2.42E+01	2.82E+01
PA-230	17.4 D	2.88E+03	2.79E+03	3.12E+03	3.70E+03	2.75E+03	2.48E+03	2.93E+03	2.68E+03	2.92E+03
PA-231	3.276E4 Y	1.25E+02	1.16E+02	1.24E+02	1.85E+02	1.12E+02	1.00E+02	1.19E+02	1.11E+02	1.20E+02
PA-233	27.0 D	8.90E+02	8.29E+02	8.98E+02	1.26E+03	8.06E+02	7.19E+02	8.56E+02	7.95E+02	8.53E+02
PA-234	6.70 H	8.67E+03	8.41E+03	9.41E+03	1.09E+04	8.29E+03	7.52E+03	8.82E+03	8.11E+03	8.79E+03
PA-234M	1.17 M	5.10E+01	4.96E+01	5.57E+01	6.32E+01	4.90E+01	4.44E+01	5.22E+01	4.79E+01	5.20E+01
U-230	20.8 D	4.04E+00	3.88E+00	4.05E+00	8.38E+00	3.67E+00	3.26E+00	3.90E+00	3.59E+00	3.99E+00
U-231	4.2 D	2.52E+02	2.45E+02	2.55E+02	4.78E+02	2.34E+02	2.03E+02	2.53E+02	2.26E+02	2.51E+02
U-232	72 Y	7.62E-01	7.39E-01	7.39E-01	2.95E+00	6.72E-01	5.96E-01	7.21E-01	6.68E-01	7.74E-01
U-233	1.592E5 Y	8.56E-01	7.95E-01	8.45E-01	1.94E+00	7.80E-01	6.71E-01	8.38E-01	7.60E-01	8.07E-01
U-234	2.445E5 Y	3.69E-01	3.52E-01	3.44E-01	2.05E+00	3.14E-01	2.78E-01	3.39E-01	3.19E-01	3.74E-01
U-235	7.038E8 Y	6.31E+02	5.79E+02	6.18E+02	9.56E+02	5.66E+02	5.00E+02	6.01E+02	5.59E+02	5.92E+02
U-236	2.3415E7 Y	2.57E-01	2.50E-01	2.46E-01	1.77E+00	2.21E-01	1.95E-01	2.32E-01	2.21E-01	2.61E-01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/CUBIC MI

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
PO-216	0.146 S	6.24E-02	6.67E-02	7.26E-02	6.77E-02	6.07E-02	5.39E-02	7.38E-02	6.06E-02	6.18E-02
PO-218	3.05 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AT-211	7.214 H	1.32E+02	1.45E+02	2.46E+02	1.02E+02	1.11E+02	9.46E+01	2.53E+02	1.24E+02	1.26E+02
AT-217	0.0323 S	9.87E-01	1.06E+00	1.19E+00	1.08E+00	9.55E-01	8.50E-01	1.21E+00	9.61E-01	9.75E-01
RN-218	0.035 S	3.15E+00	3.37E+00	3.79E+00	3.44E+00	3.05E+00	2.71E+00	3.85E+00	3.06E+00	3.11E+00
RN-219	3.96 S	2.26E+02	2.45E+02	3.09E+02	2.50E+02	2.08E+02	1.95E+02	3.14E+02	2.23E+02	2.23E+02
RN-220	55.61 S	2.15E+00	2.30E+00	2.62E+00	2.35E+00	2.07E+00	1.85E+00	2.66E+00	2.09E+00	2.12E+00
RN-222	3.8235 D	1.58E+00	1.70E+00	1.96E+00	1.74E+00	1.52E+00	1.36E+00	1.99E+00	1.55E+00	1.56E+00
FR-221	4.8 M	1.19E+02	1.29E+02	1.79E+02	1.28E+02	1.05E+02	1.01E+02	1.83E+02	1.18E+02	1.17E+02
FR-223	21.8 M	1.67E+02	1.83E+02	2.74E+02	1.49E+02	1.46E+02	1.28E+02	2.81E+02	1.58E+02	1.60E+02
RA-222	38.0 S	3.63E+01	3.92E+01	4.92E+01	4.04E+01	3.34E+01	3.13E+01	5.01E+01	3.59E+01	3.59E+01
RA-223	11.434 D	5.07E+02	5.54E+02	7.95E+02	5.07E+02	4.49E+02	4.15E+02	8.14E+02	4.96E+02	4.97E+02
RA-224	3.62 D	3.89E+01	4.23E+01	5.68E+01	4.26E+01	3.47E+01	3.33E+01	5.80E+01	3.86E+01	3.84E+01
RA-225	14.8 D	1.79E+01	2.00E+01	3.55E+01	8.33E+00	1.45E+01	9.74E+00	3.62E+01	1.41E+01	1.55E+01
RA-226	1600 Y	2.58E+01	2.82E+01	4.05E+01	2.71E+01	2.25E+01	2.17E+01	4.15E+01	2.56E+01	2.54E+01
RA-228	5.75 Y	2.24E-10	1.82E-08	1.09E-08	5.97E-09	9.01E-09	1.34E-08	2.95E-08	5.19E-09	4.69E-09
AC-225	10.0 D	4.93E+01	5.43E+01	8.52E+01	4.60E+01	4.24E+01	3.91E+01	8.76E+01	4.82E+01	4.82E+01
AC-227	21.773 Y	4.32E-01	4.83E-01	7.71E-01	4.06E-01	3.73E-01	3.49E-01	7.96E-01	4.30E-01	4.28E-01
AC-228	6.13 H	3.99E+03	4.25E+03	4.65E+03	4.30E+03	3.82E+03	3.44E+03	4.73E+03	3.87E+03	3.93E+03
TH-226	30.9 M	2.90E+01	3.19E+01	4.86E+01	2.84E+01	2.52E+01	2.36E+01	4.99E+01	2.86E+01	2.85E+01
TH-227	18.718 D	4.01E+02	4.35E+02	5.87E+02	4.29E+02	3.58E+02	3.39E+02	6.00E+02	3.95E+02	3.94E+02
TH-228	1.9132 Y	7.09E+00	7.81E+00	1.23E+01	6.51E+00	6.07E+00	5.56E+00	1.26E+01	6.89E+00	6.90E+00
TH-229	7.34E3 Y	3.11E+02	3.44E+02	5.52E+02	2.80E+02	2.66E+02	2.43E+02	5.67E+02	3.03E+02	3.03E+02
TH-230	7.7E4 Y	1.27E+00	1.41E+00	2.34E+00	1.02E+00	1.07E+00	9.27E-01	2.41E+00	1.19E+00	1.21E+00
TH-231	25.52 H	3.82E+01	4.30E+01	7.25E+01	3.07E+01	3.25E+01	2.83E+01	7.48E+01	3.66E+01	3.70E+01
TH-232	1.405E10 Y	5.24E-01	5.96E-01	1.00E+00	3.92E-01	4.43E-01	3.74E-01	1.04E+00	4.88E-01	4.98E-01
TH-233	22.3 M	1.34E+02	1.45E+02	1.78E+02	1.43E+02	1.26E+02	1.14E+02	1.81E+02	1.31E+02	1.32E+02
TH-234	24.10 D	2.71E+01	3.01E+01	5.14E+01	2.11E+01	2.27E+01	1.96E+01	5.29E+01	2.56E+01	2.60E+01
PA-230	17.4 D	2.78E+03	2.97E+03	3.39E+03	2.96E+03	2.66E+03	2.37E+03	3.45E+03	2.69E+03	2.74E+03
PA-231	3.276E4 Y	1.15E+02	1.25E+02	1.64E+02	1.25E+02	1.04E+02	9.81E+01	1.68E+02	1.13E+02	1.13E+02
PA-233	27.0 D	8.25E+02	8.95E+02	1.19E+03	8.84E+02	7.48E+02	6.99E+02	1.21E+03	8.13E+02	8.13E+02
PA-234	6.70 H	8.37E+03	8.94E+03	9.97E+03	8.99E+03	8.01E+03	7.20E+03	1.01E+04	8.12E+03	8.25E+03
PA-234M	1.17 M	4.93E+01	5.26E+01	5.74E+01	5.29E+01	4.76E+01	4.25E+01	5.84E+01	4.78E+01	4.87E+01
U-230	20.8 D	3.86E+00	4.26E+00	6.57E+00	3.58E+00	3.32E+00	3.04E+00	6.76E+00	3.74E+00	3.75E+00
U-231	4.2 D	2.43E+02	2.71E+02	4.48E+02	2.10E+02	2.07E+02	1.87E+02	4.61E+02	2.37E+02	2.37E+02
U-232	72 Y	7.30E-01	8.37E-01	1.35E+00	6.08E-01	6.29E-01	5.56E-01	1.41E+00	6.98E-01	7.07E-01
U-233	1.592E5 Y	7.93E-01	8.90E-01	1.42E+00	7.45E-01	6.87E-01	6.43E-01	1.47E+00	7.90E-01	7.86E-01
U-234	2.445E5 Y	3.46E-01	4.11E-01	6.71E-01	2.76E-01	3.03E-01	2.64E-01	7.09E-01	3.31E-01	3.37E-01
U-235	7.038E8 Y	5.77E+02	6.31E+02	9.14E+02	6.06E+02	5.03E+02	4.86E+02	9.36E+02	5.75E+02	5.70E+02
U-236	2.3415E7 Y	2.48E-01	2.99E-01	5.07E-01	1.72E-01	2.15E-01	1.79E-01	5.39E-01	2.32E-01	2.39E-01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
PO-216	0.146 S	8.84E-02	7.00E-02	8.40E-02	5.43E-02	7.56E-02	1.02E-01	0.0	1.02E-01
PO-218	3.05 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AT-211	7.214 H	2.16E+02	1.69E+02	2.15E+02	1.09E+02	1.85E+02	2.36E+02	0.0	2.36E+02
AT-217	0.0323 S	1.41E+00	1.09E+00	1.32E+00	8.60E-01	1.21E+00	1.62E+00	0.0	1.62E+00
RN-218	0.035 S	4.50E+00	3.47E+00	4.21E+00	2.74E+00	3.85E+00	5.18E+00	0.0	5.18E+00
RN-219	3.96 S	3.32E+02	2.51E+02	3.12E+02	1.99E+02	2.88E+02	3.72E+02	3.28E+01	4.05E+02
RN-220	55.61 S	3.08E+00	2.35E+00	2.87E+00	1.87E+00	2.63E+00	3.53E+00	0.0	3.53E+00
RN-222	3.8235 D	2.28E+00	1.73E+00	2.11E+00	1.38E+00	1.95E+00	2.61E+00	0.0	2.61E+00
FR-221	4.8 M	1.78E+02	1.36E+02	1.71E+02	1.05E+02	1.56E+02	1.96E+02	3.73E+01	2.33E+02
FR-223	21.8 M	2.73E+02	2.04E+02	2.60E+02	1.37E+02	2.31E+02	3.16E+02	2.33E+03	2.64E+03
RA-222	38.0 S	5.31E+01	4.01E+01	4.99E+01	3.20E+01	4.61E+01	5.96E+01	4.17E+00	6.38E+01
RA-223	11.434 D	7.74E+02	5.92E+02	7.48E+02	4.40E+02	6.72E+02	8.54E+02	1.99E+02	1.05E+03
RA-224	3.62 D	5.78E+01	4.39E+01	5.52E+01	3.44E+01	5.06E+01	6.40E+01	1.07E+01	7.46E+01
RA-225	14.8 D	4.48E+01	2.83E+01	3.73E+01	1.13E+01	3.40E+01	6.35E+01	2.88E+02	3.52E+02
RA-226	1600 Y	3.90E+01	2.99E+01	3.79E+01	2.27E+01	3.43E+01	4.26E+01	1.29E+01	5.55E+01
RA-228	5.75 Y	1.67E-07	3.84E-12	1.15E-08	1.68E-12	3.20E-07	3.84E-06	0.0	3.84E-06
AC-225	10.0 D	7.78E+01	5.97E+01	7.64E+01	4.23E+01	6.79E+01	8.76E+01	3.00E+00	9.06E+01
AC-227	21.773 Y	7.07E-01	5.25E-01	6.81E-01	3.74E-01	6.29E-01	1.00E+00	0.0	1.00E+00
AC-228	6.13 H	5.63E+03	4.46E+03	5.35E+03	3.50E+03	4.83E+03	6.48E+03	2.60E+03	9.08E+03
TH-226	30.9 M	4.50E+01	3.45E+01	4.41E+01	2.52E+01	3.95E+01	5.00E+01	2.02E+01	7.02E+01
TH-227	18.718 D	6.01E+02	4.55E+02	5.72E+02	3.51E+02	5.23E+02	6.76E+02	5.68E+01	7.33E+02
TH-228	1.9132 Y	1.13E+01	8.63E+00	1.10E+01	6.06E+00	9.89E+00	1.40E+01	1.29E+00	1.53E+01
TH-229	7.34E3 Y	4.97E+02	3.82E+02	4.90E+02	2.65E+02	4.32E+02	5.51E+02	7.77E+01	6.29E+02
TH-230	7.7E4 Y	2.22E+00	1.62E+00	2.07E+00	1.04E+00	1.96E+00	4.03E+00	0.0	4.03E+00
TH-231	25.52 H	6.81E+01	4.86E+01	6.40E+01	3.14E+01	5.82E+01	9.48E+01	1.93E+02	2.88E+02
TH-232	1.405E10 Y	1.03E+00	6.83E-01	8.93E-01	4.16E-01	9.33E-01	2.74E+00	1.84E-01	2.92E+00
TH-233	22.3 M	1.97E+02	1.50E+02	1.85E+02	1.17E+02	1.69E+02	2.26E+02	2.80E+03	3.03E+03
TH-234	24.10 D	4.52E+01	3.48E+01	4.47E+01	2.23E+01	3.88E+01	5.09E+01	3.72E+01	8.81E+01
PA-230	17.4 D	3.97E+03	3.14E+03	3.79E+03	2.42E+03	3.41E+03	4.57E+03	1.18E+02	4.68E+03
PA-231	3.276E4 Y	1.74E+02	1.29E+02	1.63E+02	1.01E+02	1.51E+02	2.06E+02	3.05E+01	2.37E+02
PA-233	27.0 D	1.23E+03	9.30E+02	1.17E+03	7.23E+02	1.07E+03	1.38E+03	6.46E+02	2.02E+03
PA-234	6.70 H	1.19E+04	9.38E+03	1.13E+04	7.32E+03	1.02E+04	1.37E+04	2.10E+03	1.58E+04
PA-234M	1.17 M	6.97E+01	5.57E+01	6.67E+01	4.30E+01	5.97E+01	8.05E+01	6.41E+03	6.49E+03
U-230	20.8 D	6.32E+00	4.68E+00	5.98E+00	3.29E+00	5.56E+00	9.42E+00	6.55E-01	1.01E+01
U-231	4.2 D	3.98E+02	3.03E+02	3.92E+02	2.06E+02	3.45E+02	4.51E+02	7.77E-01	4.52E+02
U-232	72 Y	1.46E+00	9.24E-01	1.22E+00	5.95E-01	1.33E+00	4.12E+00	3.43E-01	4.46E+00
U-233	1.592E5 Y	1.33E+00	9.64E-01	1.26E+00	6.85E-01	1.20E+00	2.23E+00	1.66E-02	2.25E+00
U-234	2.445E5 Y	8.12E-01	4.46E-01	6.08E-01	2.74E-01	7.65E-01	3.09E+00	1.83E-01	3.27E+00
U-235	7.038E8 Y	8.73E+02	6.69E+02	8.51E+02	5.09E+02	7.70E+02	9.55E+02	2.10E+01	9.76E+02
U-236	2.3415E7 Y	6.27E-01	3.28E-01	4.47E-01	1.94E-01	6.05E-01	2.76E+00	1.19E-01	2.88E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
U-237	6.75 D	5.15E+02	4.93E+02	5.14E+02	8.84E+02	4.68E+02	4.14E+02	5.03E+02	4.59E+02	5.08E+02
U-238	4.468E9 Y	2.14E-01	2.08E-01	2.04E-01	1.55E+00	1.83E-01	1.62E-01	1.92E-01	1.84E-01	2.19E-01
U-239	23.40 M	1.65E+02	1.71E+02	1.75E+02	3.14E+02	1.56E+02	1.40E+02	1.67E+02	1.50E+02	1.78E+02
U-240	14.1 H	1.29E+00	1.53E+00	1.03E+00	1.03E+01	9.44E-01	9.58E-01	1.22E+00	1.08E+00	1.87E+00
NP-235	396.1 D	6.80E+00	6.43E+00	6.75E+00	1.74E+01	6.21E+00	5.35E+00	6.69E+00	6.05E+00	6.55E+00
NP-236	1.15E6 Y	5.03E+02	4.75E+02	5.02E+02	8.72E+02	4.61E+02	4.01E+02	4.96E+02	4.49E+02	4.84E+02
NP-236M	22.5 H	1.98E+02	1.90E+02	2.03E+02	3.32E+02	1.84E+02	1.61E+02	1.98E+02	1.78E+02	1.95E+02
NP-237	2.14E6 Y	8.12E+01	8.02E+01	8.17E+01	1.66E+02	7.46E+01	6.54E+01	8.12E+01	7.25E+01	8.37E+01
NP-238	2.117 D	2.48E+03	2.42E+03	2.72E+03	3.03E+03	2.39E+03	2.18E+03	2.55E+03	2.34E+03	2.54E+03
NP-239	2.355 D	6.74E+02	6.29E+02	6.71E+02	1.06E+03	6.11E+02	5.39E+02	6.54E+02	6.01E+02	6.45E+02
NP-240	65 M	5.08E+03	4.88E+03	5.46E+03	6.41E+03	4.81E+03	4.34E+03	5.11E+03	4.71E+03	5.09E+03
NP-240M	7.4 M	1.44E+03	1.39E+03	1.56E+03	1.81E+03	1.37E+03	1.24E+03	1.45E+03	1.34E+03	1.45E+03
PU-236	2.851 Y	1.81E-01	1.51E-01	1.46E-01	2.18E+00	1.33E-01	1.15E-01	1.36E-01	1.46E-01	1.63E-01
PU-237	45.3 D	1.78E+02	1.71E+02	1.79E+02	3.29E+02	1.65E+02	1.42E+02	1.78E+02	1.59E+02	1.75E+02
PU-238	87.75 Y	1.04E-01	7.19E-02	6.84E-02	1.80E+00	6.37E-02	5.33E-02	6.26E-02	7.77E-02	8.04E-02
PU-239	24131 Y	2.33E-01	2.05E-01	2.19E-01	9.98E-01	2.03E-01	1.73E-01	2.16E-01	2.03E-01	2.08E-01
PU-240	6537 Y	1.05E-01	7.67E-02	7.16E-02	1.74E+00	6.64E-02	5.64E-02	6.65E-02	7.98E-02	8.62E-02
PU-241	14.4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU-242	3.758E5 Y	9.37E-02	7.03E-02	6.67E-02	1.45E+00	6.15E-02	5.23E-02	6.15E-02	7.20E-02	7.78E-02
PU-243	4.956 H	8.35E+01	8.40E+01	8.67E+01	1.59E+02	7.84E+01	6.90E+01	8.39E+01	7.52E+01	8.61E+01
PU-244	8.26E7 Y	4.82E-02	2.61E-02	2.08E-02	1.19E+00	2.08E-02	1.67E-02	2.08E-02	3.23E-02	3.28E-02
PU-245	10.57 H	1.82E+03	1.73E+03	1.92E+03	2.35E+03	1.70E+03	1.53E+03	1.81E+03	1.67E+03	1.80E+03
PU-246	10.85 D	3.89E+02	3.65E+02	3.79E+02	6.02E+02	3.45E+02	3.10E+02	3.70E+02	3.44E+02	3.81E+02
AM-241	432.2 Y	5.59E+01	6.41E+01	5.86E+01	1.47E+02	5.19E+01	4.80E+01	5.70E+01	5.03E+01	6.91E+01
AM-242	16.02 H	5.14E+01	4.89E+01	5.14E+01	9.60E+01	4.74E+01	4.09E+01	5.12E+01	4.59E+01	4.97E+01
AM-242M	152 Y	1.06E+00	9.06E-01	9.19E-01	6.94E+00	8.52E-01	7.30E-01	9.04E-01	8.91E-01	9.62E-01
AM-243	7.38E3 Y	1.69E+02	1.80E+02	1.78E+02	3.66E+02	1.60E+02	1.43E+02	1.72E+02	1.53E+02	1.86E+02
AM-244	10.1 H	3.56E+03	3.42E+03	3.84E+03	4.44E+03	3.37E+03	3.05E+03	3.59E+03	3.30E+03	3.57E+03
AM-245	122.4 M	1.27E+02	1.18E+02	1.26E+02	1.97E+02	1.15E+02	1.02E+02	1.23E+02	1.13E+02	1.21E+02
AM-246	25.0 H	4.36E+03	4.26E+03	4.79E+03	5.36E+03	4.21E+03	3.83E+03	4.48E+03	4.12E+03	4.47E+03
CM-242	163.2 D	1.13E-01	6.76E-02	6.91E-02	2.01E+00	6.53E-02	5.20E-02	6.02E-02	8.32E-02	7.58E-02
CM-243	28.5 Y	5.14E+02	4.79E+02	5.11E+02	7.98E+02	4.65E+02	4.11E+02	4.97E+02	4.58E+02	4.91E+02
CM-244	18.11 Y	8.79E-02	4.59E-02	4.75E-02	1.76E+00	4.57E-02	3.50E-02	4.03E-02	6.24E-02	5.26E-02
CM-245	8.5E3 Y	2.73E+02	2.58E+02	2.72E+02	4.74E+02	2.51E+02	2.17E+02	2.70E+02	2.44E+02	2.62E+02
CM-246	4.75E3 Y	6.27E-02	2.63E-02	2.35E-02	1.54E+00	2.44E-02	1.74E-02	2.11E-02	4.11E-02	3.42E-02
CM-247	1.56E7 Y	1.36E+03	1.27E+03	1.40E+03	1.77E+03	1.24E+03	1.11E+03	1.31E+03	1.22E+03	1.31E+03
CM-248	3.39E5 Y	6.96E-02	4.14E-02	4.13E-02	1.26E+00	3.92E-02	3.12E-02	3.63E-02	5.08E-02	4.71E-02
CM-249	64.15 M	8.22E+01	7.82E+01	8.73E+01	1.03E+02	7.67E+01	6.90E+01	8.15E+01	7.51E+01	8.13E+01
CM-250	6.9E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BK-249	320 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/CUBIC M

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
U-237	6.75 D	4.89E+02	5.39E+02	8.30E+02	4.62E+02	4.22E+02	3.89E+02	8.52E+02	4.77E+02	4.78E+02
U-238	4.468E9 Y	2.07E-01	2.51E-01	4.25E-01	1.41E-01	1.80E-01	1.49E-01	4.53E-01	1.93E-01	1.99E-01
U-239	23.40 M	1.69E+02	1.85E+02	2.96E+02	1.36E+02	1.46E+02	1.23E+02	3.03E+02	1.58E+02	1.61E+02
U-240	14.1 H	1.33E+00	1.63E+00	2.80E+00	7.01E-01	1.15E+00	8.39E-01	2.96E+00	1.13E+00	1.22E+00
NP-235	396.1 D	6.41E+00	7.24E+00	1.19E+01	5.66E+00	5.53E+00	5.05E+00	1.23E+01	6.31E+00	6.32E+00
NP-236	1.15E6 Y	4.73E+02	5.24E+02	8.30E+02	4.46E+02	4.07E+02	3.80E+02	8.54E+02	4.67E+02	4.66E+02
NP-236M	22.5 H	1.89E+02	2.08E+02	3.17E+02	1.76E+02	1.67E+02	1.51E+02	3.25E+02	1.85E+02	1.86E+02
NP-237	2.14E6 Y	7.91E+01	8.81E+01	1.46E+02	6.70E+01	6.73E+01	5.99E+01	1.50E+02	7.62E+01	7.67E+01
NP-238	2.117 D	2.40E+03	2.56E+03	2.73E+03	2.59E+03	2.33E+03	2.08E+03	2.78E+03	2.33E+03	2.37E+03
NP-239	2.355 D	6.26E+02	6.87E+02	1.00E+03	6.35E+02	5.51E+02	5.19E+02	1.03E+03	6.19E+02	6.17E+02
NP-240	65 M	4.86E+03	5.20E+03	5.86E+03	5.24E+03	4.66E+03	4.18E+03	5.97E+03	4.72E+03	4.80E+03
NP-240M	7.4 M	1.38E+03	1.48E+03	1.65E+03	1.50E+03	1.33E+03	1.19E+03	1.68E+03	1.34E+03	1.36E+03
PU-236	2.851 Y	1.51E-01	2.09E-01	3.38E-01	1.05E-01	1.44E-01	1.22E-01	3.76E-01	1.47E-01	1.53E-01
PU-237	45.3 D	1.70E+02	1.90E+02	3.13E+02	1.50E+02	1.46E+02	1.33E+02	3.22E+02	1.67E+02	1.67E+02
PU-238	87.75 Y	7.16E-02	1.18E-01	1.79E-01	5.31E-02	7.77E-02	6.79E-02	2.09E-01	7.50E-02	7.83E-02
PU-239	24131 Y	2.05E-01	2.42E-01	3.80E-01	1.95E-01	1.84E-01	1.73E-01	4.01E-01	2.08E-01	2.07E-01
PU-240	6537 Y	7.59E-02	1.21E-01	1.86E-01	5.45E-02	8.02E-02	6.90E-02	2.15E-01	7.79E-02	8.14E-02
PU-241	14.4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU-242	3.758E5 Y	6.98E-02	1.07E-01	1.67E-01	5.00E-02	7.20E-02	6.18E-02	1.92E-01	7.09E-02	7.39E-02
PU-243	4.956 H	8.35E+01	9.21E+01	1.52E+02	6.85E+01	7.08E+01	6.17E+01	1.56E+02	7.95E+01	8.02E+01
PU-244	8.26E7 Y	2.41E-02	5.28E-02	7.20E-02	2.03E-02	3.29E-02	3.03E-02	9.12E-02	2.86E-02	3.03E-02
PU-245	10.57 H	1.72E+03	1.85E+03	2.17E+03	1.87E+03	1.63E+03	1.48E+03	2.21E+03	1.68E+03	1.70E+03
PU-246	10.85 D	3.59E+02	3.92E+02	5.49E+02	3.77E+02	3.15E+02	3.00E+02	5.62E+02	3.53E+02	3.52E+02
AM-241	432.2 Y	6.23E+01	6.92E+01	1.24E+02	3.74E+01	5.06E+01	3.88E+01	1.27E+02	5.46E+01	5.69E+01
AM-242	16.02 H	4.86E+01	5.42E+01	8.85E+01	4.40E+01	4.18E+01	3.84E+01	9.12E+01	4.80E+01	4.79E+01
AM-242M	152 Y	9.00E-01	1.14E+00	1.82E+00	7.81E-01	8.37E-01	7.55E-01	1.95E+00	9.08E-01	9.20E-01
AM-243	7.38E3 Y	1.78E+02	1.96E+02	3.43E+02	1.26E+02	1.47E+02	1.21E+02	3.53E+02	1.64E+02	1.67E+02
AM-244	10.1 H	3.40E+03	3.64E+03	4.05E+03	3.68E+03	3.29E+03	2.93E+03	4.12E+03	3.31E+03	3.37E+03
AM-245	122.4 M	1.18E+02	1.29E+02	1.87E+02	1.21E+02	1.04E+02	9.81E+01	1.91E+02	1.17E+02	1.16E+02
AM-246	25.0 M	4.24E+03	4.51E+03	4.84E+03	4.56E+03	4.09E+03	3.66E+03	4.92E+03	4.10E+03	4.18E+03
CM-242	163.2 D	6.98E-02	1.26E-01	1.87E-01	5.72E-02	8.23E-02	7.40E-02	2.22E-01	7.85E-02	8.17E-02
CM-243	28.5 Y	4.76E+02	5.22E+02	7.55E+02	4.88E+02	4.20E+02	3.96E+02	7.74E+02	4.72E+02	4.70E+02
CM-244	18.11 Y	4.79E-02	9.69E-02	1.38E-01	4.17E-02	6.18E-02	5.68E-02	1.69E-01	5.72E-02	5.96E-02
CM-245	8.5E3 Y	2.57E+02	2.84E+02	4.52E+02	2.41E+02	2.21E+02	2.06E+02	4.66E+02	2.54E+02	2.53E+02
CM-246	4.75E3 Y	2.60E-02	6.78E-02	8.97E-02	2.55E-02	4.15E-02	3.92E-02	1.16E-01	3.51E-02	3.72E-02
CM-247	1.56E7 Y	1.26E+03	1.36E+03	1.65E+03	1.40E+03	1.19E+03	1.09E+03	1.68E+03	1.24E+03	1.25E+03
CM-248	3.39E5 Y	4.24E-02	7.80E-02	1.15E-01	3.43E-02	5.06E-02	4.52E-02	1.37E-01	4.78E-02	4.99E-02
CM-249	64.15 M	7.78E+01	8.34E+01	9.51E+01	8.50E+01	7.49E+01	6.69E+01	9.67E+01	7.58E+01	7.69E+01
CM-250	6.9E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BK-249	320 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/CUBIC M

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
U-237	6.75 D	7.76E+02	5.91E+02	7.56E+02	4.18E+02	6.72E+02	8.62E+02	3.11E+02	1.17E+03
U-238	4.468E9 Y	5.37E-01	2.75E-01	3.76E-01	1.60E-01	5.19E-01	2.43E+00	8.57E-02	2.51E+00
U-239	23.40 M	2.75E+02	2.14E+02	2.69E+02	1.39E+02	2.34E+02	3.06E+02	2.76E+03	3.07E+03
U-240	14.1 H	4.16E+00	2.00E+00	2.80E+00	8.79E-01	3.61E+00	1.51E+01	5.20E+02	5.35E+02
NP-235	396.1 D	1.12E+01	7.94E+00	1.04E+01	5.44E+00	1.01E+01	2.04E+01	9.98E-04	2.04E+01
NP-236	1.15E6 Y	7.48E+02	5.74E+02	7.38E+02	4.08E+02	6.56E+02	8.32E+02	3.11E+02	1.14E+03
NP-236M	22.5 H	2.96E+02	2.28E+02	2.91E+02	1.62E+02	2.57E+02	3.28E+02	3.67E+02	6.95E+02
NP-237	2.14E6 Y	1.34E+02	9.92E+01	1.29E+02	6.59E+01	1.15E+02	1.63E+02	6.04E+00	1.69E+02
NP-238	2.117 D	3.38E+03	2.71E+03	3.23E+03	2.10E+03	2.89E+03	3.92E+03	1.41E+03	5.33E+03
NP-239	2.355 D	9.61E+02	7.33E+02	9.32E+02	5.45E+02	8.40E+02	1.06E+03	7.73E+02	1.84E+03
NP-240	65 M	6.93E+03	5.44E+03	6.57E+03	4.24E+03	5.94E+03	7.97E+03	1.84E+03	9.82E+03
NP-240M	7.4 H	1.97E+03	1.53E+03	1.85E+03	1.21E+03	1.69E+03	2.27E+03	4.45E+03	6.72E+03
PU-236	2.851 Y	5.95E-01	2.02E-01	3.10E-01	1.12E-01	5.96E-01	3.58E+00	0.0	3.58E+00
PU-237	45.3 D	2.76E+02	2.11E+02	2.73E+02	1.45E+02	2.41E+02	3.07E+02	4.04E-02	3.07E+02
PU-238	87.75 Y	4.23E-01	9.64E-02	1.71E-01	5.01E-02	4.41E-01	3.06E+00	0.0	3.06E+00
PU-239	24131 Y	4.34E-01	2.49E-01	3.39E-01	1.76E-01	4.11E-01	1.45E+00	0.0	1.45E+00
PU-240	6537 Y	4.19E-01	1.03E-01	1.77E-01	5.28E-02	4.32E-01	2.93E+00	0.0	2.93E+00
PU-241	14.4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU-242	3.758E5 Y	3.58E-01	9.41E-02	1.58E-01	4.96E-02	3.67E-01	2.44E+00	0.0	2.44E+00
PU-243	4.956 H	1.36E+02	1.05E+02	1.34E+02	6.97E+01	1.17E+02	1.49E+02	8.03E+02	9.53E+02
PU-244	8.26E7 Y	2.51E-01	3.44E-02	7.63E-02	1.49E-02	2.68E-01	2.06E+00	0.0	2.06E+00
PU-245	10.57 H	2.48E+03	1.92E+03	2.35E+03	1.50E+03	2.13E+03	2.83E+03	1.91E+03	4.74E+03
PU-246	10.85 D	5.55E+02	4.18E+02	5.29E+02	3.13E+02	4.81E+02	6.22E+02	8.66E+01	7.08E+02
AM-241	432.2 Y	1.15E+02	8.53E+01	1.10E+02	4.66E+01	9.50E+01	1.41E+02	1.06E-01	1.41E+02
AM-242	16.02 H	7.89E+01	5.99E+01	7.76E+01	4.16E+01	6.91E+01	9.23E+01	8.71E+02	9.63E+02
AM-242M	152 Y	2.57E+00	1.13E+00	1.67E+00	7.24E-01	2.38E+00	1.04E+01	0.0	1.04E+01
AM-243	7.38E3 Y	3.01E+02	2.33E+02	2.97E+02	1.43E+02	2.56E+02	3.36E+02	6.45E-02	3.36E+02
AM-244	10.1 H	4.85E+03	3.82E+03	4.61E+03	2.96E+03	4.15E+03	5.61E+03	9.26E+02	6.54E+03
AM-245	122.4 M	1.80E+02	1.37E+02	1.74E+02	1.03E+02	1.57E+02	1.99E+02	1.70E+03	1.90E+03
AM-246	25.0 M	5.96E+03	4.76E+03	5.68E+03	3.71E+03	5.10E+03	6.89E+03	3.07E+03	9.96E+03
CM-242	163.2 D	4.88E-01	9.09E-02	1.82E-01	4.91E-02	4.90E-01	3.33E+00	0.0	3.33E+00
CM-243	28.5 Y	7.29E+02	5.55E+02	7.05E+02	4.16E+02	6.37E+02	8.10E+02	3.16E+02	1.13E+03
CM-244	18.11 Y	4.11E-01	6.19E-02	1.38E-01	3.25E-02	4.18E-01	2.95E+00	0.0	2.95E+00
CM-245	8.5E3 Y	4.06E+02	3.11E+02	4.01E+02	2.21E+02	3.57E+02	4.50E+02	1.07E+02	5.57E+02
CM-246	4.75E3 Y	3.44E-01	3.51E-02	9.76E-02	1.52E-02	3.51E-01	2.60E+00	0.0	2.60E+00
CM-247	1.56E7 Y	1.84E+03	1.38E+03	1.71E+03	1.11E+03	1.58E+03	2.08E+03	6.03E+01	2.14E+03
CM-248	3.39E5 Y	3.07E-01	5.57E-02	1.13E-01	2.91E-02	3.08E-01	2.10E+00	0.0	2.10E+00
CM-249	64.15 M	1.12E+02	8.58E+01	1.05E+02	6.78E+01	9.55E+01	1.28E+02	1.72E+03	1.85E+03
CM-250	6.9E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BK-249	320 D	0.0	0.0	0.0	0.0	0.0	0.0	5.87E+00	5.87E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
BK-250	3.222 H	3.98E+03	3.89E+03	4.38E+03	4.87E+03	3.84E+03	3.50E+03	4.09E+03	3.76E+03	4.08E+03
BK-251	57.0 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CF-248	333.5 D	5.72E-02	1.41E-02	1.58E-02	1.47E+00	1.78E-02	1.00E-02	1.12E-02	3.59E-02	2.14E-02
CF-249	350.6 Y	1.41E+03	1.31E+03	1.44E+03	1.85E+03	1.28E+03	1.15E+03	1.35E+03	1.26E+03	1.35E+03
CF-250	13.08 Y	1.28E-01	8.57E-02	9.29E-02	1.59E+00	8.70E-02	7.01E-02	8.28E-02	1.00E-01	9.21E-02
CF-251	9.0E2 Y	4.68E+02	4.36E+02	4.64E+02	7.55E+02	4.25E+02	3.72E+02	4.55E+02	4.17E+02	4.45E+02
CF-252	2.639 Y	9.86E-02	6.06E-02	6.51E-02	1.45E+00	6.14E-02	4.86E-02	5.64E-02	7.49E-02	6.69E-02
CF-253	17.81 D	1.01E-03	2.37E-04	3.35E-04	2.48E-02	3.59E-04	2.03E-04	2.14E-04	6.46E-04	3.21E-04
CF-254	60.5 D	3.08E-05	4.33E-05	2.73E-05	1.10E-04	2.48E-05	2.63E-05	3.40E-05	2.70E-05	5.35E-05
ES-253	20.467 D	1.28E+00	1.14E+00	1.22E+00	2.68E+00	1.11E+00	9.90E-01	1.17E+00	1.12E+00	1.17E+00
ES-254	275.7 D	1.05E+01	9.76E+00	1.00E+01	3.61E+01	9.05E+00	8.08E+00	9.54E+03	9.13E+00	1.03E+01
ES-254M	39.3 H	2.47E+03	2.37E+03	2.65E+03	3.06E+03	2.32E+03	2.10E+03	2.47E+03	2.27E+03	2.47E+03
ES-255	39.8 D	4.70E-03	1.38E-03	1.41E-03	1.12E-01	1.57E-03	9.59E-04	1.10E-03	3.02E-03	2.10E-03
FM-254	3.240 H	1.97E-01	1.42E-01	1.54E-01	1.86E+00	1.44E-01	1.18E-01	1.41E-01	1.60E-01	1.52E-01
FM-255	20.07 H	5.76E+00	5.54E+00	5.58E+00	2.34E+01	5.06E+00	4.44E+00	5.37E+00	5.05E+00	5.83E+00
FM-256	157.6 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

∞
∞

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
BK-250	3.222 H	3.87E+03	4.12E+03	4.39E+03	4.16E+03	3.74E+03	3.34E+03	4.47E+03	3.74E+03	3.82E+03
BK-251	57.0 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CF-248	333.5 D	1.63E-02	6.05E-02	7.55E-02	2.16E-02	3.59E-02	3.54E-02	1.02E-01	2.88E-02	3.06E-02
CF-249	350.6 Y	1.30E+03	1.41E+03	1.72E+03	1.44E+03	1.22E+03	1.12E+03	1.76E+03	1.28E+03	1.29E+03
CF-250	13.08 Y	8.94E-02	1.41E-01	2.15E-01	7.71E-02	9.62E-02	8.71E-02	2.45E-01	9.79E-02	1.00E-01
CF-251	9.0E2 Y	4.34E+02	4.78E+02	7.20E+02	4.34E+02	3.77E+02	3.58E+02	7.39E+02	4.31E+02	4.28E+02
CF-252	2.639 Y	6.38E-02	1.09E-01	1.65E-01	5.41E-02	7.30E-02	6.57E-02	1.91E-01	7.17E-02	7.41E-02
CF-253	17.81 D	3.04E-04	1.06E-03	1.34E-03	4.09E-04	6.32E-04	6.32E-04	1.78E-03	5.29E-04	5.54E-04
CF-254	60.5 D	3.66E-05	4.05E-05	7.27E-05	1.76E-05	2.94E-05	2.01E-05	7.42E-05	2.92E-05	3.18E-05
ES-253	20.467 D	1.14E+00	1.26E+00	1.74E+00	1.24E+00	1.01E+00	9.87E-01	1.80E+00	1.14E+00	1.13E+00
ES-254	275.7 D	9.71E+00	1.12E+01	1.67E+01	8.95E+00	8.67E+00	7.79E+00	1.74E+01	9.41E+00	9.53E+00
ES-254M	39.3 H	2.35E+03	2.52E+03	2.80E+03	2.56E+03	2.28E+03	2.02E+03	2.85E+03	2.29E+03	2.32E+03
ES-255	39.8 D	1.53E-03	5.06E-03	6.52E-03	1.82E-03	3.05E-03	2.92E-03	8.53E-03	2.48E-03	2.66E-03
FM-254	3.240 H	1.47E-01	2.15E-01	3.35E-01	1.30E-01	1.52E-01	1.37E-01	3.72E-01	1.59E-01	1.62E-01
FM-255	20.07 H	5.53E+00	6.52E+00	1.09E+01	4.26E+00	4.81E+00	4.12E+00	1.14E+01	5.29E+00	5.39E+00
FM-256	157.6 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR
IN MREM/YR PER MICROCURIE/CUBIC M

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
BK-250	3.222 H	5.43E+03	4.36E+03	5.19E+03	3.38E+03	4.65E+03	6.29E+03	1.78E+03	8.07E+03
BK-251	57.0 M	0.0	0.0	0.0	0.0	0.0	0.0	2.46E+03	2.46E+03
CF-248	333.5 D	3.42E-01	1.92E-02	8.73E-02	7.71E-03	3.36E-01	2.43E+00	0.0	2.43E+00
CF-249	350.6 Y	1.90E+03	1.43E+03	1.77E+03	1.15E+03	1.64E+03	2.15E+03	7.10E+01	2.22E+03
CF-250	13.08 Y	4.52E-01	1.12E-01	2.04E-01	6.90E-02	4.30E-01	2.52E+00	9.92E-03	2.53E+00
CF-251	9.0E2 Y	6.71E+02	5.13E+02	6.57E+02	3.78E+02	5.89E+02	7.40E+02	5.20E+02	1.26E+03
CF-252	2.639 Y	3.92E-01	8.05E-02	1.60E-01	4.69E-02	3.75E-01	2.32E+00	1.11E-02	2.33E+00
CF-253	17.81 D	5.74E-03	3.31E-04	1.48E-03	1.72E-04	5.68E-03	4.10E-02	1.92E+02	1.92E+02
CF-254	60.5 D	8.41E-05	5.62E-05	7.31E-05	2.41E-05	6.47E-05	1.08E-04	0.0	1.08E-04
ES-253	20.467 D	1.89E+00	1.29E+00	1.67E+00	1.00E+00	1.68E+00	3.30E+00	0.0	3.30E+00
ES-254	275.7 D	1.98E+01	1.18E+01	1.58E+01	8.05E+00	1.73E+01	4.83E+01	4.62E-02	4.83E+01
ES-254M	39.3 H	3.36E+03	2.61E+03	3.16E+03	2.04E+03	2.87E+03	3.88E+03	9.57E+02	4.84E+03
ES-255	39.8 D	2.74E-02	1.87E-03	7.55E-03	7.43E-04	2.61E-02	1.82E-01	1.65E+02	1.65E+02
FM-254	3.240 H	6.14E-01	1.82E-01	3.16E-01	1.17E-01	5.57E-01	2.83E+00	1.85E-01	3.01E+00
FM-255	20.07 H	1.22E+01	7.10E+00	9.76E+00	4.43E+00	1.06E+01	3.02E+01	1.41E+00	3.16E+01
FM-256	157.6 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

A.2 Dose-Rate Factors for Immersion in Contaminated Water

The following tables give the dose-rate conversion factors for external exposure to photons and electrons for immersion in an infinite, uniformly contaminated water medium. In lieu of site-specific data, the dose-rate factors for this exposure mode should be reduced by a factor of 100 in estimating dose equivalents to members of the public. Dose-reduction factors which can be applied to these results to take into account external exposure to contaminated water during boating activities are discussed in Section 3.2.3.

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
H-3	12.28 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE-7	53.44 D	4.65E-01	4.40E-01	4.89E-01	5.89E-01	4.29E-01	3.86E-01	4.56E-01	4.21E-01	4.56E-01
BE-10	1.6E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C-11	20.48 M	9.55E+00	9.07E+00	1.01E+01	1.20E+01	8.86E+00	7.97E+00	9.40E+00	8.68E+00	9.40E+00
C-14	5.73E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N-13	9.97 M	9.55E+00	9.07E+00	1.01E+01	1.20E+01	8.86E+00	7.97E+00	9.41E+00	8.69E+00	9.41E+00
N-16	7.13 S	5.31E+01	5.37E+01	5.68E+01	6.84E+01	5.29E+01	5.06E+01	5.65E+01	5.30E+01	6.00E+01
O-15	122.24 S	9.56E+00	9.08E+00	1.01E+01	1.21E+01	8.87E+00	7.98E+00	9.42E+00	8.70E+00	9.41E+00
F-18	109.74 M	9.26E+00	8.79E+00	9.80E+00	1.17E+01	8.59E+00	7.73E+00	9.12E+00	8.42E+00	9.12E+00
NA-22	2.602 Y	2.07E+01	2.02E+01	2.27E+01	2.58E+01	1.99E+01	1.81E+01	2.11E+01	1.95E+01	2.11E+01
NA-24	15.00 H	4.26E+01	4.37E+01	4.86E+01	5.49E+01	4.36E+01	4.09E+01	4.64E+01	4.30E+01	4.71E+01
MG-27	9.458 M	8.69E+00	8.43E+00	9.48E+00	1.06E+01	8.32E+00	7.55E+00	8.86E+00	8.14E+00	8.83E+00
MG-28	20.91 H	1.29E+01	1.27E+01	1.43E+01	1.62E+01	1.26E+01	1.15E+01	1.34E+01	1.23E+01	1.34E+01
AL-26	7.2E5 Y	2.63E+01	2.64E+01	2.95E+01	3.34E+01	2.61E+01	2.41E+01	2.78E+01	2.56E+01	2.78E+01
AL-28	2.240 M	1.78E+01	1.82E+01	2.04E+01	2.26E+01	1.81E+01	1.69E+01	1.93E+01	1.78E+01	1.93E+01
SI-31	157.3 M	8.41E-03	8.36E-03	9.43E-03	1.04E-02	8.27E-03	7.62E-03	8.81E-03	8.12E-03	8.79E-03
SI-32	3.3E2 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P-32	14.29 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P-33	25.4 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S-35	87.44 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL-36	3.01E5 Y	7.47E-09	1.35E-15	5.96E-10	5.85E-07	9.73E-10	1.25E-11	1.85E-11	3.07E-09	8.95E-12
CL-38	37.21 M	1.53E+01	1.57E+01	1.76E+01	1.96E+01	1.57E+01	1.46E+01	1.67E+01	1.54E+01	1.68E+01
AR-37	35.02 D	1.19E-06	2.19E-13	9.51E-08	9.34E-05	1.55E-07	2.00E-09	2.95E-09	4.89E-07	1.43E-09
AR-39	269 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AR-41	1.827 H	1.22E+01	1.21E+01	1.37E+01	1.51E+01	1.20E+01	1.11E+01	1.28E+01	1.18E+01	1.27E+01
K-40	1.277E9 Y	1.47E+00	1.48E+00	1.67E+00	1.85E+00	1.47E+00	1.36E+00	1.57E+00	1.44E+00	1.56E+00
K-42	12.36 H	2.62E+00	2.65E+00	2.99E+00	3.30E+00	2.63E+00	2.44E+00	2.80E+00	2.58E+00	2.80E+00
K-43	22.6 H	9.16E+00	8.67E+00	9.64E+00	1.16E+01	8.49E+00	7.64E+00	9.01E+00	8.34E+00	9.00E+00
CA-41	1.03E5 Y	2.78E-06	5.01E-13	2.22E-07	2.18E-04	3.62E-07	4.67E-09	6.87E-09	1.14E-06	3.33E-09
CA-45	162.7 D	2.24E-11	2.07E-15	2.40E-12	1.07E-09	3.66E-12	1.93E-13	2.93E-14	1.11E-11	2.79E-13
CA-47	4.536 D	1.01E+01	1.00E+01	1.13E+01	1.25E+01	9.90E+00	9.11E+00	1.05E+01	9.71E+00	1.05E+01
CA-49	8.719 M	3.42E+01	3.53E+01	3.88E+01	4.48E+01	3.53E+01	3.34E+01	3.75E+01	3.50E+01	3.86E+01
SC-44	3.927 H	2.03E+01	1.97E+01	2.21E+01	2.52E+01	1.94E+01	1.76E+01	2.06E+01	1.90E+01	2.06E+01
SC-46	83.80 D	1.95E+01	1.90E+01	2.14E+01	2.38E+01	1.88E+01	1.72E+01	2.00E+01	1.84E+01	2.00E+01
SC-46M	18.72 S	8.52E-01	7.85E-01	8.41E-01	1.34E+00	7.75E-01	6.74E-01	8.27E-01	7.58E-01	7.97E-01
SC-47	3.422 D	1.04E+00	9.50E-01	1.02E+00	1.58E+00	9.35E-01	8.20E-01	9.95E-01	9.21E-01	9.67E-01
SC-48	43.67 H	3.23E+01	3.18E+01	3.59E+01	3.98E+01	3.15E+01	2.88E+01	3.35E+01	3.08E+01	3.34E+01
SC-49	57.4 M	1.03E-02	1.06E-02	1.19E-02	1.31E-02	1.05E-02	9.78E-03	1.12E-02	1.03E-02	1.12E-02
TI-44	47.3 Y	1.06E+00	1.13E+00	1.13E+00	2.27E+00	1.01E+00	9.00E-01	1.08E+00	9.61E-01	1.17E+00
TI-45	3.08 H	8.15E+00	7.74E+00	8.63E+00	1.03E+01	7.57E+00	6.81E+00	8.03E+00	7.42E+00	8.03E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/CUBIC M

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
H-3	12.28 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE-7	53.44 D	4.37E-01	4.70E-01	5.47E-01	4.82E-01	4.18E-01	3.76E-01	5.55E-01	4.28E-01	4.31E-01
BE-10	1.6E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C-11	20.48 M	9.01E+00	9.67E+00	1.11E+01	9.90E+00	8.66E+00	7.76E+00	1.13E+01	8.80E+00	8.89E+00
C-14	5.73E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N-13	9.97 M	9.02E+00	9.68E+00	1.11E+01	9.90E+00	8.66E+00	7.76E+00	1.13E+01	8.80E+00	8.90E+00
N-16	7.13 S	5.35E+01	5.49E+01	5.77E+01	5.96E+01	4.82E+01	4.94E+01	5.84E+01	5.23E+01	5.46E+01
O-15	122.24 S	9.03E+00	9.69E+00	1.12E+01	9.91E+00	8.67E+00	7.77E+00	1.13E+01	8.81E+00	8.91E+00
F-18	109.74 M	8.74E+00	9.38E+00	1.08E+01	9.60E+00	8.39E+00	7.52E+00	1.10E+01	8.53E+00	8.62E+00
NA-22	2.602 Y	2.01E+01	2.14E+01	2.34E+01	2.17E+01	1.92E+01	1.74E+01	2.38E+01	1.95E+01	1.97E+01
NA-24	15.00 H	4.39E+01	4.60E+01	4.73E+01	4.69E+01	3.96E+01	3.85E+01	4.80E+01	4.22E+01	4.33E+01
MG-27	9.458 M	8.38E+00	8.93E+00	9.63E+00	9.05E+00	8.13E+00	7.23E+00	9.79E+00	8.12E+00	8.28E+00
MG-28	20.91 H	1.27E+01	1.35E+01	1.44E+01	1.36E+01	1.21E+01	1.10E+01	1.47E+01	1.23E+01	1.24E+01
AL-26	7.2E5 Y	2.64E+01	2.79E+01	2.97E+01	2.83E+01	2.45E+01	2.29E+01	3.02E+01	2.54E+01	2.58E+01
AL-28	2.240 M	1.83E+01	1.92E+01	1.98E+01	1.94E+01	1.68E+01	1.59E+01	2.01E+01	1.75E+01	1.78E+01
SI-31	157.3 M	8.34E-03	8.83E-03	9.29E-03	8.91E-03	7.94E-03	7.23E-03	9.44E-03	8.06E-03	8.16E-03
SI-32	3.3E2 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P-32	14.29 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P-33	25.4 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S-35	87.44 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL-36	3.01E5 Y	7.26E-11	5.91E-09	3.55E-09	1.94E-09	2.92E-09	4.36E-09	9.59E-09	1.68E-09	1.52E-09
CL-38	37.21 M	1.58E+01	1.66E+01	1.70E+01	1.68E+01	1.44E+01	1.38E+01	1.73E+01	1.51E+01	1.54E+01
AR-37	35.02 D	1.16E-08	9.43E-07	5.66E-07	3.09E-07	4.67E-07	6.96E-07	1.53E-06	2.69E-07	2.43E-07
AR-39	269 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AR-41	1.827 H	1.21E+01	1.28E+01	1.34E+01	1.29E+01	1.15E+01	1.05E+01	1.37E+01	1.17E+01	1.18E+01
K-40	1.277E9 Y	1.48E+00	1.57E+00	1.63E+00	1.58E+00	1.39E+00	1.29E+00	1.66E+00	1.43E+00	1.44E+00
K-42	12.36 H	2.65E+00	2.80E+00	2.92E+00	2.82E+00	2.48E+00	2.30E+00	2.96E+00	2.56E+00	2.58E+00
K-43	22.6 H	8.62E+00	9.25E+00	1.07E+01	9.48E+00	8.23E+00	7.43E+00	1.09E+01	8.43E+00	8.52E+00
CA-41	1.03E5 Y	2.70E-08	2.20E-06	1.32E-06	7.21E-07	1.09E-06	1.62E-06	3.57E-06	6.27E-07	5.66E-07
CA-45	162.7 D	7.68E-13	2.03E-11	1.75E-11	6.78E-12	1.04E-11	1.36E-11	3.30E-11	7.05E-12	6.94E-12
CA-47	4.536 D	9.98E+00	1.06E+01	1.12E+01	1.07E+01	9.50E+00	8.64E+00	1.13E+01	9.65E+00	9.76E+00
CA-49	8.719 M	3.55E+01	3.69E+01	3.78E+01	3.82E+01	3.12E+01	3.15E+01	3.83E+01	3.42E+01	3.54E+01
SC-44	3.927 H	1.96E+01	2.09E+01	2.29E+01	2.12E+01	1.88E+01	1.69E+01	2.33E+01	1.90E+01	1.93E+01
SC-46	83.80 D	1.89E+01	2.01E+01	2.15E+01	2.04E+01	1.83E+01	1.64E+01	2.19E+01	1.83E+01	1.87E+01
SC-46M	18.72 S	7.84E-01	8.63E-01	1.31E+00	7.91E-01	6.79E-01	6.51E-01	1.35E+00	7.83E-01	7.76E-01
SC-47	3.422 D	9.48E-01	1.04E+00	1.54E+00	9.85E-01	8.24E-01	7.97E-01	1.57E+00	9.48E-01	9.39E-01
SC-48	43.67 H	3.17E+01	3.37E+01	3.57E+01	3.40E+01	3.04E+01	2.74E+01	3.63E+01	3.07E+01	3.11E+01
SC-49	57.4 M	1.06E-02	1.12E-02	1.15E-02	1.13E-02	9.76E-03	9.21E-03	1.17E-02	1.02E-02	1.03E-02
TI-44	47.3 Y	1.12E+00	1.24E+00	2.17E+00	7.89E-01	9.24E-01	7.62E-01	2.23E+00	1.03E+00	1.05E+00
TI-45	3.08 H	7.70E+00	8.26E+00	9.51E+00	8.45E+00	7.39E+00	6.62E+00	9.66E+00	7.52E+00	7.59E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
H-3	12.28 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE-7	53.44 D	6.31E-01	4.76E-01	5.84E-01	3.83E-01	5.41E-01	7.20E-01	0.0	7.20E-01
BE-10	1.6E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	1.16E+00	1.16E+00
C-11	20.48 M	1.30E+01	9.83E+00	1.20E+01	7.87E+00	1.11E+01	1.48E+01	2.80E+00	1.77E+01
C-14	5.73E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	3.05E-02	3.05E-02
N-13	9.97 M	1.30E+01	9.83E+00	1.20E+01	7.88E+00	1.11E+01	1.49E+01	3.76E+00	1.86E+01
N-16	7.13 S	7.35E+01	5.97E+01	6.66E+01	4.74E+01	6.36E+01	7.71E+01	2.43E+01	1.01E+02
O-15	122.24 S	1.30E+01	9.84E+00	1.20E+01	7.88E+00	1.11E+01	1.49E+01	5.94E+00	2.08E+01
F-18	109.74 M	1.26E+01	9.53E+00	1.17E+01	7.63E+00	1.08E+01	1.44E+01	1.54E+00	1.59E+01
NA-22	2.602 Y	2.84E+01	2.22E+01	2.67E+01	1.77E+01	2.43E+01	3.25E+01	1.16E+00	3.37E+01
NA-24	15.00 H	5.99E+01	4.73E+01	5.48E+01	3.94E+01	5.16E+01	6.69E+01	4.30E+00	7.12E+01
MG-27	9.458 M	1.18E+01	9.42E+00	1.13E+01	7.30E+00	1.01E+01	1.37E+01	5.63E+00	1.93E+01
MG-28	20.91 H	1.78E+01	1.41E+01	1.68E+01	1.12E+01	1.53E+01	2.05E+01	7.43E-01	2.13E+01
AL-26	7.2E5 Y	3.66E+01	2.86E+01	3.39E+01	2.36E+01	3.14E+01	4.16E+01	3.05E+00	4.47E+01
AL-28	2.240 M	2.49E+01	1.97E+01	2.32E+01	1.65E+01	2.15E+01	2.83E+01	1.05E+01	3.89E+01
SI-31	157.3 M	1.16E-02	9.29E-03	1.10E-02	7.38E-03	9.94E-03	1.33E-02	4.67E+00	4.68E+00
SI-32	3.3E2 Y	0.0	0.0	0.0	0.0	0.0	0.0	1.02E-01	1.02E-01
P-32	14.29 D	0.0	0.0	0.0	0.0	0.0	0.0	5.57E+00	5.57E+00
P-33	25.4 D	0.0	0.0	0.0	0.0	0.0	0.0	1.71E-01	1.71E-01
S-35	87.44 D	0.0	0.0	0.0	0.0	0.0	0.0	3.77E-02	3.77E-02
CL-36	3.01E5 Y	5.42E-08	1.25E-12	3.74E-09	5.45E-13	1.04E-07	1.25E-06	1.59E+00	1.59E+00
CL-38	37.21 M	2.15E+01	1.70E+01	1.98E+01	1.43E+01	1.85E+01	2.43E+01	1.33E+01	3.76E+01
AR-37	35.02 D	8.65E-06	1.99E-10	5.96E-07	8.70E-11	1.66E-05	1.99E-04	0.0	1.99E-04
AR-39	269 Y	0.0	0.0	0.0	0.0	0.0	0.0	1.33E+00	1.33E+00
AR-41	1.827 H	1.68E+01	1.34E+01	1.59E+01	1.07E+01	1.44E+01	1.93E+01	3.50E+00	2.28E+01
K-40	1.277E9 Y	2.05E+00	1.64E+00	1.93E+00	1.33E+00	1.76E+00	2.35E+00	3.48E+00	5.82E+00
K-42	12.36 H	3.66E+00	2.91E+00	3.44E+00	2.38E+00	3.14E+00	4.18E+00	1.23E+01	1.65E+01
K-43	22.6 H	1.24E+01	9.49E+00	1.16E+01	7.54E+00	1.06E+01	1.42E+01	2.08E+00	1.63E+01
CA-41	1.03E5 Y	2.02E-05	4.64E-10	1.39E-06	2.03E-10	3.86E-05	4.64E-04	0.0	4.64E-04
CA-45	162.7 D	1.56E-10	7.08E-14	1.97E-11	2.64E-15	2.09E-10	2.01E-09	1.79E-01	1.79E-01
CA-47	4.536 D	1.39E+01	1.11E+01	1.32E+01	8.84E+00	1.19E+01	1.60E+01	2.44E+00	1.84E+01
CA-49	8.719 M	4.83E+01	3.80E+01	4.33E+01	3.18E+01	4.17E+01	5.28E+01	7.17E+00	5.99E+01
SC-44	3.927 H	2.77E+01	2.17E+01	2.61E+01	1.72E+01	2.37E+01	3.18E+01	4.75E+00	3.66E+01
SC-46	83.80 D	2.66E+01	2.13E+01	2.54E+01	1.66E+01	2.28E+01	3.07E+01	4.25E-01	3.11E+01
SC-464	18.72 S	1.20E+00	9.27E-01	1.19E+00	6.89E-01	1.06E+00	1.29E+00	1.81E-01	1.47E+00
SC-47	3.422 D	1.44E+00	1.11E+00	1.41E+00	8.37E-01	1.27E+00	1.55E+00	8.41E-01	2.39E+00
SC-48	43.67 H	4.43E+01	3.55E+01	4.22E+01	2.79E+01	3.80E+01	5.11E+01	1.33E+00	5.24E+01
SC-49	57.4 M	1.45E-02	1.15E-02	1.35E-02	9.55E-03	1.25E-02	1.65E-02	6.72E+00	6.74E+00
TI-44	47.3 Y	1.89E+00	1.47E+00	1.88E+00	9.04E-01	1.61E+00	2.05E+00	1.41E-04	2.05E+00
TI-45	3.08 H	1.11E+01	8.40E+00	1.03E+01	6.72E+00	9.48E+00	1.27E+01	2.79E+00	1.55E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/LICUBIC M

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
TI-51	5.752 M	3.50E+00	3.27E+00	3.59E+00	4.58E+00	3.19E+00	2.87E+00	3.38E+00	3.16E+00	3.38E+00
V-48	15.971 D	2.79E+01	2.74E+01	3.08E+01	3.46E+01	2.71E+01	2.48E+01	2.88E+01	2.65E+01	2.88E+01
V-49	330 D	8.40E-06	1.51E-12	6.70E-07	6.58E-04	1.09E-06	1.41E-08	2.08E-08	3.45E-06	1.01E-08
V-52	3.75 M	1.37E+01	1.37E+01	1.55E+01	1.71E+01	1.36E+01	1.26E+01	1.45E+01	1.33E+01	1.45E+01
CR-49	42.09 M	9.74E+00	9.26E+00	1.03E+01	1.27E+01	9.03E+00	8.10E+00	9.59E+00	8.84E+00	9.59E+00
CR-51	27.704 D	2.97E-01	2.74E-01	3.00E-01	3.96E-01	2.68E-01	2.40E-01	2.83E-01	2.65E-01	2.83E-01
MN-52	5.591 D	3.30E+01	3.25E+01	3.65E+01	4.09E+01	3.21E+01	2.93E+01	3.41E+01	3.14E+01	3.41E+01
MN-52M	21.4 M	2.27E+01	2.23E+01	2.50E+01	2.85E+01	2.20E+01	2.01E+01	2.33E+01	2.15E+01	2.33E+01
MN-53	3.7E6 Y	1.56E-05	2.82E-12	1.25E-06	1.22E-03	2.03E-06	2.62E-08	3.86E-08	6.41E-06	1.87E-08
MN-54	312.7 D	8.12E+00	7.84E+00	8.82E+00	9.91E+00	7.74E+00	7.01E+00	8.23E+00	7.57E+00	8.21E+00
MN-56	2.5785 M	1.69E+01	1.69E+01	1.90E+01	2.12E+01	1.68E+01	1.54E+01	1.79E+01	1.65E+01	1.79E+01
MN-57	1.47 M	6.80E-01	6.54E-01	7.25E-01	9.11E-01	6.44E-01	5.79E-01	6.86E-01	6.30E-01	6.80E-01
FE-52	8.275 M	6.92E+00	6.51E+00	7.19E+00	9.10E+00	6.37E+00	5.71E+00	6.76E+00	6.25E+00	6.73E+00
FE-55	2.7 Y	2.06E-05	3.71E-12	1.64E-06	1.61E-03	2.68E-06	3.46E-08	5.09E-08	8.46E-06	2.47E-08
FE-59	44.63 D	1.14E+01	1.12E+01	1.27E+01	1.40E+01	1.11E+01	1.02E+01	1.18E+01	1.09E+01	1.18E+01
CO-56	78.76 D	3.61E+01	3.61E+01	4.03E+01	4.54E+01	3.58E+01	3.31E+01	3.81E+01	3.52E+01	3.84E+01
CO-57	270.9 D	1.13E+00	1.05E+00	1.12E+00	1.87E+00	1.03E+00	8.95E-01	1.11E+00	1.01E+00	1.07E+00
CO-58	70.80 D	9.40E+00	9.06E+00	1.02E+01	1.15E+01	8.92E+00	8.07E+00	9.48E+00	8.72E+00	9.46E+00
CO-58M	9.15 M	3.69E-05	7.81E-06	5.39E-06	2.38E-03	7.16E-06	3.35E-06	9.83E-06	1.78E-05	1.51E-05
CO-60	5.271 Y	2.38E+01	2.37E+01	2.67E+01	2.95E+01	2.34E+01	2.16E+01	2.50E+01	2.30E+01	2.49E+01
CO-60M	10.47 M	3.84E-02	3.95E-02	4.26E-02	5.96E-02	3.75E-02	3.46E-02	4.02E-02	3.67E-02	4.18E-02
CO-61	1.650 H	7.33E-01	7.65E-01	7.89E-01	1.32E+00	6.98E-01	6.32E-01	7.47E-01	6.73E-01	8.00E-01
NI-56	6.10 D	1.65E+01	1.59E+01	1.77E+01	2.09E+01	1.56E+01	1.41E+01	1.66E+01	1.53E+01	1.66E+01
NI-57	36.08 M	1.84E+01	1.83E+01	2.06E+01	2.32E+01	1.81E+01	1.67E+01	1.93E+01	1.78E+01	1.93E+01
NI-59	7.5E4 Y	3.48E-05	6.27E-12	2.77E-06	2.72E-03	4.53E-06	5.84E-08	8.60E-08	1.43E-05	4.17E-08
NI-63	100.1 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NI-65	2.520 M	5.22E+00	5.22E+00	5.87E+00	6.52E+00	5.16E+00	4.77E+00	5.50E+00	5.07E+00	5.49E+00
CU-61	3.408 M	7.73E+00	7.36E+00	8.21E+00	9.76E+00	7.20E+00	6.49E+00	7.65E+00	7.06E+00	7.65E+00
CU-62	9.74 M	9.43E+00	8.96E+00	9.98E+00	1.19E+01	8.76E+00	7.88E+00	9.29E+00	8.58E+00	9.29E+00
CU-64	12.701 M	1.77E+00	1.69E+00	1.88E+00	2.23E+00	1.65E+00	1.48E+00	1.75E+00	1.62E+00	1.75E+00
CU-67	61.88 D	1.07E+00	9.93E-01	1.06E+00	1.65E+00	9.67E-01	8.54E-01	1.03E+00	9.53E-01	1.02E+00
ZN-62	9.26 M	4.19E+00	3.99E+00	4.43E+00	5.36E+00	3.89E+00	3.50E+00	4.14E+00	3.81E+00	4.16E+00
ZN-65	244.4 D	5.59E+00	5.50E+00	6.20E+00	6.87E+00	5.44E+00	4.97E+00	5.79E+00	5.33E+00	5.77E+00
ZN-69	55.6 M	5.61E-05	5.26E-05	5.81E-05	7.21E-05	5.13E-05	4.61E-05	5.44E-05	5.05E-05	5.44E-05
ZN-69M	13.76 M	3.89E+00	3.66E+00	4.05E+00	4.97E+00	3.57E+00	3.21E+00	3.78E+00	3.51E+00	3.79E+00
GA-66	9.40 M	2.54E+01	2.55E+01	2.82E+01	3.25E+01	2.53E+01	2.35E+01	2.69E+01	2.49E+01	2.73E+01
GA-67	3.261 D	1.34E+00	1.25E+00	1.35E+00	2.01E+00	1.22E+00	1.08E+00	1.29E+00	1.20E+00	1.29E+00
GA-68	68.0 M	8.91E+00	8.47E+00	9.44E+00	1.12E+01	8.28E+00	7.46E+00	8.79E+00	8.12E+00	8.79E+00
GA-72	14.1 M	2.73E+01	2.74E+01	3.07E+01	3.44E+01	2.72E+01	2.51E+01	2.90E+01	2.67E+01	2.91E+01
GE-68	288 D	8.31E-05	1.88E-11	6.66E-06	6.44E-03	1.09E-05	1.45E-07	1.96E-07	3.42E-05	1.05E-07

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
TI-51	5.752 M	3.25E+00	3.50E+00	4.26E+00	3.60E+00	3.02E+00	2.81E+00	4.34E+00	3.20E+00	3.21E+00
V-48	15.971 D	2.73E+01	2.90E+01	3.12E+01	2.94E+01	2.62E+01	2.36E+01	3.17E+01	2.65E+01	2.68E+01
V-49	330 D	8.16E-08	6.64E-06	3.99E-06	2.18E-06	3.29E-06	4.91E-06	1.08E-05	1.89E-06	1.71E-06
V-52	3.75 M	1.37E+01	1.45E+01	1.51E+01	1.46E+01	1.29E+01	1.19E+01	1.54E+01	1.32E+01	1.34E+01
CR-49	42.09 M	9.21E+00	9.91E+00	1.19E+01	9.94E+00	8.75E+00	7.85E+00	1.21E+01	8.99E+00	9.08E+00
CR-51	27.704 D	2.73E-01	2.95E-01	3.70E-01	3.05E-01	2.51E-01	2.36E-01	3.76E-01	2.70E-01	2.70E-01
MN-52	5.591 D	3.23E+01	3.44E+01	3.68E+01	3.48E+01	3.10E+01	2.80E+01	3.75E+01	3.13E+01	3.18E+01
MN-52M	21.4 M	2.22E+01	2.36E+01	2.57E+01	2.40E+01	2.11E+01	1.92E+01	2.61E+01	2.15E+01	2.18E+01
MN-53	3.7E6 Y	1.52E-07	1.24E-05	7.42E-06	4.05E-06	6.12E-06	9.13E-06	2.01E-05	3.52E-06	3.18E-06
MN-54	312.7 D	7.79E+00	8.32E+00	9.02E+00	8.44E+00	7.58E+00	6.72E+00	9.17E+00	7.56E+00	7.71E+00
MN-56	2.5785 H	1.69E+01	1.79E+01	1.88E+01	1.81E+01	1.59E+01	1.47E+01	1.92E+01	1.63E+01	1.66E+01
MN-57	1.47 M	6.51E-01	7.00E-01	8.39E-01	6.92E-01	6.11E-01	5.56E-01	8.56E-01	6.36E-01	6.42E-01
FE-52	8.275 H	6.48E+00	6.99E+00	8.51E+00	7.05E+00	6.10E+00	5.55E+00	8.67E+00	6.36E+00	6.40E+00
FE-55	2.7 Y	2.00E-07	1.63E-05	9.78E-06	5.35E-06	8.07E-06	1.20E-05	2.64E-05	4.65E-06	4.20E-06
FE-59	44.63 D	1.12E+01	1.19E+01	1.26E+01	1.20E+01	1.07E+01	9.70E+00	1.28E+01	1.08E+01	1.10E+01
CO-56	78.76 D	3.61E+01	3.81E+01	4.01E+01	3.88E+01	3.36E+01	3.14E+01	4.07E+01	3.48E+01	3.56E+01
CO-57	270.9 D	1.05E+00	1.16E+00	1.82E+00	1.01E+00	9.06E-01	8.54E-01	1.88E+00	1.04E+00	1.04E+00
CO-58	70.80 D	9.00E+00	9.62E+00	1.05E+01	9.78E+00	8.73E+00	7.76E+00	1.07E+01	8.74E+00	8.90E+00
CO-58M	9.15 H	5.50E-06	3.26E-05	2.86E-05	1.09E-05	1.79E-05	2.18E-05	5.36E-05	1.20E-05	1.21E-05
CO-60	5.271 Y	2.36E+01	2.50E+01	2.63E+01	2.52E+01	2.25E+01	2.05E+01	2.68E+01	2.28E+01	2.31E+01
CO-60M	10.47 M	3.91E-02	4.18E-02	5.07E-02	3.79E-02	3.60E-02	3.19E-02	5.17E-02	3.71E-02	3.77E-02
CO-61	1.650 H	7.57E-01	8.23E-01	1.23E+00	6.28E-01	6.65E-01	5.59E-01	1.26E+00	7.03E-01	7.20E-01
NI-56	6.10 D	1.58E+01	1.69E+01	1.92E+01	1.71E+01	1.51E+01	1.36E+01	1.96E+01	1.54E+01	1.56E+01
NI-57	36.08 H	1.83E+01	1.94E+01	2.07E+01	1.96E+01	1.72E+01	1.58E+01	2.10E+01	1.77E+01	1.79E+01
NI-59	7.5E4 Y	3.38E-07	2.75E-05	1.65E-05	9.02E-06	1.36E-05	2.03E-05	4.46E-05	7.84E-06	7.09E-06
NI-63	100.1 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NI-65	2.520 H	5.21E+00	5.51E+00	5.80E+00	5.56E+00	4.92E+00	4.51E+00	5.90E+00	5.03E+00	5.09E+00
CU-61	3.408 H	7.32E+00	7.85E+00	9.01E+00	8.02E+00	7.02E+00	6.30E+00	9.16E+00	7.14E+00	7.22E+00
CU-62	9.74 M	8.91E+00	9.56E+00	1.10E+01	9.78E+00	8.55E+00	7.67E+00	1.12E+01	8.70E+00	8.79E+00
CU-64	12.701 H	1.68E+00	1.80E+00	2.06E+00	1.84E+00	1.61E+00	1.44E+00	2.10E+00	1.64E+00	1.65E+00
CU-67	61.88 D	9.90E-01	1.08E+00	1.59E+00	1.02E+00	8.61E-01	8.25E-01	1.63E+00	9.82E-01	9.76E-01
ZN-62	9.26 H	3.96E+00	4.25E+00	4.91E+00	4.32E+00	3.80E+00	3.40E+00	4.99E+00	3.86E+00	3.91E+00
ZN-65	244.4 D	5.47E+00	5.81E+00	6.17E+00	5.87E+00	5.26E+00	4.73E+00	6.28E+00	5.30E+00	5.38E+00
ZN-69	55.6 M	5.23E-05	5.63E-05	6.71E-05	5.80E-05	4.94E-05	4.51E-05	6.82E-05	5.14E-05	5.16E-05
ZN-69M	13.76 H	3.64E+00	3.91E+00	4.62E+00	4.02E+00	3.45E+00	3.14E+00	4.69E+00	3.57E+00	3.59E+00
GA-66	9.40 H	2.55E+01	2.68E+01	2.84E+01	2.76E+01	2.33E+01	2.24E+01	2.88E+01	2.46E+01	2.53E+01
GA-67	3.261 D	1.25E+00	1.36E+00	1.91E+00	1.29E+00	1.11E+00	1.04E+00	1.95E+00	1.23E+00	1.23E+00
GA-68	68.0 M	8.42E+00	9.03E+00	1.04E+01	9.24E+00	8.09E+00	7.25E+00	1.05E+01	8.22E+00	8.31E+00
GA-72	14.1 H	2.74E+01	2.90E+01	3.05E+01	2.94E+01	2.55E+01	2.38E+01	3.10E+01	2.64E+01	2.70E+01
GE-68	288 D	8.32E-07	6.59E-05	3.99E-05	2.16E-05	3.26E-05	4.86E-05	1.07E-04	1.89E-05	1.71E-05

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
TI-51	5.752 M	4.71E+00	3.60E+00	4.44E+00	2.86E+00	4.08E+00	5.32E+00	7.11E+00	1.24E+01
V-48	15.971 D	3.83E+01	3.04E+01	3.63E+01	2.40E+01	3.28E+01	4.41E+01	9.84E+01	4.51E+01
V-49	330 D	6.09E-05	1.40E-09	4.20E-06	6.13E-10	1.17E-04	1.40E-03	0.0	1.40E-03
V-52	3.75 M	1.90E+01	1.51E+01	1.79E+01	1.22E+01	1.63E+01	2.17E+01	8.95E+00	3.07E+01
CR-49	42.09 M	1.34E+01	1.02E+01	1.25E+01	8.03E+00	1.15E+01	1.52E+01	4.73E+00	2.00E+01
CR-51	27.704 D	3.99E-01	3.01E-01	3.74E-01	2.41E-01	3.47E-01	4.50E-01	0.0	4.50E-01
MN-52	5.591 D	4.53E+01	3.59E+01	4.29E+01	2.85E+01	3.88E+01	5.22E+01	4.45E-01	5.26E+01
MN-52M	21.4 M	3.12E+01	2.44E+01	2.92E+01	1.97E+01	2.68E+01	3.57E+01	9.56E+00	4.53E+01
MN-53	3.7E6 Y	1.13E-04	2.61E-09	7.81E-06	1.14E-09	2.17E-04	2.61E-03	0.0	2.61E-03
MN-54	312.7 D	1.10E+01	8.75E+00	1.05E+01	6.78E+00	9.42E+00	1.28E+01	0.0	1.28E+01
MN-56	2.5785 H	2.34E+01	1.85E+01	2.19E+01	1.50E+01	2.01E+01	2.68E+01	6.81E+00	3.36E+01
MN-57	1.47 M	9.41E-01	7.33E-01	8.95E-01	5.71E-01	8.11E-01	1.07E+00	9.25E+00	1.03E+01
FE-52	8.275 H	9.43E+00	7.16E+00	8.84E+00	5.68E+00	8.13E+00	1.07E+01	1.37E+00	1.20E+01
FE-55	2.7 Y	1.50E-04	3.44E-09	1.03E-05	1.50E-09	2.86E-04	3.44E-03	0.0	3.44E-03
FE-59	44.63 D	1.56E+01	1.25E+01	1.49E+01	9.88E+00	1.34E+01	1.80E+01	4.89E-01	1.85E+01
CO-56	78.76 D	5.00E+01	3.95E+01	4.66E+01	3.20E+01	4.29E+01	5.67E+01	9.50E-01	5.77E+01
CO-57	270.9 D	1.64E+00	1.26E+00	1.62E+00	9.14E-01	1.44E+00	1.76E+00	1.18E-02	1.77E+00
CO-58	70.80 D	1.28E+01	1.00E+01	1.21E+01	7.83E+00	1.09E+01	1.47E+01	1.71E-01	1.49E+01
CO-58M	9.15 H	2.50E-04	7.22E-06	3.41E-05	1.37E-06	4.34E-04	5.01E-03	0.0	5.01E-03
CO-60	5.271 Y	3.29E+01	2.63E+01	3.12E+01	2.09E+01	2.82E+01	3.78E+01	3.08E-01	3.81E+01
CO-60M	10.47 M	5.82E-02	4.56E-02	5.52E-02	3.36E-02	4.95E-02	7.15E-02	1.11E-02	8.27E-02
CO-61	1.650 H	1.21E+00	9.45E-01	1.18E+00	6.21E-01	1.02E+00	1.35E+00	3.48E+00	4.83E+00
NI-56	6.10 D	2.25E+01	1.76E+01	2.14E+01	1.38E+01	1.93E+01	2.58E+01	9.17E-03	2.58E+01
NI-57	36.08 H	2.55E+01	2.01E+01	2.39E+01	1.63E+01	2.19E+01	2.91E+01	9.88E-01	3.01E+01
NI-59	7.5E4 Y	2.52E-04	5.81E-09	1.74E-05	2.54E-09	4.84E-04	5.81E-03	0.0	5.81E-03
NI-63	100.1 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NI-65	2.520 H	7.23E+00	5.76E+00	6.83E+00	4.63E+00	6.20E+00	8.29E+00	5.02E+00	1.33E+01
CU-61	3.408 H	1.05E+01	8.03E+00	9.79E+00	6.40E+00	9.01E+00	1.20E+01	2.36E+00	1.44E+01
CU-62	9.74 M	1.28E+01	9.71E+00	1.19E+01	7.78E+00	1.10E+01	1.47E+01	1.09E+01	2.56E+01
CU-64	12.701 H	2.41E+00	1.83E+00	2.24E+00	1.47E+00	2.06E+00	2.76E+00	7.31E-01	3.49E+00
CU-67	61.88 D	1.51E+00	1.16E+00	1.47E+00	8.68E-01	1.32E+00	1.64E+00	6.79E-01	2.32E+00
ZN-62	9.26 H	5.74E+00	4.37E+00	5.33E+00	3.45E+00	4.90E+00	6.60E+00	1.27E-01	6.73E+00
ZN-65	244.4 D	7.66E+00	6.14E+00	7.30E+00	4.81E+00	6.56E+00	8.85E+00	8.80E-03	8.85E+00
ZN-69	55.6 M	7.58E-05	5.71E-05	7.04E-05	4.59E-05	6.52E-05	8.60E-05	2.23E+00	2.23E+00
ZN-69M	13.76 H	5.26E+00	3.97E+00	4.88E+00	3.19E+00	4.52E+00	5.99E+00	1.62E-01	6.15E+00
GA-66	9.40 H	3.53E+01	2.77E+01	3.24E+01	2.26E+01	3.04E+01	3.95E+01	8.37E+00	4.78E+01
GA-67	3.261 D	1.89E+00	1.44E+00	1.82E+00	1.09E+00	1.64E+00	2.09E+00	1.45E-02	2.10E+00
GA-68	68.0 M	1.21E+01	9.19E+00	1.12E+01	7.36E+00	1.04E+01	1.39E+01	6.04E+00	1.99E+01
GA-72	14.1 H	3.79E+01	2.99E+01	3.53E+01	2.44E+01	3.26E+01	4.31E+01	3.85E+00	4.70E+01
GE-68	288 D	6.02E-04	1.51E-08	4.21E-05	5.99E-09	1.14E-03	1.37E-02	0.0	1.37E-02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
GE-71	11.8 D	8.40E-05	1.90E-11	6.74E-06	6.51E-03	1.10E-05	1.47E-07	1.98E-07	3.46E-05	1.07E-07
GE-77	11.30 H	1.02E+01	9.71E+00	1.08E+01	1.31E+01	9.54E+00	8.64E+00	1.01E+01	9.39E+00	1.01E+01
AS-72	26.0 H	1.71E+01	1.65E+01	1.84E+01	2.13E+01	1.62E+01	1.46E+01	1.72E+01	1.58E+01	1.72E+01
AS-73	80.30 D	3.04E-02	3.60E-02	3.09E-02	1.01E-01	2.74E-02	2.59E-02	3.10E-02	2.71E-02	4.00E-02
AS-74	17.77 D	7.21E+00	6.87E+00	7.68E+00	9.01E+00	6.73E+00	6.06E+00	7.15E+00	6.59E+00	7.14E+00
AS-76	26.32 H	4.10E+00	3.96E+00	4.44E+00	5.11E+00	3.90E+00	3.54E+00	4.14E+00	3.82E+00	4.14E+00
AS-77	38.8 H	8.11E-02	7.53E-02	8.21E-02	1.10E-01	7.35E-02	6.58E-02	7.79E-02	7.26E-02	7.78E-02
SE-73	7.15 H	1.01E+01	9.62E+00	1.06E+01	1.33E+01	9.35E+00	8.41E+00	9.92E+00	9.18E+00	9.97E+00
SE-75	119.78 D	3.65E+00	3.36E+00	3.64E+00	5.22E+00	3.29E+00	2.92E+00	3.49E+00	3.25E+00	3.45E+00
SE-79	6.5E4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BR-77	57.04 H	2.97E+00	2.80E+00	3.10E+00	3.86E+00	2.74E+00	2.46E+00	2.91E+00	2.70E+00	2.90E+00
BR-80	17.4 H	7.06E-01	6.74E-01	7.53E-01	8.79E-01	6.60E-01	5.95E-01	7.01E-01	6.46E-01	7.00E-01
BR-80M	4.42 H	3.78E-02	5.61E-02	2.86E-02	1.86E-01	2.68E-02	3.03E-02	4.28E-02	3.22E-02	7.67E-02
BR-82	35.30 H	2.53E+01	2.46E+01	2.76E+01	3.13E+01	2.42E+01	2.20E+01	2.58E+01	2.37E+01	2.57E+01
BR-83	2.39 H	6.99E-02	6.65E-02	7.42E-02	8.78E-02	6.50E-02	5.85E-02	6.90E-02	6.37E-02	6.90E-02
BR-84	31.80 M	1.84E+01	1.86E+01	2.07E+01	2.34E+01	1.85E+01	1.73E+01	1.97E+01	1.82E+01	2.00E+01
BR-85	172 S	6.45E-01	6.29E-01	7.07E-01	7.92E-01	6.22E-01	5.65E-01	6.61E-01	6.08E-01	6.60E-01
KR-79	35.04 H	2.37E+00	2.24E+00	2.48E+00	3.06E+00	2.19E+00	1.97E+00	2.33E+00	2.16E+00	2.32E+00
KR-81	2.1E5 Y	9.43E-02	8.62E-02	9.34E-02	1.41E-01	8.41E-02	7.54E-02	8.89E-02	8.36E-02	8.89E-02
KR-83M	1.83 H	1.52E-04	3.99E-05	3.16E-05	5.90E-03	3.82E-05	2.13E-05	3.17E-05	8.60E-05	6.48E-05
KR-85	10.72 Y	2.09E-02	1.98E-02	2.21E-02	2.63E-02	1.94E-02	1.75E-02	2.06E-02	1.90E-02	2.06E-02
KR-85M	4.48 H	1.50E+00	1.38E+00	1.48E+00	2.24E+00	1.35E+00	1.19E+00	1.44E+00	1.33E+00	1.40E+00
KR-87	76.3 M	8.05E+00	8.08E+00	8.98E+00	1.04E+01	8.03E+00	7.43E+00	8.53E+00	7.90E+00	8.61E+00
KR-88	2.84 H	2.02E+01	2.07E+01	2.30E+01	2.60E+01	2.06E+01	1.92E+01	2.19E+01	2.03E+01	2.21E+01
KR-89	3.16 M	1.84E+01	1.85E+01	2.05E+01	2.34E+01	1.83E+01	1.70E+01	1.95E+01	1.80E+01	1.97E+01
KR-90	32.32 S	1.23E+01	1.22E+01	1.36E+01	1.56E+01	1.20E+01	1.10E+01	1.28E+01	1.18E+01	1.28E+01
RB-81	4.58 H	5.69E+00	5.35E+00	5.91E+00	7.44E+00	5.23E+00	4.70E+00	5.55E+00	5.15E+00	5.54E+00
RB-82	1.25 M	1.03E+01	9.79E+00	1.09E+01	1.29E+01	9.57E+00	8.62E+00	1.02E+01	9.38E+00	1.02E+01
RB-83	86.2 D	4.68E+00	4.45E+00	4.96E+00	5.89E+00	4.35E+00	3.91E+00	4.62E+00	4.26E+00	4.62E+00
RB-84	32.9 D	8.63E+00	8.32E+00	9.34E+00	1.07E+01	8.20E+00	7.42E+00	8.72E+00	8.02E+00	8.70E+00
RB-86	18.66 D	9.16E-01	8.99E-01	1.01E+00	1.12E+00	8.89E-01	8.12E-01	9.47E-01	8.71E-01	9.44E-01
RB-87	4.73E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RB-88	17.8 M	6.44E+00	6.54E+00	7.33E+00	8.17E+00	6.52E+00	6.05E+00	6.93E+00	6.40E+00	6.97E+00
RB-89	15.44 M	2.07E+01	2.07E+01	2.32E+01	2.59E+01	2.06E+01	1.90E+01	2.19E+01	2.02E+01	2.20E+01
RB-90	157 S	2.30E+01	2.34E+01	2.55E+01	2.97E+01	2.32E+01	2.20E+01	2.47E+01	2.31E+01	2.55E+01
RB-90M	258 S	3.36E+01	3.39E+01	3.76E+01	4.27E+01	3.37E+01	3.14E+01	3.58E+01	3.32E+01	3.64E+01
SR-82	25.0 D	5.61E-04	1.01E-06	7.21E-05	2.11E-02	1.05E-04	1.11E-05	2.13E-06	3.03E-04	2.41E-05
SR-85	64.84 D	4.78E+00	4.54E+00	5.06E+00	6.05E+00	4.44E+00	3.99E+00	4.71E+00	4.35E+00	4.71E+00
SR-85M	67.66 M	2.04E+00	1.86E+00	2.00E+00	2.89E+00	1.82E+00	1.62E+00	1.92E+00	1.81E+00	1.92E+00
SR-87M	2.805 H	2.99E+00	2.80E+00	3.08E+00	3.88E+00	2.73E+00	2.45E+00	2.89E+00	2.69E+00	2.89E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
GE-71	11.8 D	8.42E-07	6.66E-05	4.04E-05	2.19E-05	3.30E-05	4.91E-05	1.08E-04	1.91E-05	1.73E-05
GE-77	11.30 H	9.67E+00	1.04E+01	1.20E+01	1.05E+01	9.08E+00	8.35E+00	1.22E+01	9.45E+00	9.53E+00
AS-72	26.0 H	1.64E+01	1.75E+01	1.95E+01	1.78E+01	1.57E+01	1.41E+01	1.98E+01	1.59E+01	1.62E+01
AS-73	80.30 D	3.44E-02	3.85E-02	6.94E-02	1.92E-02	2.79E-02	2.07E-02	7.14E-02	2.95E-02	3.11E-02
AS-74	17.77 D	6.83E+00	7.32E+00	8.31E+00	7.48E+00	6.59E+00	5.88E+00	8.44E+00	6.66E+00	6.74E+00
AS-76	26.32 H	3.94E+00	4.21E+00	4.66E+00	4.29E+00	3.78E+00	3.40E+00	4.73E+00	3.83E+00	3.88E+00
AS-77	38.8 H	7.50E-02	8.11E-02	1.03E-01	8.21E-02	6.87E-02	6.43E-02	1.05E-01	7.40E-02	7.40E-02
SE-73	7.15 H	9.56E+00	1.03E+01	1.23E+01	1.04E+01	9.04E+00	8.16E+00	1.26E+01	9.33E+00	9.41E+00
SE-75	119.78 D	3.35E+00	3.65E+00	4.95E+00	3.61E+00	3.00E+00	2.85E+00	5.06E+00	3.32E+00	3.31E+00
SE-79	6.5E4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BR-77	57.04 H	2.79E+00	3.00E+00	3.57E+00	3.06E+00	2.63E+00	2.40E+00	3.63E+00	2.73E+00	2.75E+00
BR-80	17.4 H	6.69E-01	7.17E-01	8.09E-01	7.32E-01	6.47E-01	5.77E-01	8.22E-01	6.52E-01	6.61E-01
BR-80M	4.42 H	4.37E-02	5.00E-02	8.77E-02	2.01E-02	3.63E-02	2.41E-02	8.98E-02	3.43E-02	3.80E-02
BR-82	35.30 H	2.45E+01	2.61E+01	2.84E+01	2.65E+01	2.36E+01	2.11E+01	2.89E+01	2.37E+01	2.41E+01
BR-83	2.39 H	6.61E-02	7.09E-02	8.12E-02	7.25E-02	6.36E-02	5.69E-02	8.25E-02	6.45E-02	6.52E-02
BR-84	31.80 M	1.86E+01	1.96E+01	2.04E+01	2.00E+01	1.70E+01	1.63E+01	2.07E+01	1.80E+01	1.84E+01
BR-85	172 S	6.26E-01	6.66E-01	7.16E-01	6.76E-01	6.03E-01	5.41E-01	7.28E-01	6.06E-01	6.18E-01
KR-79	35.04 H	2.23E+00	2.40E+00	2.83E+00	2.45E+00	2.11E+00	1.92E+00	2.88E+00	2.18E+00	2.20E+00
KR-81	2.1E5 Y	8.58E-02	9.31E-02	1.20E-01	9.56E-02	7.78E-02	7.43E-02	1.23E-01	8.52E-02	8.49E-02
KR-83M	1.83 H	3.50E-05	1.51E-04	1.65E-04	5.19E-05	8.59E-05	9.25E-05	2.50E-04	6.45E-05	6.74E-05
KR-85	10.72 Y	1.97E-02	2.12E-02	2.44E-02	2.17E-02	1.90E-02	1.70E-02	2.47E-02	1.93E-02	1.95E-02
KR-85M	4.48 H	1.37E+00	1.50E+00	2.16E+00	1.44E+00	1.21E+00	1.16E+00	2.21E+00	1.37E+00	1.36E+00
KR-87	76.3 M	8.10E+00	8.54E+00	9.13E+00	8.73E+00	7.40E+00	7.06E+00	9.28E+00	7.81E+00	7.97E+00
KR-88	2.84 H	2.08E+01	2.18E+01	2.27E+01	2.21E+01	1.88E+01	1.81E+01	2.31E+01	1.99E+01	2.03E+01
KR-89	3.16 M	1.85E+01	1.95E+01	2.06E+01	1.99E+01	1.70E+01	1.61E+01	2.10E+01	1.78E+01	1.82E+01
KR-90	32.32 S	1.21E+01	1.29E+01	1.40E+01	1.30E+01	1.14E+01	1.05E+01	1.42E+01	1.18E+01	1.19E+01
RB-81	4.58 H	5.33E+00	5.74E+00	6.92E+00	5.83E+00	5.02E+00	4.58E+00	7.04E+00	5.22E+00	5.26E+00
RB-82	1.25 M	9.73E+00	1.04E+01	1.19E+01	1.07E+01	9.35E+00	8.37E+00	1.21E+01	9.49E+00	9.60E+00
RB-83	86.2 D	4.42E+00	4.74E+00	5.43E+00	4.85E+00	4.26E+00	3.81E+00	5.52E+00	4.31E+00	4.36E+00
RB-84	32.9 D	8.28E+00	8.84E+00	9.72E+00	8.99E+00	8.00E+00	7.14E+00	9.88E+00	8.04E+00	8.18E+00
RB-86	18.66 D	8.95E-01	9.51E-01	1.01E+00	9.61E-01	8.62E-01	7.74E-01	1.03E+00	8.65E-01	8.81E-01
RB-87	4.73E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RB-88	17.8 M	6.56E+00	6.91E+00	7.16E+00	7.01E+00	6.05E+00	5.71E+00	7.29E+00	6.31E+00	6.43E+00
RB-89	15.44 M	2.07E+01	2.19E+01	2.29E+01	2.22E+01	1.94E+01	1.80E+01	2.33E+01	2.00E+01	2.04E+01
RB-90	157 S	2.34E+01	2.43E+01	2.52E+01	2.54E+01	2.09E+01	2.09E+01	2.56E+01	2.20E+01	2.35E+01
RB-90M	258 S	3.39E+01	3.56E+01	3.72E+01	3.65E+01	3.10E+01	2.97E+01	3.77E+01	3.27E+01	3.36E+01
SR-82	25.0 D	3.54E-05	5.38E-04	5.35E-04	1.81E-04	2.88E-04	3.42E-04	8.79E-04	2.05E-04	2.10E-04
SR-85	64.84 D	4.51E+00	4.85E+00	5.57E+00	4.96E+00	4.34E+00	3.89E+00	5.66E+00	4.41E+00	4.45E+00
SR-85M	67.66 M	1.86E+00	2.02E+00	2.74E+00	2.03E+00	1.65E+00	1.59E+00	2.80E+00	1.85E+00	1.83E+00
SR-87M	2.805 H	2.78E+00	2.99E+00	3.61E+00	3.09E+00	2.61E+00	2.40E+00	3.67E+00	2.73E+00	2.74E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
GE-71	11.8 D	6.09E-04	1.52E-08	4.26E-05	6.06E-09	1.16E-03	1.39E-02	0.0	1.39E-02
GE-77	11.30 H	1.38E+01	1.07E+01	1.31E+01	8.51E+00	1.19E+01	1.57E+01	5.18E+00	2.09E+01
AS-72	26.0 H	2.33E+01	1.80E+01	2.18E+01	1.43E+01	1.99E+01	2.67E+01	8.74E+00	3.55E+01
AS-73	80.30 D	6.82E-02	4.81E-02	6.27E-02	2.45E-02	5.68E-02	1.14E-01	0.0	1.14E-01
AS-74	17.77 D	9.80E+00	7.50E+00	9.13E+00	5.96E+00	8.38E+00	1.12E+01	2.00E+00	1.32E+01
AS-76	26.32 H	5.59E+00	4.34E+00	5.23E+00	3.46E+00	4.79E+00	6.42E+00	8.99E+00	1.54E+01
AS-77	38.8 H	1.10E-01	8.36E-02	1.04E-01	6.60E-02	9.56E-02	1.23E-01	1.41E+00	1.54E+00
SE-73	7.15 H	1.39E+01	1.05E+01	1.30E+01	8.34E+00	1.19E+01	1.58E+01	2.93E+00	1.88E+01
SE-75	119.78 D	5.00E+00	3.80E+00	4.78E+00	2.95E+00	4.37E+00	5.53E+00	1.79E-02	5.55E+00
SE-79	6.5E4 Y	0.0	0.0	0.0	0.0	0.0	0.0	4.12E-02	4.12E-02
BR-77	57.04 H	4.03E+00	3.08E+00	3.78E+00	2.44E+00	3.47E+00	4.60E+00	1.36E-02	4.62E+00
BR-80	17.4 M	9.59E-01	7.37E-01	8.96E-01	5.83E-01	8.20E-01	1.10E+00	5.90E+00	7.00E+00
BR-80M	4.42 H	1.23E-01	7.03E-02	9.63E-02	2.60E-02	9.27E-02	2.11E-01	0.0	2.11E-01
BR-82	35.30 H	3.46E+01	2.72E+01	3.26E+01	2.14E+01	2.96E+01	3.98E+01	6.29E-01	4.04E+01
BR-83	2.39 H	9.51E-02	7.22E-02	8.82E-02	5.77E-02	8.13E-02	1.09E-01	2.22E+00	2.33E+00
BR-84	31.80 M	2.56E+01	2.03E+01	2.36E+01	1.66E+01	2.21E+01	2.87E+01	1.08E+01	3.95E+01
BR-85	172 S	8.80E-01	6.99E-01	8.35E-01	5.48E-01	7.53E-01	1.02E+00	8.39E+00	9.41E+00
KR-79	35.04 H	3.22E+00	2.46E+00	3.01E+00	1.95E+00	2.77E+00	3.69E+00	1.23E-01	3.81E+00
KR-81	2.1E5 Y	1.28E-01	9.54E-02	1.20E-01	7.59E-02	1.13E-01	1.67E-01	0.0	1.67E-01
KR-83M	1.83 H	9.67E-04	4.86E-05	1.92E-04	1.46E-05	1.20E-03	1.09E-02	0.0	1.09E-02
KR-85	10.72 Y	2.84E-02	2.15E-02	2.63E-02	1.72E-02	2.43E-02	3.25E-02	1.66E+00	1.69E+00
KR-85M	4.48 H	2.07E+00	1.59E+00	2.01E+00	1.21E+00	1.82E+00	2.25E+00	1.70E+00	3.95E+00
KR-87	76.3 M	1.12E+01	8.74E+00	1.03E+01	7.24E+00	9.65E+00	1.26E+01	1.14E+01	2.40E+01
KR-88	2.84 H	2.83E+01	2.23E+01	2.61E+01	1.87E+01	2.45E+01	3.19E+01	2.64E+00	3.46E+01
KR-89	3.16 M	2.56E+01	2.01E+01	2.37E+01	1.64E+01	2.20E+01	2.88E+01	1.18E+01	4.06E+01
KR-90	32.32 S	1.70E+01	1.34E+01	1.60E+01	1.08E+01	1.46E+01	1.94E+01	1.12E+01	3.06E+01
RB-81	4.58 H	7.74E+00	5.88E+00	7.24E+00	4.67E+00	6.66E+00	8.79E+00	1.39E+00	1.02E+01
RB-82	1.25 M	1.40E+01	1.06E+01	1.30E+01	8.50E+00	1.20E+01	1.60E+01	1.21E+01	2.81E+01
RB-83	86.2 D	6.36E+00	4.83E+00	5.90E+00	3.86E+00	5.44E+00	7.31E+00	0.0	7.31E+00
RB-84	32.9 D	1.17E+01	9.21E+00	1.11E+01	7.22E+00	1.00E+01	1.36E+01	1.26E+00	1.48E+01
RB-86	18.66 D	1.25E+00	1.01E+00	1.20E+00	7.84E-01	1.07E+00	1.45E+00	5.42E+00	6.86E+00
RB-87	4.73E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	1.96E-01	1.96E-01
RB-88	17.8 M	8.99E+00	7.12E+00	8.35E+00	5.88E+00	7.74E+00	1.02E+01	1.85E+01	2.87E+01
RB-89	15.44 M	2.86E+01	2.28E+01	2.68E+01	1.84E+01	2.46E+01	3.26E+01	8.59E+00	4.12E+01
RB-90	157 S	3.22E+01	2.55E+01	2.91E+01	2.07E+01	2.77E+01	3.50E+01	1.75E+01	5.25E+01
RB-90M	258 S	4.67E+01	3.69E+01	4.30E+01	3.01E+01	4.02E+01	5.23E+01	1.20E+01	6.44E+01
SR-82	25.0 D	3.82E-03	7.10E-06	6.29E-04	2.00E-07	4.38E-03	3.74E-02	0.0	3.74E-02
SR-85	64.84 D	6.51E+00	4.92E+00	6.02E+00	3.94E+00	5.56E+00	7.47E+00	2.38E-02	7.50E+00
SR-85M	67.66 M	2.76E+00	2.10E+00	2.64E+00	1.64E+00	2.42E+00	3.05E+00	3.24E-02	3.08E+00
SR-87M	2.805 H	4.04E+00	3.04E+00	3.76E+00	2.44E+00	3.48E+00	4.58E+00	4.69E-01	5.05E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/CUBIC M1

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
SR-89	50.55 D	1.33E-03	1.29E-03	1.46E-03	1.63E-03	1.28E-03	1.16E-03	1.36E-03	1.25E-03	1.36E-03
SR-90	28.6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR-91	9.5 H	6.65E+00	6.46E+00	7.26E+00	8.16E+00	6.38E+00	5.79E+00	6.79E+00	6.24E+00	6.77E+00
SR-92	2.71 H	1.27E+01	1.27E+01	1.43E+01	1.58E+01	1.25E+01	1.16E+01	1.33E+01	1.23E+01	1.33E+01
SR-93	7.3 H	2.18E+01	2.15E+01	2.41E+01	2.73E+01	2.12E+01	1.94E+01	2.26E+01	2.08E+01	2.26E+01
Y-86	14.74 H	3.50E+01	3.45E+01	3.87E+01	4.37E+01	3.41E+01	3.12E+01	3.63E+01	3.35E+01	3.63E+01
Y-87	80.3 H	4.27E+00	4.04E+00	4.50E+00	5.43E+00	3.95E+00	3.55E+00	4.19E+00	3.87E+00	4.19E+00
Y-88	106.60 D	2.68E+01	2.71E+01	3.04E+01	3.38E+01	2.69E+01	2.49E+01	2.86E+01	2.64E+01	2.87E+01
Y-90	64.1 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-90M	3.19 H	5.95E+00	5.56E+00	6.11E+00	7.87E+00	5.43E+00	4.87E+00	5.76E+00	5.35E+00	5.75E+00
Y-91	58.51 D	3.45E-02	3.41E-02	3.85E-02	4.25E-02	3.38E-02	3.10E-02	3.60E-02	3.31E-02	3.59E-02
Y-91M	49.71 H	5.00E+00	4.76E+00	5.31E+00	6.24E+00	4.65E+00	4.19E+00	4.94E+00	4.56E+00	4.94E+00
Y-92	3.54 H	2.43E+00	2.38E+00	2.68E+00	3.00E+00	2.35E+00	2.15E+00	2.50E+00	2.30E+00	2.50E+00
Y-93	10.1 H	8.79E-01	8.69E-01	9.69E-01	1.12E+00	8.61E-01	7.90E-01	9.15E-01	8.46E-01	9.16E-01
ZR-86	16.5 H	2.57E+00	2.36E+00	2.55E+00	3.62E+00	2.30E+00	2.06E+00	2.44E+00	2.29E+00	2.44E+00
ZR-88	83.4 D	3.58E+00	3.35E+00	3.69E+00	4.66E+00	3.27E+00	2.93E+00	3.46E+00	3.22E+00	3.46E+00
ZR-89	78.43 H	1.12E+01	1.08E+01	1.21E+01	1.37E+01	1.07E+01	9.66E+00	1.13E+01	1.04E+01	1.13E+01
ZR-93	1.53E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR-95	64.02 D	7.07E+00	6.80E+00	7.64E+00	8.67E+00	6.69E+00	6.05E+00	7.12E+00	6.55E+00	7.10E+00
ZR-97	16.90 H	1.73E+00	1.70E+00	1.90E+00	2.17E+00	1.67E+00	1.53E+00	1.78E+00	1.64E+00	1.78E+00
NB-90	14.60 H	4.22E+01	4.26E+01	4.76E+01	5.41E+01	4.24E+01	3.92E+01	4.51E+01	4.16E+01	4.53E+01
NB-91	1E4 Y	1.71E-02	1.49E-02	1.69E-02	5.52E-02	1.49E-02	1.32E-02	1.55E-02	1.51E-02	1.58E-02
NB-91M	61 D	4.09E-01	4.04E-01	4.55E-01	5.38E-01	3.99E-01	3.67E-01	4.25E-01	3.92E-01	4.24E-01
NB-92	3.6E7 Y	1.44E+01	1.39E+01	1.56E+01	1.78E+01	1.37E+01	1.24E+01	1.46E+01	1.34E+01	1.45E+01
NB-92M	10.15 D	9.38E+00	9.12E+00	1.03E+01	1.15E+01	9.02E+00	8.19E+00	9.60E+00	8.82E+00	9.57E+00
NB-93M	14.6 Y	3.19E-04	1.95E-05	6.21E-05	7.16E-03	8.16E-05	2.74E-05	2.59E-05	2.01E-04	1.05E-04
NB-94	2.03E4 Y	1.52E+01	1.47E+01	1.65E+01	1.86E+01	1.45E+01	1.31E+01	1.54E+01	1.41E+01	1.53E+01
NB-94M	6.26 H	4.15E-02	3.91E-02	4.41E-02	7.66E-02	3.88E-02	3.50E-02	4.11E-02	3.84E-02	4.13E-02
NB-95	35.06 D	7.38E+00	7.10E+00	7.98E+00	9.03E+00	7.00E+00	6.32E+00	7.44E+00	6.84E+00	7.42E+00
NB-95M	86.6 H	5.62E-01	5.12E-01	5.51E-01	8.12E-01	5.00E-01	4.47E-01	5.29E-01	4.98E-01	5.28E-01
NB-96	23.35 H	2.37E+01	2.30E+01	2.58E+01	2.93E+01	2.26E+01	2.06E+01	2.41E+01	2.22E+01	2.40E+01
NB-97	72.1 H	6.33E+00	6.06E+00	6.80E+00	7.81E+00	5.96E+00	5.37E+00	6.33E+00	5.83E+00	6.32E+00
NB-97M	60 S	7.01E+00	6.74E+00	7.57E+00	8.59E+00	6.63E+00	5.99E+00	7.05E+00	6.49E+00	7.04E+00
MO-91	15.49 H	9.17E+00	8.72E+00	9.72E+00	1.16E+01	8.53E+00	7.68E+00	9.05E+00	8.36E+00	9.05E+00
MO-93	3.5E3 Y	1.79E-03	1.09E-04	3.48E-04	4.00E-02	4.57E-04	1.54E-04	1.45E-04	1.13E-03	5.90E-04
MO-99	66.02 H	1.48E+00	1.42E+00	1.58E+00	1.87E+00	1.39E+00	1.26E+00	1.48E+00	1.36E+00	1.48E+00
MO-101	14.61 H	1.45E+01	1.44E+01	1.61E+01	1.83E+01	1.42E+01	1.30E+01	1.51E+01	1.39E+01	1.51E+01
TC-95	20.0 H	7.58E+00	7.30E+00	8.20E+00	9.32E+00	7.20E+00	6.51E+00	7.65E+00	7.04E+00	7.63E+00
TC-95M	61 D	6.36E+00	6.06E+00	6.74E+00	8.13E+00	5.95E+00	5.37E+00	6.33E+00	5.84E+00	6.31E+00
TC-96	4.28 D	2.42E+01	2.34E+01	2.63E+01	2.96E+01	2.30E+01	2.09E+01	2.45E+01	2.25E+01	2.44E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
SR-89	50.55 D	1.29E-03	1.37E-03	1.47E-03	1.39E-03	1.25E-03	1.11E-03	1.50E-03	1.25E-03	1.27E-03
SR-90	28.6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR-91	9.5 H	6.42E+00	6.85E+00	7.40E+00	6.94E+00	6.21E+00	5.55E+00	7.53E+00	6.23E+00	6.34E+00
SR-92	2.71 H	1.26E+01	1.34E+01	1.40E+01	1.35E+01	1.20E+01	1.10E+01	1.43E+01	1.22E+01	1.23E+01
SR-93	7.3 M	2.14E+01	2.28E+01	2.46E+01	2.31E+01	2.03E+01	1.86E+01	2.50E+01	2.07E+01	2.11E+01
Y-86	14.74 H	3.44E+01	3.65E+01	3.92E+01	3.71E+01	3.26E+01	2.98E+01	3.99E+01	3.33E+01	3.38E+01
Y-87	80.3 H	4.02E+00	4.32E+00	5.01E+00	4.42E+00	3.85E+00	3.46E+00	5.09E+00	3.93E+00	3.97E+00
Y-88	106.60 D	2.71E+01	2.86E+01	2.99E+01	2.90E+01	2.53E+01	2.35E+01	3.04E+01	2.61E+01	2.65E+01
Y-90	64.1 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-90M	3.19 H	5.54E+00	5.97E+00	7.35E+00	6.07E+00	5.16E+00	4.76E+00	7.49E+00	5.44E+00	5.46E+00
Y-91	58.51 D	3.40E-02	3.61E-02	3.80E-02	3.64E-02	3.25E-02	2.95E-02	3.87E-02	3.29E-02	3.33E-02
Y-91M	49.71 M	4.73E+00	5.07E+00	5.76E+00	5.18E+00	4.56E+00	4.07E+00	5.85E+00	4.61E+00	4.67E+00
Y-92	3.54 H	2.37E+00	2.52E+00	2.70E+00	2.55E+00	2.27E+00	2.05E+00	2.75E+00	2.29E+00	2.33E+00
Y-93	10.1 H	8.69E-01	9.22E-01	1.01E+00	9.36E-01	8.06E-01	7.53E-01	1.03E+00	8.41E-01	8.52E-01
ZR-86	16.5 H	2.35E+00	2.55E+00	3.32E+00	2.59E+00	2.12E+00	2.02E+00	3.39E+00	2.33E+00	2.32E+00
ZR-88	83.4 D	3.33E+00	3.58E+00	4.32E+00	3.70E+00	3.13E+00	2.87E+00	4.39E+00	3.27E+00	3.29E+00
ZR-89	78.43 H	1.07E+01	1.15E+01	1.25E+01	1.16E+01	1.04E+01	9.27E+00	1.27E+01	1.04E+01	1.06E+01
ZR-93	1.53E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR-95	64.02 D	6.76E+00	7.22E+00	7.92E+00	7.35E+00	6.57E+00	5.82E+00	8.06E+00	6.56E+00	6.68E+00
ZR-97	16.90 H	1.69E+00	1.80E+00	1.96E+00	1.83E+00	1.61E+00	1.46E+00	1.99E+00	1.64E+00	1.66E+00
NB-90	14.60 H	4.27E+01	4.51E+01	4.76E+01	4.57E+01	3.92E+01	3.71E+01	4.84E+01	4.11E+01	4.19E+01
NB-91	1E4 Y	1.50E-02	1.74E-02	2.01E-02	1.68E-02	1.51E-02	1.36E-02	2.10E-02	1.51E-02	1.53E-02
NB-91M	61 D	4.02E-01	4.28E-01	4.55E-01	4.30E-01	3.85E-01	3.49E-01	4.64E-01	3.90E-01	3.95E-01
NB-92	3.6E7 Y	1.38E+01	1.48E+01	1.62E+01	1.50E+01	1.34E+01	1.19E+01	1.64E+01	1.34E+01	1.37E+01
NB-92M	10.15 D	9.07E+00	9.66E+00	1.04E+01	9.79E+00	8.79E+00	7.83E+00	1.05E+01	8.78E+00	8.96E+00
NB-93M	14.6 Y	6.03E-05	3.43E-04	4.27E-04	1.16E-04	2.03E-04	1.96E-04	5.63E-04	1.55E-04	1.70E-04
NB-94	2.03E4 Y	1.46E+01	1.56E+01	1.70E+01	1.58E+01	1.42E+01	1.26E+01	1.73E+01	1.42E+01	1.44E+01
NB-94M	6.26 M	3.90E-02	4.27E-02	4.64E-02	4.23E-02	3.84E-02	3.42E-02	4.77E-02	3.82E-02	3.90E-02
NB-95	35.06 D	7.06E+00	7.54E+00	8.25E+00	7.67E+00	6.86E+00	6.08E+00	8.39E+00	6.85E+00	6.98E+00
NB-95M	86.6 H	5.10E-01	5.55E-01	7.43E-01	5.64E-01	4.55E-01	4.40E-01	7.59E-01	5.08E-01	5.05E-01
NB-96	23.35 H	2.29E+01	2.44E+01	2.66E+01	2.48E+01	2.21E+01	1.97E+01	2.71E+01	2.22E+01	2.25E+01
NB-97	72.1 M	6.03E+00	6.45E+00	7.17E+00	6.57E+00	5.85E+00	5.19E+00	7.29E+00	5.86E+00	5.96E+00
NB-97M	60 S	6.69E+00	7.16E+00	7.85E+00	7.28E+00	6.51E+00	5.77E+00	7.98E+00	6.50E+00	6.62E+00
MO-91	15.49 M	8.67E+00	9.30E+00	1.07E+01	9.52E+00	8.32E+00	7.46E+00	1.09E+01	8.46E+00	8.55E+00
MO-93	3.5E3 Y	3.38E-04	1.92E-03	2.39E-03	6.48E-04	1.14E-03	1.10E-03	3.15E-03	8.68E-04	9.50E-04
MO-99	66.02 H	1.41E+00	1.51E+00	1.72E+00	1.53E+00	1.35E+00	1.21E+00	1.75E+00	1.37E+00	1.39E+00
MO-101	14.61 M	1.43E+01	1.52E+01	1.64E+01	1.54E+01	1.35E+01	1.24E+01	1.67E+01	1.39E+01	1.41E+01
TC-95	20.0 H	7.26E+00	7.75E+00	8.47E+00	7.88E+00	7.05E+00	6.26E+00	8.61E+00	7.04E+00	7.18E+00
TC-95M	61 D	6.02E+00	6.46E+00	7.45E+00	6.55E+00	5.74E+00	5.19E+00	7.58E+00	5.88E+00	5.96E+00
TC-96	4.28 D	2.32E+01	2.48E+01	2.69E+01	2.52E+01	2.26E+01	2.00E+01	2.74E+01	2.25E+01	2.30E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
SR-89	50.55 D	1.81E-03	1.45E-03	1.73E-03	1.12E-03	1.55E-03	2.10E-03	4.66E+00	4.66E+00
SR-90	28.6 Y	0.0	0.0	0.0	0.0	0.0	0.0	1.17E+00	1.17E+00
SR-91	9.5 H	9.06E+00	7.20E+00	8.62E+00	5.61E+00	7.75E+00	1.05E+01	5.26E+00	1.57E+01
SR-92	2.71 H	1.75E+01	1.40E+01	1.66E+01	1.12E+01	1.50E+01	2.01E+01	1.18E+00	2.13E+01
SR-93	7.3 H	3.00E+01	2.36E+01	2.82E+01	1.89E+01	2.57E+01	3.43E+01	7.48E+00	4.18E+01
Y-86	14.74 H	4.81E+01	3.80E+01	4.52E+01	3.04E+01	4.13E+01	5.52E+01	1.79E+00	5.70E+01
Y-87	80.3 H	5.81E+00	4.38E+00	5.37E+00	3.52E+00	4.97E+00	6.66E+00	1.01E-02	6.67E+00
Y-88	106.60 D	3.73E+01	2.96E+01	3.49E+01	2.42E+01	3.21E+01	4.27E+01	5.61E-03	4.27E+01
Y-90	64.1 H	0.0	0.0	0.0	0.0	0.0	0.0	7.86E+00	7.86E+00
Y-90M	3.19 H	8.08E+00	6.12E+00	7.57E+00	4.86E+00	6.97E+00	9.11E+00	3.34E-01	9.45E+00
Y-91	58.51 D	4.74E-02	3.80E-02	4.51E-02	3.00E-02	4.06E-02	5.46E-02	4.84E+00	4.89E+00
Y-91M	49.71 H	6.79E+00	5.18E+00	6.31E+00	4.12E+00	5.80E+00	7.79E+00	2.07E-01	7.99E+00
Y-92	3.54 H	3.33E+00	2.64E+00	3.16E+00	2.08E+00	2.85E+00	3.83E+00	1.26E+01	1.64E+01
Y-93	10.1 H	1.21E+00	9.54E-01	1.14E+00	7.74E-01	1.05E+00	1.38E+00	1.01E+01	1.14E+01
ZR-86	16.5 H	3.49E+00	2.64E+00	3.30E+00	2.07E+00	3.05E+00	3.99E+00	5.60E-02	4.05E+00
ZR-88	83.4 D	4.84E+00	3.64E+00	4.49E+00	2.93E+00	4.17E+00	5.52E+00	7.30E-02	5.59E+00
ZR-89	78.43 H	1.52E+01	1.20E+01	1.44E+01	9.37E+00	1.30E+01	1.76E+01	7.23E-01	1.83E+01
ZR-93	1.53E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR-95	64.02 D	9.60E+00	7.54E+00	9.08E+00	5.87E+00	8.20E+00	1.11E+01	4.69E-01	1.16E+01
ZR-97	16.90 H	2.38E+00	1.87E+00	2.24E+00	1.49E+00	2.04E+00	2.72E+00	5.60E+00	8.33E+00
NB-90	14.60 H	5.88E+01	4.63E+01	5.45E+01	3.82E+01	5.07E+01	6.66E+01	2.93E+00	6.95E+01
NB-91	1E4 Y	3.04E-02	1.63E-02	2.20E-02	1.29E-02	2.64E-02	8.10E-02	5.23E-04	8.16E-02
NB-91M	61 D	5.71E-01	4.50E-01	5.37E-01	3.55E-01	4.89E-01	6.96E-01	7.20E-02	7.68E-01
NB-92	3.6E7 Y	1.96E+01	1.54E+01	1.85E+01	1.20E+01	1.68E+01	2.27E+01	1.10E-02	2.27E+01
NB-92M	10.15 D	1.28E+01	1.02E+01	1.22E+01	7.91E+00	1.09E+01	1.48E+01	0.0	1.48E+01
NB-93M	14.6 Y	2.03E-03	3.38E-05	5.51E-04	1.76E-04	1.75E-03	1.11E-02	0.0	1.11E-02
NB-94	2.03E4 Y	2.07E+01	1.63E+01	1.96E+01	1.27E+01	1.77E+01	2.39E+01	7.15E-01	2.46E+01
NB-94M	6.26 H	6.26E-02	4.38E-02	5.44E-02	3.37E-02	5.34E-02	1.06E-01	1.56E-02	1.21E-01
NB-95	35.06 D	1.00E+01	7.89E+00	9.49E+00	6.13E+00	8.56E+00	1.16E+01	3.30E-02	1.16E+01
NB-95M	86.6 H	7.63E-01	5.74E-01	7.24E-01	4.52E-01	6.69E-01	8.76E-01	1.07E+00	1.95E+00
NB-96	23.35 H	3.23E+01	2.55E+01	3.06E+01	2.00E+01	2.77E+01	3.73E+01	1.61E+00	3.89E+01
NB-97	72.1 H	8.60E+00	6.68E+00	8.08E+00	5.24E+00	7.34E+00	9.91E+00	3.53E+00	1.34E+01
NB-97M	60 S	9.51E+00	7.47E+00	9.00E+00	5.82E+00	8.13E+00	1.10E+01	1.15E-01	1.11E+01
MO-91	15.49 H	1.25E+01	9.45E+00	1.16E+01	7.58E+00	1.07E+01	1.43E+01	1.25E+01	2.68E+01
MO-93	3.5E3 Y	1.13E-02	1.89E-04	3.09E-03	9.86E-06	9.78E-03	6.20E-02	0.0	6.20E-02
MO-99	66.02 H	2.02E+00	1.58E+00	1.91E+00	1.23E+00	1.73E+00	2.32E+00	2.88E+00	5.19E+00
MO-101	14.61 H	2.00E+01	1.58E+01	1.88E+01	1.27E+01	1.72E+01	2.29E+01	4.03E+00	2.70E+01
TC-95	20.0 H	1.03E+01	8.12E+00	9.76E+00	6.31E+00	8.80E+00	1.20E+01	7.21E-03	1.20E+01
TC-95M	61 D	8.65E+00	6.74E+00	8.20E+00	5.26E+00	7.43E+00	9.95E+00	4.17E-02	9.99E+00
TC-96	4.28 D	3.29E+01	2.60E+01	3.12E+01	2.02E+01	2.81E+01	3.80E+01	7.57E-03	3.81E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
TC-96M	51.5 M	3.98E-01	3.86E-01	4.35E-01	5.16E-01	3.81E-01	3.47E-01	4.06E-01	3.74E-01	4.05E-01
TC-97	2.6E6 Y	2.40E-03	2.79E-04	5.18E-04	4.76E-02	6.65E-04	2.82E-04	4.16E-04	1.56E-03	1.20E-03
TC-97M	89 D	5.05E-03	3.13E-03	3.34E-03	4.56E-02	3.25E-03	2.57E-03	3.48E-03	4.01E-03	4.35E-03
TC-98	4.2E6 Y	1.34E+01	1.28E+01	1.44E+01	1.64E+01	1.26E+01	1.14E+01	1.34E+01	1.23E+01	1.34E+01
TC-99	2.13E5 Y	4.43E-06	4.42E-06	4.57E-06	8.44E-06	4.16E-06	3.62E-06	4.47E-06	3.98E-06	4.50E-06
TC-99M	6.02 H	1.19E+00	1.10E+00	1.18E+00	1.90E+00	1.08E+00	9.44E-01	1.16E+00	1.06E+00	1.12E+00
TC-101	14.2 M	3.24E+00	3.00E+00	3.29E+00	4.29E+00	2.93E+00	2.63E+00	3.11E+00	2.90E+00	3.10E+00
RU-97	2.9 D	2.15E+00	1.97E+00	2.12E+00	3.08E+00	1.92E+00	1.72E+00	2.03E+00	1.91E+00	2.03E+00
RU-103	39.35 D	4.52E+00	4.29E+00	4.78E+00	5.71E+00	4.20E+00	3.77E+00	4.45E+00	4.11E+00	4.45E+00
RU-105	4.44 H	7.48E+00	7.14E+00	7.98E+00	9.33E+00	7.02E+00	6.33E+00	7.45E+00	6.88E+00	7.44E+00
RU-106	368.2 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH-103M	56.119 M	6.61E-04	3.83E-04	2.37E-04	8.46E-03	2.63E-04	2.12E-04	5.27E-04	4.80E-04	8.60E-04
RH-105	35.36 H	7.33E-01	6.77E-01	7.38E-01	5.76E-01	6.60E-01	5.92E-01	6.98E-01	6.54E-01	6.98E-01
RH-105M	45 S	2.53E-01	2.33E-01	2.49E-01	4.50E-01	2.29E-01	1.99E-01	2.47E-01	2.25E-01	2.39E-01
RH-106	29.92 S	1.96E+00	1.88E+00	2.10E+00	2.45E+00	1.84E+00	1.66E+00	1.96E+00	1.80E+00	1.95E+00
PD-103	16.961 D	6.24E-03	3.30E-03	2.57E-03	7.42E-02	2.74E-03	2.12E-03	4.89E-03	4.60E-03	7.29E-03
PD-107	6.5E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD-109	13.453 H	6.45E-03	6.12E-03	6.82E-03	8.13E-03	5.98E-03	5.38E-03	6.35E-03	5.86E-03	6.34E-03
AG-106M	8.46 D	2.67E+01	2.59E+01	2.91E+01	3.33E+01	2.55E+01	2.32E+01	2.72E+01	2.50E+01	2.71E+01
AG-108	2.37 M	1.65E-01	1.57E-01	1.76E-01	2.07E-01	1.54E-01	1.39E-01	1.64E-01	1.51E-01	1.64E-01
AG-108M	127 Y	1.52E+01	1.45E+01	1.62E+01	1.91E+01	1.42E+01	1.28E+01	1.51E+01	1.40E+01	1.51E+01
AG-109M	39.6 S	3.18E-02	3.09E-02	3.02E-02	9.94E-02	2.78E-02	2.42E-02	3.25E-02	2.80E-02	3.51E-02
AG-110	24.57 S	2.91E-01	2.79E-01	3.12E-01	3.59E-01	2.74E-01	2.47E-01	2.91E-01	2.68E-01	2.90E-01
AG-110M	249.85 D	2.63E+01	2.56E+01	2.87E+01	3.23E+01	2.52E+01	2.29E+01	2.68E+01	2.47E+01	2.68E+01
AG-111	7.46 D	2.48E-01	2.30E-01	2.51E-01	3.29E-01	2.24E-01	2.01E-01	2.37E-01	2.22E-01	2.37E-01
CD-109	464 D	7.62E-03	5.75E-03	2.65E-03	8.67E-02	3.02E-03	2.63E-03	8.37E-03	5.61E-03	1.27E-02
CD-111M	48.7 M	2.63E+00	2.41E+00	2.59E+00	3.78E+00	2.35E+00	2.10E+00	2.49E+00	2.33E+00	2.48E+00
CD-113	9.3E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CD-113M	13.7 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CD-115	53.46 H	1.91E+00	1.81E+00	2.02E+00	2.42E+00	1.77E+00	1.59E+00	1.88E+00	1.73E+00	1.88E+00
CD-115M	44.6 D	2.11E-01	2.07E-01	2.33E-01	2.60E-01	2.05E-01	1.87E-01	2.18E-01	2.00E-01	2.17E-01
CD-117	2.49 H	1.04E+01	1.03E+01	1.15E+01	1.32E+01	1.02E+01	9.32E+00	1.08E+01	9.97E+00	1.08E+01
CD-117M	3.36 H	2.04E+01	2.05E+01	2.30E+01	2.57E+01	2.04E+01	1.88E+01	2.17E+01	2.00E+01	2.17E+01
IN-111	2.83 D	3.67E+00	3.35E+00	3.60E+00	5.37E+00	3.27E+00	2.91E+00	3.48E+00	3.25E+00	3.45E+00
IN-113M	1.658 H	2.39E+00	2.23E+00	2.45E+00	3.12E+00	2.17E+00	1.95E+00	2.30E+00	2.14E+00	2.31E+00
IN-114	71.9 S	3.00E-01	2.87E-01	3.21E-01	3.75E-01	2.81E-01	2.54E-01	2.99E-01	2.75E-01	2.99E-01
IN-114M	49.51 D	8.43E-01	7.94E-01	8.71E-01	1.16E+00	7.75E-01	6.95E-01	8.28E-01	7.64E-01	8.29E-01
IN-115	4.6E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IN-115M	4.36 H	1.49E+00	1.38E+00	1.51E+00	2.01E+00	1.34E+00	1.21E+00	1.43E+00	1.33E+00	1.43E+00
IN-116M	54.15 M	2.38E+01	2.37E+01	2.66E+01	2.97E+01	2.34E+01	2.16E+01	2.50E+01	2.30E+01	2.49E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/CUBIC Ml

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
TC-96M	51.5 M	3.84E-01	4.11E-01	4.44E-01	4.15E-01	3.72E-01	3.33E-01	4.52E-01	3.73E-01	3.79E-01
TC-97	2.6E6 Y	5.73E-04	2.64E-03	3.44E-03	8.94E-04	1.61E-03	1.47E-03	4.35E-03	1.24E-03	1.38E-03
TC-97M	89 D	3.34E-03	5.55E-03	8.44E-03	3.16E-03	3.88E-03	3.45E-03	9.36E-03	3.85E-03	4.01E-03
TC-98	4.2E6 Y	1.27E+01	1.36E+01	1.50E+01	1.39E+01	1.24E+01	1.10E+01	1.53E+01	1.24E+01	1.26E+01
TC-99	2.13E5 Y	4.40E-06	4.87E-06	8.26E-06	3.57E-06	3.70E-06	3.26E-06	8.50E-06	4.22E-06	4.24E-06
TC-99M	6.02 H	1.10E+00	1.21E+00	1.85E+00	1.10E+00	9.51E-01	9.10E-01	1.90E+00	1.10E+00	1.09E+00
TC-101	14.2 M	2.99E+00	3.23E+00	4.01E+00	3.32E+00	2.76E+00	2.58E+00	4.09E+00	2.95E+00	2.95E+00
RU-97	2.9 D	1.96E+00	2.13E+00	2.86E+00	2.15E+00	1.75E+00	1.69E+00	2.92E+00	1.95E+00	1.94E+00
RU-103	39.35 D	4.27E+00	4.58E+00	5.29E+00	4.69E+00	4.10E+00	3.67E+00	5.37E+00	4.17E+00	4.21E+00
RU-105	4.44 H	7.10E+00	7.61E+00	8.57E+00	7.76E+00	6.84E+00	6.12E+00	8.72E+00	6.92E+00	7.02E+00
RU-106	368.2 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH-103M	56.119 H	3.45E-04	7.88E-04	1.17E-03	2.77E-04	5.20E-04	4.08E-04	1.33E-03	4.29E-04	4.85E-04
RH-105	35.36 H	6.73E-01	7.27E-01	9.14E-01	7.51E-01	6.18E-01	5.82E-01	9.30E-01	6.66E-01	6.65E-01
RH-105M	45 S	2.33E-01	2.59E-01	4.04E-01	2.28E-01	2.02E-01	1.92E-01	4.15E-01	2.33E-01	2.31E-01
RH-106	29.92 S	1.87E+00	2.00E+00	2.25E+00	2.04E+00	1.80E+00	1.61E+00	2.28E+00	1.82E+00	1.84E+00
PD-103	16.961 D	3.16E-03	7.13E-03	1.00E-02	3.15E-03	4.85E-03	4.01E-03	1.14E-02	4.11E-03	4.54E-03
PD-107	6.5E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD-109	13.453 H	6.08E-03	6.53E-03	7.52E-03	6.68E-03	5.84E-03	5.23E-03	7.64E-03	5.94E-03	6.00E-03
AG-106M	8.46 D	2.58E+01	2.75E+01	3.02E+01	2.80E+01	2.47E+01	2.23E+01	3.07E+01	2.51E+01	2.54E+01
AG-108	2.37 M	1.56E-01	1.67E-01	1.89E-01	1.71E-01	1.51E-01	1.35E-01	1.92E-01	1.52E-01	1.54E-01
AG-108M	127 Y	1.44E+01	1.55E+01	1.75E+01	1.58E+01	1.39E+01	1.24E+01	1.78E+01	1.41E+01	1.43E+01
AG-109M	39.6 S	3.00E-02	3.56E-02	5.97E-02	2.40E-02	2.66E-02	2.29E-02	6.20E-02	2.92E-02	2.98E-02
AG-110	24.57 S	2.77E-01	2.96E-01	3.29E-01	3.02E-01	2.69E-01	2.39E-01	3.35E-01	2.69E-01	2.74E-01
AG-110M	249.85 D	2.54E+01	2.71E+01	2.93E+01	2.75E+01	2.45E+01	2.20E+01	2.98E+01	2.47E+01	2.51E+01
AG-111	7.46 D	2.29E-01	2.47E-01	3.08E-01	2.55E-01	2.11E-01	1.98E-01	3.14E-01	2.26E-01	2.26E-01
CD-109	464 D	4.29E-03	9.25E-03	1.40E-02	3.20E-03	6.20E-03	4.67E-03	1.55E-02	5.07E-03	5.81E-03
CD-111M	48.7 M	2.40E+00	2.61E+00	3.54E+00	2.62E+00	2.13E+00	2.06E+00	3.62E+00	2.39E+00	2.37E+00
CD-113	9.3E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CD-113M	13.7 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CD-115	53.46 H	1.80E+00	1.93E+00	2.23E+00	1.98E+00	1.73E+00	1.55E+00	2.27E+00	1.76E+00	1.78E+00
CD-115M	44.6 D	2.06E-01	2.19E-01	2.34E-01	2.22E-01	1.98E-01	1.78E-01	2.38E-01	2.00E-01	2.03E-01
CO-117	2.49 H	1.03E+01	1.09E+01	1.18E+01	1.10E+01	9.67E+00	8.88E+00	1.20E+01	9.94E+00	1.00E+01
CO-117M	3.36 H	2.05E+01	2.17E+01	2.27E+01	2.20E+01	1.91E+01	1.78E+01	2.31E+01	1.98E+01	2.01E+01
IN-111	2.83 D	3.34E+00	3.64E+00	5.01E+00	3.62E+00	2.96E+00	2.86E+00	5.13E+00	3.33E+00	3.30E+00
IN-113M	1.658 H	2.22E+00	2.39E+00	2.88E+00	2.46E+00	2.08E+00	1.91E+00	2.93E+00	2.18E+00	2.19E+00
IN-114	71.9 S	2.85E-01	3.05E-01	3.44E-01	3.12E-01	2.75E-01	2.46E-01	3.49E-01	2.78E-01	2.82E-01
IN-114M	49.51 D	7.88E-01	8.52E-01	1.04E+00	8.54E-01	7.40E-01	6.76E-01	1.06E+00	7.73E-01	7.79E-01
IN-115	4.6E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IN-115M	4.36 H	1.37E+00	1.48E+00	1.84E+00	1.53E+00	1.27E+00	1.19E+00	1.87E+00	1.35E+00	1.35E+00
IN-116M	54.15 M	2.36E+01	2.50E+01	2.65E+01	2.53E+01	2.23E+01	2.05E+01	2.69E+01	2.28E+01	2.31E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
TC-96M	51.5 M	5.51E-01	4.30E-01	5.17E-01	3.36E-01	4.71E-01	6.66E-01	0.0	6.66E-01
TC-97	2.6E6 Y	1.49E-02	3.89E-04	4.51E-03	2.64E-05	1.22E-02	7.14E-02	0.0	7.14E-02
TC-97M	89 D	1.82E-02	3.86E-03	8.95E-03	2.30E-03	1.45E-02	6.37E-02	3.68E-02	1.00E-01
TC-98	4.2E6 Y	1.81E+01	1.42E+01	1.71E+01	1.11E+01	1.55E+01	2.09E+01	5.03E-01	2.14E+01
TC-99	2.13E5 Y	7.15E-06	5.56E-06	7.15E-06	3.68E-06	6.18E-06	7.63E-06	2.35E-01	2.35E-01
TC-99M	6.02 H	1.69E+00	1.30E+00	1.67E+00	9.65E-01	1.49E+00	1.81E+00	3.59E-02	1.85E+00
TC-101	14.2 M	4.36E+00	3.31E+00	4.10E+00	2.63E+00	3.78E+00	4.91E+00	3.57E+00	8.48E+00
RU-97	2.9 D	2.93E+00	2.21E+00	2.78E+00	1.73E+00	2.56E+00	3.30E+00	3.71E-02	3.34E+00
RU-103	39.35 D	6.15E+00	4.65E+00	5.70E+00	3.73E+00	5.26E+00	7.03E+00	1.65E-01	7.20E+00
RU-105	4.44 H	1.02E+01	7.88E+00	9.56E+00	6.19E+00	8.69E+00	1.17E+01	2.95E+00	1.46E+01
RU-106	368.2 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH-103M	56.119 M	3.53E-03	4.11E-04	1.52E-03	9.45E-05	2.59E-03	1.16E-02	0.0	1.16E-02
RH-105	35.36 H	9.85E-01	7.43E-01	9.24E-01	5.94E-01	8.55E-01	1.10E+00	7.85E-01	1.89E+00
RH-105M	45 S	3.76E-01	2.78E-01	3.63E-01	2.03E-01	3.29E-01	4.42E-01	2.29E-01	6.71E-01
RH-106	29.92 S	2.67E+00	2.05E+00	2.49E+00	1.63E+00	2.28E+00	3.06E+00	1.22E+01	1.52E+01
PD-103	16.961 D	3.10E-02	3.32E-03	1.32E-02	1.13E-03	2.28E-02	1.02E-01	0.0	1.02E-01
PD-107	6.5E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD-109	13.453 H	8.76E-03	6.63E-03	8.11E-03	5.31E-03	7.49E-03	1.00E-02	2.58E+00	2.59E+00
AG-106M	8.46 D	3.65E+01	2.86E+01	3.44E+01	2.27E+01	3.13E+01	4.20E+01	2.20E-02	4.20E+01
AG-108	2.37 M	2.24E-01	1.72E-01	2.09E-01	1.36E-01	1.92E-01	2.59E-01	4.83E+00	5.09E+00
AG-108M	127 Y	2.07E+01	1.60E+01	1.94E+01	1.26E+01	1.77E+01	2.38E+01	4.32E-02	2.39E+01
AG-109M	39.6 S	6.66E-02	3.80E-02	5.52E-02	2.36E-02	5.41E-02	1.08E-01	1.97E-02	1.28E-01
AG-110	24.57 S	3.95E-01	3.07E-01	3.71E-01	2.41E-01	3.37E-01	4.55E-01	1.00E+01	1.05E+01
AG-110M	249.85 D	3.59E+01	2.83E+01	3.40E+01	2.23E+01	3.07E+01	4.13E+01	2.81E-01	4.16E+01
AG-111	7.46 D	3.34E-01	2.52E-01	3.13E-01	2.02E-01	2.90E-01	3.76E-01	2.49E+00	2.87E+00
CD-109	464 D	4.03E-02	5.27E-03	1.88E-02	8.38E-04	2.85E-02	1.13E-01	0.0	1.13E-01
CD-111M	48.7 M	3.59E+00	2.71E+00	3.42E+00	2.12E+00	3.14E+00	4.00E+00	3.75E-01	4.37E+00
CD-113	9.3E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	2.96E-01	2.96E-01
CD-113M	13.7 Y	0.0	0.0	0.0	0.0	0.0	0.0	1.04E+00	1.04E+00
CD-115	53.46 H	2.60E+00	1.97E+00	2.41E+00	1.57E+00	2.22E+00	2.97E+00	2.16E+00	5.13E+00
CD-115M	44.6 D	2.89E-01	2.31E-01	2.75E-01	1.81E-01	2.48E-01	3.34E-01	4.78E+00	5.12E+00
CD-117	2.49 H	1.44E+01	1.14E+01	1.36E+01	9.09E+00	1.23E+01	1.64E+01	3.22E+00	1.97E+01
CD-117M	3.36 H	2.83E+01	2.24E+01	2.64E+01	1.83E+01	2.43E+01	3.23E+01	1.21E+00	3.35E+01
IN-111	2.83 D	5.03E+00	3.80E+00	4.81E+00	2.95E+00	4.40E+00	5.61E+00	1.34E-01	5.74E+00
IN-113M	1.658 H	3.23E+00	2.42E+00	3.00E+00	1.95E+00	2.78E+00	3.69E+00	9.25E-01	4.61E+00
IN-114	71.9 S	4.08E-01	3.14E-01	3.81E-01	2.49E-01	3.49E-01	4.70E-01	6.28E+00	6.74E+00
IN-114M	49.51 D	1.17E+00	8.84E-01	1.10E+00	6.87E-01	1.00E+00	1.36E+00	6.67E-01	2.03E+00
IN-115	4.6E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	7.61E-01	7.61E-01
IN-115M	4.36 H	2.02E+00	1.51E+00	1.88E+00	1.21E+00	1.75E+00	2.31E+00	1.13E+00	3.44E+00
IN-116M	54.15 M	3.28E+01	2.61E+01	3.10E+01	2.10E+01	2.82E+01	3.76E+01	2.06E+00	3.97E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
IN-117	43.8 M	6.49E+00	6.13E+00	6.79E+00	8.50E+00	6.01E+00	5.38E+00	6.38E+00	5.89E+00	6.34E+00
IN-117M	116.5 M	8.27E-01	7.62E-01	8.25E-01	1.18E+00	7.43E-01	6.63E-01	7.91E-01	7.36E-01	7.87E-01
SN-113	115.1 D	5.96E-02	5.62E-02	5.15E-02	1.85E-01	4.75E-02	4.31E-02	6.06E-02	5.13E-02	7.00E-02
SN-117M	13.60 D	1.36E+00	1.25E+00	1.32E+00	2.18E+00	1.22E+00	1.07E+00	1.31E+00	1.20E+00	1.28E+00
SN-119M	293.0 D	8.47E-03	9.17E-03	3.68E-03	7.59E-02	3.95E-03	4.00E-03	1.08E-02	6.53E-03	1.73E-02
SN-123	129.2 D	6.67E-02	6.55E-02	7.38E-02	8.18E-02	6.48E-02	5.92E-02	6.90E-02	6.34E-02	6.88E-02
SN-125	9.64 D	2.97E+00	2.93E+00	3.29E+00	3.68E+00	2.90E+00	2.65E+00	3.09E+00	2.84E+00	3.08E+00
SN-126	1.0E5 Y	3.91E-01	4.00E-01	4.02E-01	8.28E-01	3.65E-01	3.21E-01	3.98E-01	3.52E-01	4.18E-01
SB-117	2.80 H	1.58E+00	1.46E+00	1.57E+00	2.47E+00	1.43E+00	1.26E+00	1.53E+00	1.41E+00	1.51E+00
SB-122	2.70 D	4.19E+00	3.99E+00	4.46E+00	5.22E+00	3.91E+00	3.53E+00	4.16E+00	3.83E+00	4.15E+00
SB-124	60.20 D	1.81E+01	1.80E+01	2.02E+01	2.28E+01	1.78E+01	1.64E+01	1.89E+01	1.75E+01	1.90E+01
SB-125	2.77 Y	3.96E+00	3.76E+00	4.16E+00	5.10E+00	3.66E+00	3.30E+00	3.90E+00	3.60E+00	3.91E+00
SB-126	12.4 D	2.63E+01	2.51E+01	2.82E+01	3.25E+01	2.47E+01	2.23E+01	2.63E+01	2.42E+01	2.62E+01
SB-126M	19.0 M	1.49E+01	1.43E+01	1.59E+01	1.86E+01	1.40E+01	1.26E+01	1.49E+01	1.37E+01	1.48E+01
SB-127	3.85 D	6.29E+00	6.00E+00	6.70E+00	7.85E+00	5.89E+00	5.31E+00	6.26E+00	5.77E+00	6.25E+00
SB-129	4.40 H	1.39E+01	1.35E+01	1.52E+01	1.71E+01	1.33E+01	1.22E+01	1.42E+01	1.31E+01	1.42E+01
TE-121	16.8 D	5.27E+00	5.02E+00	5.59E+00	6.71E+00	4.90E+00	4.41E+00	5.22E+00	4.80E+00	5.23E+00
TE-121M	154 D	1.94E+00	1.79E+00	1.92E+00	2.81E+00	1.74E+00	1.56E+00	1.85E+00	1.73E+00	1.86E+00
TE-123	1E13 Y	1.25E-02	1.53E-02	6.02E-03	9.75E-02	6.29E-03	6.77E-03	1.58E-02	9.81E-03	2.73E-02
TE-123M	119.7 D	1.30E+00	1.19E+00	1.26E+00	2.07E+00	1.16E+00	1.02E+00	1.25E+00	1.15E+00	1.23E+00
TE-125M	58 D	4.37E-02	5.68E-02	2.51E-02	2.86E-01	2.52E-02	2.73E-02	5.27E-02	3.54E-02	9.35E-02
TE-127	9.35 H	4.53E-02	4.24E-02	4.68E-02	5.87E-02	4.14E-02	3.72E-02	4.38E-02	4.08E-02	4.38E-02
TE-127M	109 D	1.46E-02	1.83E-02	8.98E-03	9.08E-02	8.83E-03	9.28E-03	1.73E-02	1.19E-02	2.96E-02
TE-129	69.6 M	5.02E-01	4.78E-01	5.27E-01	6.67E-01	4.65E-01	4.19E-01	4.96E-01	4.58E-01	5.01E-01
TE-129M	33.6 D	3.10E-01	3.00E-01	3.29E-01	4.34E-01	2.89E-01	2.62E-01	3.13E-01	2.85E-01	3.21E-01
TE-131	25.0 M	3.98E+00	3.79E+00	4.20E+00	5.29E+00	3.73E+00	3.35E+00	3.97E+00	3.66E+00	3.94E+00
TE-131M	30 H	1.37E+01	1.33E+01	1.49E+01	1.72E+01	1.32E+01	1.20E+01	1.40E+01	1.29E+01	1.40E+01
TE-132	78.2 H	2.00E+00	1.84E+00	1.95E+00	3.00E+00	1.77E+00	1.59E+00	1.89E+00	1.77E+00	1.92E+00
TE-133	12.45 M	8.90E+00	8.61E+00	9.59E+00	1.13E+01	8.48E+00	7.72E+00	9.00E+00	8.33E+00	9.00E+00
TE-133M	55.4 M	2.16E+01	2.10E+01	2.35E+01	2.68E+01	2.07E+01	1.88E+01	2.20E+01	2.03E+01	2.20E+01
TE-134	41.8 M	8.23E+00	7.82E+00	8.66E+00	1.06E+01	7.65E+00	6.89E+00	8.13E+00	7.51E+00	8.14E+00
I-122	3.62 M	9.12E+00	8.70E+00	9.69E+00	1.15E+01	8.51E+00	7.67E+00	9.03E+00	8.34E+00	9.04E+00
I-123	13.13 H	1.44E+00	1.34E+00	1.41E+00	2.32E+00	1.30E+00	1.14E+00	1.40E+00	1.28E+00	1.39E+00
I-124	4.18 D	1.01E+01	9.84E+00	1.10E+01	1.27E+01	9.69E+00	8.83E+00	1.03E+01	9.50E+00	1.03E+01
I-125	60.14 D	4.85E-02	6.40E-02	2.62E-02	3.36E-01	2.66E-02	2.96E-02	5.93E-02	3.89E-02	1.08E-01
I-126	12.93 D	4.31E+00	4.11E+00	4.58E+00	5.47E+00	4.02E+00	3.63E+00	4.28E+00	3.95E+00	4.29E+00
I-128	24.99 M	7.01E-01	6.63E-01	7.34E-01	8.99E-01	6.46E-01	5.82E-01	6.86E-01	6.35E-01	6.88E-01
I-129	1.57E7 Y	4.00E-02	5.56E-02	2.56E-02	2.27E-01	2.49E-02	2.82E-02	4.51E-02	3.31E-02	8.65E-02
I-130	12.36 H	2.03E+01	1.95E+01	2.18E+01	2.52E+01	1.91E+01	1.73E+01	2.03E+01	1.87E+01	2.03E+01
I-131	8.040 D	3.58E+00	3.34E+00	3.68E+00	4.66E+00	3.26E+00	2.93E+00	3.46E+00	3.22E+00	3.46E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
IN-117	43.8 M	6.10E+00	6.57E+00	7.93E+00	6.61E+00	5.77E+00	5.22E+00	8.07E+00	5.97E+00	6.02E+00
IN-117M	116.5 M	7.58E-01	8.24E-01	1.09E+00	8.27E-01	6.86E-01	6.50E-01	1.11E+00	7.52E-01	7.50E-01
SN-113	115.1 D	5.17E-02	6.23E-02	8.61E-02	5.29E-02	4.93E-02	4.46E-02	8.93E-02	5.16E-02	5.27E-02
SN-117M	13.60 D	1.24E+00	1.36E+00	2.02E+00	1.28E+00	1.08E+00	1.04E+00	2.07E+00	1.24E+00	1.23E+00
SN-119M	293.0 D	6.27E-03	1.06E-02	1.69E-02	3.77E-03	7.37E-03	5.21E-03	1.81E-02	6.22E-03	7.12E-03
SN-123	129.2 D	6.52E-02	6.93E-02	7.35E-02	7.00E-02	6.28E-02	5.64E-02	7.48E-02	6.31E-02	6.42E-02
SN-125	9.64 D	2.92E+00	3.10E+00	3.30E+00	3.14E+00	2.79E+00	2.53E+00	3.36E+00	2.82E+00	2.87E+00
SN-126	1.0E5 Y	3.94E-01	4.40E-01	7.52E-01	3.05E-01	3.31E-01	2.85E-01	7.74E-01	3.73E-01	3.78E-01
SB-117	2.80 H	1.45E+00	1.60E+00	2.27E+00	1.52E+00	1.29E+00	1.23E+00	2.33E+00	1.45E+00	1.44E+00
SB-122	2.70 D	3.97E+00	4.25E+00	4.81E+00	4.34E+00	3.83E+00	3.42E+00	4.88E+00	3.87E+00	3.92E+00
SB-124	60.20 D	1.80E+01	1.91E+01	2.04E+01	1.93E+01	1.69E+01	1.56E+01	2.07E+01	1.74E+01	1.76E+01
SB-125	2.77 Y	3.73E+00	4.01E+00	4.65E+00	4.08E+00	3.56E+00	3.21E+00	4.73E+00	3.64E+00	3.68E+00
SB-126	12.4 D	2.50E+01	2.67E+01	2.99E+01	2.73E+01	2.42E+01	2.15E+01	3.03E+01	2.43E+01	2.47E+01
SB-126M	19.0 M	1.42E+01	1.52E+01	1.71E+01	1.55E+01	1.37E+01	1.22E+01	1.74E+01	1.38E+01	1.40E+01
SB-127	3.85 D	5.96E+00	6.39E+00	7.21E+00	6.51E+00	5.75E+00	5.14E+00	7.33E+00	5.81E+00	5.89E+00
SB-129	4.40 H	1.35E+01	1.43E+01	1.55E+01	1.45E+01	1.29E+01	1.16E+01	1.58E+01	1.30E+01	1.33E+01
TE-121	16.8 D	4.98E+00	5.35E+00	6.09E+00	5.45E+00	4.81E+00	4.29E+00	6.19E+00	4.85E+00	4.92E+00
TE-121M	154 D	1.78E+00	1.93E+00	2.56E+00	1.93E+00	1.59E+00	1.52E+00	2.62E+00	1.76E+00	1.76E+00
TE-123	1E13 Y	1.05E-02	1.60E-02	2.59E-02	5.70E-03	1.12E-02	7.66E-03	2.74E-02	9.62E-03	1.10E-02
TE-123M	119.7 D	1.18E+00	1.30E+00	1.93E+00	1.22E+00	1.03E+00	9.93E-01	1.98E+00	1.18E+00	1.17E+00
TE-125M	58 D	4.09E-02	5.60E-02	9.28E-02	2.18E-02	4.00E-02	2.74E-02	9.69E-02	3.57E-02	4.02E-02
TE-127	9.35 H	4.22E-02	4.54E-02	5.48E-02	4.67E-02	3.96E-02	3.64E-02	5.57E-02	4.14E-02	4.16E-02
TE-127M	109 D	1.36E-02	1.85E-02	3.03E-02	7.67E-03	1.33E-02	9.28E-03	3.17E-02	1.20E-02	1.34E-02
TE-129	69.6 M	4.74E-01	5.10E-01	5.93E-01	5.18E-01	4.52E-01	4.08E-01	6.03E-01	4.63E-01	4.68E-01
TE-129M	33.6 D	2.95E-01	3.19E-01	3.59E-01	3.17E-01	2.87E-01	2.53E-01	3.65E-01	2.86E-01	2.92E-01
TE-131	25.0 M	3.77E+00	4.06E+00	4.90E+00	4.04E+00	3.54E+00	3.23E+00	5.00E+00	3.69E+00	3.72E+00
TE-131M	30 H	1.33E+01	1.42E+01	1.56E+01	1.43E+01	1.27E+01	1.15E+01	1.58E+01	1.29E+01	1.31E+01
TE-132	78.2 H	1.82E+00	1.99E+00	2.72E+00	1.97E+00	1.62E+00	1.55E+00	2.78E+00	1.81E+00	1.80E+00
TE-133	12.45 M	8.58E+00	9.15E+00	1.03E+01	9.33E+00	8.09E+00	7.42E+00	1.05E+01	8.35E+00	8.44E+00
TE-133M	55.4 M	2.09E+01	2.23E+01	2.43E+01	2.25E+01	2.00E+01	1.80E+01	2.47E+01	2.03E+01	2.06E+01
TE-134	41.8 M	7.77E+00	8.35E+00	9.80E+00	8.43E+00	7.38E+00	6.67E+00	9.97E+00	7.59E+00	7.67E+00
I-122	3.62 M	8.65E+00	9.27E+00	1.06E+01	9.47E+00	8.30E+00	7.44E+00	1.08E+01	8.43E+00	8.53E+00
I-123	13.13 H	1.32E+00	1.46E+00	2.11E+00	1.37E+00	1.17E+00	1.11E+00	2.16E+00	1.32E+00	1.31E+00
I-124	4.18 D	9.81E+00	1.04E+01	1.15E+01	1.06E+01	9.32E+00	8.47E+00	1.16E+01	9.50E+00	9.64E+00
I-125	60.14 D	4.52E-02	6.29E-02	1.04E-01	2.29E-02	4.47E-02	2.99E-02	1.09E-01	3.91E-02	4.45E-02
I-126	12.93 D	4.08E+00	4.38E+00	4.97E+00	4.46E+00	3.93E+00	3.52E+00	5.06E+00	3.98E+00	4.03E+00
I-128	24.99 M	6.58E-01	7.08E-01	8.28E-01	7.26E-01	6.27E-01	5.67E-01	8.42E-01	6.44E-01	6.50E-01
I-129	1.57E7 Y	4.21E-02	5.25E-02	8.96E-02	2.00E-02	3.79E-02	2.50E-02	9.26E-02	3.43E-02	3.86E-02
I-130	12.36 H	1.94E+01	2.07E+01	2.31E+01	2.11E+01	1.87E+01	1.67E+01	2.35E+01	1.89E+01	1.91E+01
I-131	8.040 D	3.32E+00	3.58E+00	4.33E+00	3.68E+00	3.11E+00	2.87E+00	4.41E+00	3.27E+00	3.28E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC MI)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
IN-117	43.8 M	8.86E+00	6.77E+00	8.33E+00	5.33E+00	7.63E+00	1.00E+01	1.64E+00	1.17E+01
IN-117M	116.5 M	1.13E+00	8.51E-01	1.07E+00	6.68E-01	9.87E-01	1.28E+00	3.31E+00	4.59E+00
SN-113	115.1 D	1.26E-01	6.03E-02	9.32E-02	4.02E-02	9.87E-02	2.20E-01	0.0	2.20E-01
SN-117M	13.60 D	1.93E+00	1.45E+00	1.87E+00	1.09E+00	1.69E+00	2.16E+00	5.06E-01	2.66E+00
SN-119M	293.0 D	4.04E-02	8.86E-03	2.21E-02	1.86E-03	2.82E-02	9.37E-02	0.0	9.37E-02
SN-123	129.2 D	9.13E-02	7.33E-02	8.72E-02	5.72E-02	7.82E-02	1.05E-01	4.16E+00	4.26E+00
SN-125	9.64 D	4.08E+00	3.25E+00	3.86E+00	2.57E+00	3.50E+00	4.69E+00	6.78E+00	1.15E+01
SN-126	1.0E5 Y	6.77E-01	5.06E-01	6.58E-01	3.22E-01	5.75E-01	7.70E-01	1.48E-01	9.17E-01
SB-117	2.80 H	2.25E+00	1.69E+00	2.15E+00	1.27E+00	1.96E+00	2.54E+00	8.64E-02	2.63E+00
SB-122	2.70 D	5.69E+00	4.36E+00	5.31E+00	3.46E+00	4.86E+00	6.53E+00	4.45E+00	1.10E+01
SB-124	60.20 D	2.50E+01	1.97E+01	2.34E+01	1.60E+01	2.15E+01	2.87E+01	2.80E+00	3.14E+01
SB-125	2.77 Y	5.42E+00	4.11E+00	5.04E+00	3.25E+00	4.63E+00	6.24E+00	3.54E-01	6.59E+00
SB-126	12.4 D	3.57E+01	2.77E+01	3.36E+01	2.18E+01	3.05E+01	4.10E+01	2.10E+00	4.31E+01
SB-126M	19.0 M	2.03E+01	1.57E+01	1.90E+01	1.24E+01	1.73E+01	2.33E+01	4.72E+00	2.80E+01
SB-127	3.85 D	8.54E+00	6.60E+00	8.02E+00	5.20E+00	7.30E+00	9.80E+00	2.16E+00	1.20E+01
SB-129	4.40 H	1.89E+01	1.50E+01	1.79E+01	1.18E+01	1.62E+01	2.18E+01	2.58E+00	2.44E+01
TE-121	16.8 D	7.22E+00	5.47E+00	6.69E+00	4.33E+00	6.15E+00	8.36E+00	2.00E-02	8.38E+00
TE-121M	154 D	2.67E+00	2.02E+00	2.54E+00	1.57E+00	2.33E+00	3.02E+00	7.29E-02	3.10E+00
TE-123	1E13 Y	5.60E-02	1.57E-02	3.34E-02	3.64E-03	3.91E-02	1.16E-01	0.0	1.16E-01
TE-123M	119.7 D	1.84E+00	1.39E+00	1.78E+00	1.04E+00	1.61E+00	2.04E+00	8.57E-02	2.13E+00
TE-125M	58 D	1.75E-01	6.26E-02	1.14E-01	1.81E-02	1.24E-01	3.29E-01	9.12E-02	4.20E-01
TE-127	9.35 H	6.12E-02	4.62E-02	5.70E-02	3.70E-02	5.28E-02	6.93E-02	1.37E+00	1.44E+00
TE-127M	109 D	5.59E-02	2.02E-02	3.67E-02	6.37E-03	3.97E-02	1.05E-01	5.05E-02	1.55E-01
TE-129	69.6 M	6.97E-01	5.22E-01	6.43E-01	4.13E-01	5.94E-01	8.13E-01	4.05E+00	4.86E+00
TE-129M	33.6 D	4.47E-01	3.32E-01	4.10E-01	2.53E-01	3.75E-01	5.45E-01	1.76E+00	2.30E+00
TE-131	25.0 M	5.47E+00	4.25E+00	5.21E+00	3.31E+00	4.72E+00	6.19E+00	5.66E+00	1.19E+01
TE-131M	30 H	1.88E+01	1.48E+01	1.78E+01	1.16E+01	1.61E+01	2.16E+01	1.01E+00	2.26E+01
TE-132	78.2 H	2.79E+00	2.08E+00	2.64E+00	1.60E+00	2.43E+00	3.16E+00	1.83E-01	3.35E+00
TE-133	12.45 M	1.22E+01	9.48E+00	1.14E+01	7.57E+00	1.04E+01	1.39E+01	6.74E+00	2.06E+01
TE-133M	55.4 M	2.95E+01	2.33E+01	2.79E+01	1.83E+01	2.53E+01	3.39E+01	5.63E+00	3.95E+01
TE-134	41.8 M	1.12E+01	8.67E+00	1.06E+01	6.78E+00	9.64E+00	1.28E+01	5.34E-01	1.34E+01
I-122	3.62 M	1.24E+01	9.44E+00	1.15E+01	7.56E+00	1.06E+01	1.42E+01	8.84E+00	2.31E+01
I-123	13.13 H	2.08E+00	1.54E+00	1.99E+00	1.16E+00	1.81E+00	2.35E+00	6.54E-02	2.42E+00
I-124	4.18 D	1.39E+01	1.07E+01	1.29E+01	8.64E+00	1.19E+01	1.59E+01	1.62E+00	1.76E+01
I-125	60.14 D	2.04E-01	6.99E-02	1.31E-01	1.84E-02	1.43E-01	3.89E-01	0.0	3.89E-01
I-126	12.93 D	5.89E+00	4.52E+00	5.50E+00	3.55E+00	5.03E+00	6.80E+00	9.25E-01	7.73E+00
I-128	24.99 M	9.54E-01	7.20E-01	8.84E-01	5.76E-01	8.17E-01	1.09E+00	6.21E+00	7.30E+00
I-129	1.57E7 Y	1.49E-01	6.67E-02	1.06E-01	2.08E-02	1.07E-01	2.50E-01	1.87E-02	2.69E-01
I-130	12.36 H	2.76E+01	2.14E+01	2.60E+01	1.69E+01	2.36E+01	3.18E+01	1.92E+00	3.37E+01
I-131	8.040 D	4.83E+00	3.66E+00	4.51E+00	2.92E+00	4.17E+00	5.47E+00	1.06E+00	6.53E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/ICUBIC Ml

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
I-132	2.30 H	2.20E+01	2.13E+01	2.39E+01	2.71E+01	2.10E+01	1.90E+01	2.23E+01	2.05E+01	2.23E+01
I-133	20.8 H	5.73E+00	5.48E+00	6.12E+00	7.16E+00	5.37E+00	4.84E+00	5.70E+00	5.26E+00	5.70E+00
I-134	52.6 M	2.55E+01	2.48E+01	2.79E+01	3.14E+01	2.45E+01	2.23E+01	2.61E+01	2.40E+01	2.60E+01
I-135	6.61 H	1.52E+01	1.52E+01	1.71E+01	1.90E+01	1.51E+01	1.39E+01	1.60E+01	1.48E+01	1.60E+01
I-136	83 S	2.54E+01	2.57E+01	2.87E+01	3.22E+01	2.56E+01	2.38E+01	2.72E+01	2.52E+01	2.75E+01
XE-122	20.1 H	5.31E-01	5.06E-01	5.25E-01	8.76E-01	4.71E-01	4.25E-01	5.17E-01	4.73E-01	5.46E-01
XE-123	2.14 H	5.85E+00	5.65E+00	6.25E+00	7.76E+00	5.54E+00	5.02E+00	5.91E+00	5.45E+00	5.91E+00
XE-125	16.8 H	2.29E+00	2.14E+00	2.28E+00	3.40E+00	2.06E+00	1.85E+00	2.21E+00	2.05E+00	2.24E+00
XE-127	36.406 D	2.42E+00	2.24E+00	2.38E+00	3.62E+00	2.16E+00	1.93E+00	2.31E+00	2.15E+00	2.33E+00
XE-129M	8.89 D	1.53E-01	1.70E-01	1.26E-01	5.10E-01	1.18E-01	1.15E-01	1.57E-01	1.32E-01	2.25E-01
XE-131M	11.84 D	5.48E-02	6.10E-02	4.43E-02	1.95E-01	4.18E-02	4.03E-02	5.66E-02	4.69E-02	8.24E-02
XE-133	5.245 D	2.68E-01	2.86E-01	2.71E-01	6.31E-01	2.46E-01	2.21E-01	2.74E-01	2.40E-01	3.12E-01
XE-133M	2.19 D	2.52E-01	2.42E-01	2.38E-01	4.72E-01	2.17E-01	1.98E-01	2.42E-01	2.22E-01	2.69E-01
XE-135	9.11 H	2.33E+00	2.14E+00	2.31E+00	3.21E+00	2.09E+00	1.87E+00	2.21E+00	2.07E+00	2.21E+00
XE-135M	15.36 M	4.01E+00	3.81E+00	4.25E+00	5.07E+00	3.72E+00	3.35E+00	3.96E+00	3.65E+00	3.96E+00
XE-137	3.83 M	1.77E+00	1.70E+00	1.89E+00	2.25E+00	1.67E+00	1.51E+00	1.77E+00	1.64E+00	1.77E+00
XE-138	14.13 M	1.13E+01	1.14E+01	1.27E+01	1.45E+01	1.13E+01	1.04E+01	1.20E+01	1.11E+01	1.21E+01
CS-126	1.64 M	1.06E+01	1.01E+01	1.12E+01	1.34E+01	9.84E+00	8.87E+00	1.05E+01	9.66E+00	1.05E+01
CS-129	32.06 H	2.40E+00	2.26E+00	2.45E+00	3.34E+00	2.17E+00	1.96E+00	2.33E+00	2.15E+00	2.38E+00
CS-131	9.688 D	3.28E-02	4.49E-02	1.94E-02	2.02E-01	1.93E-02	2.19E-02	3.70E-02	2.68E-02	7.33E-02
CS-132	6.475 D	6.64E+00	6.37E+00	7.11E+00	8.34E+00	6.23E+00	5.63E+00	6.64E+00	6.11E+00	6.67E+00
CS-134	2.062 Y	1.49E+01	1.43E+01	1.60E+01	1.83E+01	1.41E+01	1.27E+01	1.49E+01	1.38E+01	1.49E+01
CS-134M	2.90 H	1.71E-01	1.67E-01	1.64E-01	3.48E-01	1.52E-01	1.34E-01	1.71E-01	1.52E-01	1.83E-01
CS-135	2.3E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS-136	13.16 D	2.09E+01	2.02E+01	2.27E+01	2.60E+01	2.00E+01	1.81E+01	2.12E+01	1.96E+01	2.12E+01
CS-137	30.17 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS-138	32.2 M	2.31E+01	2.32E+01	2.60E+01	2.92E+01	2.30E+01	2.13E+01	2.45E+01	2.26E+01	2.46E+01
CS-139	9.40 M	3.02E+00	3.05E+00	3.42E+00	3.81E+00	3.03E+00	2.81E+00	3.23E+00	2.98E+00	3.24E+00
BA-131	11.8 D	4.20E+00	3.98E+00	4.35E+00	5.78E+00	3.86E+00	3.46E+00	4.12E+00	3.80E+00	4.16E+00
BA-133	10.5 Y	3.35E+00	3.16E+00	3.39E+00	4.86E+00	3.02E+00	2.72E+00	3.23E+00	2.99E+00	3.31E+00
BA-133M	38.9 H	5.02E-01	4.78E-01	4.88E-01	8.12E-01	4.41E-01	4.01E-01	4.81E-01	4.44E-01	5.15E-01
BA-135M	28.7 H	4.39E-01	4.19E-01	4.24E-01	7.29E-01	3.84E-01	3.49E-01	4.21E-01	3.88E-01	4.55E-01
BA-137M	2.552 M	5.68E+00	5.43E+00	6.09E+00	7.02E+00	5.34E+00	4.81E+00	5.67E+00	5.22E+00	5.67E+00
BA-139	83.1 M	3.28E-01	3.05E-01	3.28E-01	4.91E-01	2.99E-01	2.66E-01	3.19E-01	2.95E-01	3.15E-01
BA-140	12.789 D	1.75E+00	1.66E+00	1.83E+00	2.28E+00	1.62E+00	1.45E+00	1.72E+00	1.59E+00	1.72E+00
BA-141	18.27 M	8.50E+00	8.16E+00	9.05E+00	1.10E+01	8.03E+00	7.29E+00	8.53E+00	7.90E+00	8.52E+00
BA-142	10.70 M	8.64E+00	8.41E+00	9.40E+00	1.09E+01	8.28E+00	7.54E+00	8.81E+00	8.12E+00	8.81E+00
LA-140	40.22 H	2.24E+01	2.24E+01	2.51E+01	2.82E+01	2.21E+01	2.04E+01	2.36E+01	2.17E+01	2.36E+01
LA-141	3.94 H	4.06E-01	4.07E-01	4.59E-01	5.07E-01	4.03E-01	3.73E-01	4.30E-01	3.96E-01	4.29E-01
LA-142	95.4 M	2.81E+01	2.86E+01	3.18E+01	3.59E+01	2.85E+01	2.65E+01	3.03E+01	2.80E+01	3.06E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/CUBIC M

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
I-132	2.30 H	2.12E+01	2.26E+01	2.47E+01	2.30E+01	2.04E+01	1.83E+01	2.51E+01	2.06E+01	2.09E+01
I-133	20.8 H	5.44E+00	5.83E+00	6.59E+00	5.95E+00	5.24E+00	4.69E+00	6.69E+00	5.30E+00	5.37E+00
I-134	52.6 M	2.47E+01	2.63E+01	2.84E+01	2.67E+01	2.38E+01	2.13E+01	2.89E+01	2.39E+01	2.44E+01
I-135	6.61 H	1.52E+01	1.61E+01	1.69E+01	1.62E+01	1.43E+01	1.32E+01	1.72E+01	1.46E+01	1.49E+01
I-136	83 S	2.58E+01	2.71E+01	2.81E+01	2.76E+01	2.37E+01	2.25E+01	2.86E+01	2.48E+01	2.53E+01
XE-122	20.1 H	4.92E-01	5.40E-01	7.06E-01	5.21E-01	4.54E-01	4.16E-01	7.21E-01	4.82E-01	4.85E-01
XE-123	2.14 H	5.62E+00	6.03E+00	7.03E+00	6.04E+00	5.27E+00	4.83E+00	7.16E+00	5.48E+00	5.53E+00
XE-125	16.8 H	2.12E+00	2.30E+00	3.05E+00	2.27E+00	1.91E+00	1.80E+00	3.11E+00	2.09E+00	2.09E+00
XE-127	36.406 D	2.22E+00	2.42E+00	3.29E+00	2.39E+00	1.98E+00	1.89E+00	3.36E+00	2.20E+00	2.19E+00
XE-129M	8.89 D	1.48E-01	1.73E-01	2.67E-01	1.19E-01	1.32E-01	1.09E-01	2.75E-01	1.35E-01	1.42E-01
XE-131M	11.84 D	5.25E-02	6.23E-02	9.83E-02	4.10E-02	4.71E-02	3.86E-02	1.01E-01	4.82E-02	5.06E-02
XE-133	5.245 D	2.76E-01	3.08E-01	5.32E-01	2.01E-01	2.31E-01	1.92E-01	5.47E-01	2.56E-01	2.62E-01
XE-133M	2.19 D	2.32E-01	2.57E-01	3.56E-01	2.40E-01	2.07E-01	1.93E-01	3.64E-01	2.26E-01	2.28E-01
XE-135	9.11 H	2.13E+00	2.31E+00	3.01E+00	2.36E+00	1.92E+00	1.84E+00	3.07E+00	2.11E+00	2.11E+00
XE-135M	15.36 M	3.79E+00	4.07E+00	4.67E+00	4.15E+00	3.64E+00	3.26E+00	4.74E+00	3.70E+00	3.74E+00
XE-137	3.83 M	1.69E+00	1.81E+00	2.06E+00	1.85E+00	1.60E+00	1.46E+00	2.10E+00	1.65E+00	1.67E+00
XE-138	14.13 M	1.14E+01	1.20E+01	1.29E+01	1.22E+01	1.04E+01	9.90E+00	1.31E+01	1.10E+01	1.11E+01
CS-126	1.64 M	1.00E+01	1.07E+01	1.23E+01	1.10E+01	9.57E+00	8.62E+00	1.25E+01	9.77E+00	9.87E+00
CS-129	32.06 H	2.23E+00	2.42E+00	2.94E+00	2.45E+00	2.10E+00	1.92E+00	2.99E+00	2.19E+00	2.20E+00
CS-131	9.688 D	3.33E-02	4.30E-02	7.25E-02	1.59E-02	3.09E-02	2.03E-02	7.52E-02	2.75E-02	3.11E-02
CS-132	6.475 D	6.32E+00	6.77E+00	7.54E+00	6.87E+00	6.13E+00	5.44E+00	7.67E+00	6.14E+00	6.25E+00
CS-134	2.062 Y	1.42E+01	1.52E+01	1.68E+01	1.55E+01	1.38E+01	1.23E+01	1.71E+01	1.38E+01	1.40E+01
CS-134M	2.90 H	1.61E-01	1.81E-01	2.86E-01	1.48E-01	1.40E-01	1.28E-01	2.94E-01	1.57E-01	1.58E-01
CS-135	2.3E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS-136	13.16 D	2.01E+01	2.15E+01	2.36E+01	2.17E+01	1.93E+01	1.74E+01	2.40E+01	1.95E+01	1.99E+01
CS-137	30.17 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS-138	32.2 M	2.32E+01	2.45E+01	2.58E+01	2.48E+01	2.16E+01	2.02E+01	2.62E+01	2.24E+01	2.27E+01
CS-139	9.40 M	3.05E+00	3.22E+00	3.35E+00	3.26E+00	2.83E+00	2.66E+00	3.41E+00	2.94E+00	2.99E+00
BA-131	11.8 D	3.95E+00	4.26E+00	5.24E+00	4.26E+00	3.70E+00	3.37E+00	5.34E+00	3.86E+00	3.89E+00
BA-133	10.5 Y	3.12E+00	3.39E+00	4.36E+00	3.35E+00	2.87E+00	2.64E+00	4.45E+00	3.06E+00	3.07E+00
BA-133M	38.9 H	4.64E-01	5.07E-01	6.73E-01	4.94E-01	4.19E-01	3.91E-01	6.87E-01	4.54E-01	4.56E-01
BA-135M	28.7 H	4.06E-01	4.44E-01	5.96E-01	4.28E-01	3.65E-01	3.40E-01	6.08E-01	3.96E-01	3.98E-01
BA-137M	2.552 M	5.40E+00	5.78E+00	6.43E+00	5.89E+00	5.24E+00	4.65E+00	6.53E+00	5.25E+00	5.34E+00
BA-139	83.1 M	3.04E-01	3.31E-01	4.63E-01	3.18E-01	2.68E-01	2.57E-01	4.74E-01	3.02E-01	3.00E-01
BA-140	12.789 D	1.65E+00	1.77E+00	2.09E+00	1.80E+00	1.57E+00	1.41E+00	2.12E+00	1.61E+00	1.62E+00
BA-141	18.27 M	8.13E+00	8.70E+00	1.01E+01	8.83E+00	7.61E+00	7.02E+00	1.02E+01	7.94E+00	8.00E+00
BA-142	10.70 M	8.36E+00	8.92E+00	9.84E+00	9.00E+00	7.98E+00	7.21E+00	1.00E+01	8.12E+00	8.23E+00
LA-140	40.22 H	2.23E+01	2.36E+01	2.51E+01	2.39E+01	2.09E+01	1.94E+01	2.55E+01	2.16E+01	2.18E+01
LA-141	3.94 H	4.07E-01	4.30E-01	4.50E-01	4.34E-01	3.84E-01	3.53E-01	4.57E-01	3.93E-01	3.97E-01
LA-142	95.4 M	2.87E+01	3.01E+01	3.13E+01	3.07E+01	2.61E+01	2.51E+01	3.18E+01	2.76E+01	2.82E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
I-132	2.30 H	3.00E+01	2.35E+01	2.83E+01	1.85E+01	2.56E+01	3.45E+01	3.74E+00	3.83E+01
I-133	20.8 H	7.79E+00	5.98E+00	7.27E+00	4.76E+00	6.66E+00	8.94E+00	3.02E+00	1.20E+01
I-134	52.6 M	3.48E+01	2.76E+01	3.30E+01	2.16E+01	2.98E+01	4.01E+01	4.80E+00	4.49E+01
I-135	6.61 H	2.11E+01	1.68E+01	1.99E+01	1.35E+01	1.81E+01	2.41E+01	2.67E+00	2.68E+01
I-136	83 S	3.54E+01	2.81E+01	3.28E+01	2.30E+01	3.05E+01	3.99E+01	1.80E+01	5.79E+01
XE-122	20.1 H	8.03E-01	5.61E-01	7.23E-01	4.20E-01	6.75E-01	9.85E-01	7.10E-03	9.92E-01
XE-123	2.14 H	8.11E+00	6.25E+00	7.61E+00	4.95E+00	6.96E+00	9.27E+00	1.28E+00	1.06E+01
XE-125	16.8 H	3.23E+00	2.41E+00	3.05E+00	1.85E+00	2.79E+00	3.71E+00	8.96E-02	3.80E+00
XE-127	36.406 D	3.39E+00	2.52E+00	3.20E+00	1.94E+00	2.94E+00	3.84E+00	9.98E-02	3.93E+00
XE-129M	8.89 D	3.69E-01	1.99E-01	2.90E-01	1.03E-01	2.82E-01	5.55E-01	7.74E-01	1.33E+00
XE-131M	11.84 D	1.38E-01	7.13E-02	1.07E-01	3.58E-02	1.04E-01	2.12E-01	4.99E-01	7.11E-01
XE-133	5.245 D	5.06E-01	3.64E-01	4.77E-01	2.18E-01	4.19E-01	5.98E-01	3.50E-01	9.47E-01
XE-133M	2.19 D	4.05E-01	2.73E-01	3.60E-01	1.94E-01	3.37E-01	5.10E-01	1.04E+00	1.55E+00
XE-135	9.11 H	3.14E+00	2.38E+00	2.99E+00	1.88E+00	2.74E+00	3.50E+00	2.16E+00	5.66E+00
XE-135M	15.36 M	5.47E+00	4.14E+00	5.06E+00	3.30E+00	4.67E+00	6.27E+00	7.24E-01	7.00E+00
XE-137	3.83 M	2.42E+00	1.85E+00	2.25E+00	1.49E+00	2.07E+00	2.75E+00	1.56E+01	1.83E+01
XE-138	14.13 M	1.57E+01	1.23E+01	1.46E+01	1.02E+01	1.36E+01	1.78E+01	4.96E+00	2.28E+01
CS-126	1.64 M	1.44E+01	1.09E+01	1.34E+01	8.76E+00	1.23E+01	1.65E+01	1.16E+01	2.80E+01
CS-129	32.06 H	3.36E+00	2.47E+00	3.09E+00	1.94E+00	2.87E+00	3.92E+00	2.30E-02	3.94E+00
CS-131	9.688 D	1.30E-01	5.27E-02	8.87E-02	1.50E-02	9.15E-02	2.26E-01	0.0	2.26E-01
CS-132	6.475 D	9.09E+00	7.02E+00	8.52E+00	5.48E+00	7.75E+00	1.06E+01	5.06E-02	1.06E+01
CS-134	2.062 Y	2.02E+01	1.58E+01	1.91E+01	1.24E+01	1.73E+01	2.33E+01	9.36E-01	2.42E+01
CS-134M	2.90 H	2.86E-01	2.00E-01	2.66E-01	1.34E-01	2.40E-01	3.43E-01	2.00E-01	5.43E-01
CS-135	2.3E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	7.29E-02	7.29E-02
CS-136	13.16 D	2.85E+01	2.26E+01	2.71E+01	1.76E+01	2.44E+01	3.28E+01	4.75E-01	3.33E+01
CS-137	30.17 Y	0.0	0.0	0.0	0.0	0.0	0.0	9.23E-01	9.23E-01
CS-138	32.2 M	3.21E+01	2.54E+01	3.00E+01	2.07E+01	2.76E+01	3.66E+01	1.04E+01	4.70E+01
CS-139	9.40 M	4.20E+00	3.34E+00	3.92E+00	2.73E+00	3.61E+00	4.78E+00	1.45E+01	1.93E+01
BA-131	11.8 D	5.86E+00	4.40E+00	5.46E+00	3.43E+00	5.02E+00	6.72E+00	8.08E-02	6.80E+00
BA-133	10.5 Y	4.75E+00	3.52E+00	4.41E+00	2.71E+00	4.06E+00	5.45E+00	5.44E-02	5.50E+00
BA-133M	38.9 H	7.48E-01	5.34E-01	6.82E-01	3.98E-01	6.33E-01	8.91E-01	1.26E+00	2.15E+00
BA-135M	28.7 H	6.64E-01	4.70E-01	6.04E-01	3.46E-01	5.60E-01	7.96E-01	1.23E+00	2.03E+00
BA-137M	2.552 M	7.71E+00	5.99E+00	7.25E+00	4.69E+00	6.58E+00	8.89E+00	4.99E-01	9.39E+00
BA-139	83.1 M	4.58E-01	3.52E-01	4.44E-01	2.68E-01	4.01E-01	5.03E-01	7.43E+00	7.93E+00
BA-140	12.789 D	2.40E+00	1.81E+00	2.23E+00	1.44E+00	2.05E+00	2.75E+00	1.86E+00	4.61E+00
BA-141	18.27 M	1.16E+01	9.03E+00	1.10E+01	7.18E+00	1.00E+01	1.32E+01	7.00E+00	2.02E+01
BA-142	10.70 M	1.18E+01	9.38E+00	1.13E+01	7.33E+00	1.02E+01	1.36E+01	3.42E+00	1.70E+01
LA-140	40.22 H	3.10E+01	2.45E+01	2.90E+01	1.99E+01	2.66E+01	3.54E+01	4.11E+00	3.95E+01
LA-141	3.94 H	5.63E-01	4.50E-01	5.31E-01	3.63E-01	4.83E-01	6.45E-01	7.89E+00	8.53E+00
LA-142	95.4 M	3.93E+01	3.09E+01	3.61E+01	2.57E+01	3.38E+01	4.41E+01	7.02E+00	5.12E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/ICUBIC M

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
CE-139	137.66 D	1.33E+00	1.25E+00	1.29E+00	2.21E+00	1.18E+00	1.05E+00	1.28E+00	1.18E+00	1.31E+00
CE-141	32.50 D	6.88E-01	6.42E-01	6.75E-01	1.13E+00	6.21E-01	5.45E-01	6.69E-01	6.11E-01	6.61E-01
CE-143	33.0 H	2.41E+00	2.30E+00	2.47E+00	3.36E+00	2.20E+00	1.99E+00	2.35E+00	2.17E+00	2.41E+00
CE-144	284.3 D	1.56E-01	1.51E-01	1.54E-01	2.81E-01	1.41E-01	1.24E-01	1.55E-01	1.39E-01	1.58E-01
PR-142	19.13 H	5.61E-01	5.68E-01	6.39E-01	7.07E-01	5.64E-01	5.24E-01	6.00E-01	5.54E-01	6.01E-01
PR-143	13.56 D	8.57E-08	8.24E-08	9.25E-08	1.05E-07	8.11E-08	7.32E-08	8.62E-08	7.93E-08	8.60E-08
PR-144	17.28 M	3.22E-01	3.25E-01	3.63E-01	4.08E-01	3.23E-01	2.98E-01	3.43E-01	3.17E-01	3.45E-01
PR-144M	7.2 M	2.86E-02	4.25E-02	2.18E-02	1.27E-01	2.04E-02	2.31E-02	3.26E-02	2.44E-02	5.83E-02
ND-147	10.98 D	1.18E+00	1.16E+00	1.23E+00	1.79E+00	1.09E+00	9.83E-01	1.18E+00	1.07E+00	1.22E+00
ND-149	1.73 H	3.51E+00	3.30E+00	3.58E+00	4.87E+00	3.20E+00	2.87E+00	3.41E+00	3.16E+00	3.43E+00
PM-143	265 D	2.82E+00	2.75E+00	3.02E+00	3.69E+00	2.65E+00	2.40E+00	2.84E+00	2.60E+00	2.90E+00
PM-144	363 D	1.46E+01	1.40E+01	1.56E+01	1.83E+01	1.36E+01	1.23E+01	1.45E+01	1.34E+01	1.46E+01
PM-145	17.7 Y	9.69E-02	1.37E-01	8.11E-02	3.76E-01	7.48E-02	8.02E-02	1.08E-01	8.41E-02	1.78E-01
PM-146	2020 D	7.03E+00	6.74E+00	7.48E+00	8.90E+00	6.57E+00	5.94E+00	7.00E+00	6.45E+00	7.03E+00
PM-147	2.6234 Y	3.23E-05	3.02E-05	3.22E-05	5.39E-05	2.97E-05	2.57E-05	3.19E-05	2.89E-05	3.07E-05
PM-148	5.37 D	5.46E+00	5.39E+00	6.06E+00	6.80E+00	5.33E+00	4.89E+00	5.67E+00	5.22E+00	5.66E+00
PM-148M	41.3 D	1.89E+01	1.81E+01	2.03E+01	2.36E+01	1.78E+01	1.61E+01	1.89E+01	1.74E+01	1.89E+01
PM-149	53.08 H	1.10E-01	1.02E-01	1.11E-01	1.46E-01	9.93E-02	8.93E-02	1.05E-01	9.83E-02	1.05E-01
PM-151	28.40 H	3.10E+00	2.93E+00	3.19E+00	4.22E+00	2.84E+00	2.55E+00	3.02E+00	2.80E+00	3.04E+00
SM-147	1.069E11 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM-151	90 Y	2.77E-06	1.49E-06	8.40E-07	4.06E-05	9.89E-07	7.53E-07	2.46E-06	1.97E-06	3.76E-06
SM-153	46.7 H	4.02E-01	4.29E-01	3.94E-01	8.93E-01	3.61E-01	3.28E-01	4.12E-01	3.58E-01	4.67E-01
EU-152	13.6 Y	1.08E+01	1.06E+01	1.18E+01	1.39E+01	1.04E+01	9.52E+00	1.11E+01	1.02E+01	1.12E+01
EU-152M	9.32 H	2.99E+00	2.92E+00	3.25E+00	3.80E+00	2.86E+00	2.60E+00	3.05E+00	2.80E+00	3.07E+00
EU-154	8.8 Y	1.20E+01	1.17E+01	1.31E+01	1.51E+01	1.16E+01	1.05E+01	1.23E+01	1.13E+01	1.23E+01
EU-155	4.96 Y	4.69E-01	4.78E-01	4.75E-01	9.41E-01	4.34E-01	3.83E-01	4.76E-01	4.21E-01	4.98E-01
EU-156	15.19 D	1.33E+01	1.34E+01	1.50E+01	1.68E+01	1.33E+01	1.22E+01	1.41E+01	1.30E+01	1.41E+01
GD-152	1.1E14 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GD-153	241.6 D	6.82E-01	7.44E-01	6.64E-01	1.59E+00	6.09E-01	5.57E-01	7.05E-01	6.07E-01	8.18E-01
GD-159	18.56 H	3.38E-01	3.27E-01	3.43E-01	5.06E-01	3.05E-01	2.77E-01	3.28E-01	3.02E-01	3.44E-01
GD-162	9.7 M	3.94E+00	3.70E+00	4.09E+00	5.08E+00	3.61E+00	3.25E+00	3.83E+00	3.55E+00	3.84E+00
TB-157	150 Y	1.58E-02	2.16E-02	1.43E-02	5.54E-02	1.30E-02	1.35E-02	1.72E-02	1.39E-02	2.63E-02
TB-160	72.3 D	1.04E+01	1.01E+01	1.13E+01	1.30E+01	9.96E+00	9.07E+00	1.06E+01	9.76E+00	1.06E+01
TB-162	7.76 M	1.05E+01	1.01E+01	1.12E+01	1.34E+01	9.93E+00	8.98E+00	1.06E+01	9.74E+00	1.05E+01
DY-157	8.06 H	3.11E+00	2.94E+00	3.13E+00	4.43E+00	2.79E+00	2.52E+00	2.98E+00	2.77E+00	3.07E+00
DY-165	2.334 H	2.19E-01	2.15E-01	2.29E-01	3.30E-01	2.03E-01	1.83E-01	2.18E-01	1.99E-01	2.26E-01
DY-166	81.6 H	2.39E-01	2.68E-01	2.42E-01	5.68E-01	2.17E-01	2.01E-01	2.45E-01	2.14E-01	2.93E-01
HO-166	26.80 H	2.43E-01	2.51E-01	2.69E-01	3.78E-01	2.37E-01	2.19E-01	2.55E-01	2.33E-01	2.66E-01
HO-166M	1.20E3 Y	1.52E+01	1.45E+01	1.62E+01	1.94E+01	1.43E+01	1.29E+01	1.52E+01	1.40E+01	1.52E+01
ER-169	9.40 D	1.47E-05	1.37E-05	1.45E-05	4.32E-05	1.34E-05	1.15E-05	1.44E-05	1.31E-05	1.39E-05

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
CE-139	137.66 D	1.22E+00	1.35E+00	1.99E+00	1.25E+00	1.06E+00	1.02E+00	2.04E+00	1.21E+00	1.21E+00
CE-141	32.50 D	6.36E-01	7.01E-01	1.06E+00	6.35E-01	5.50E-01	5.24E-01	1.09E+00	6.32E-01	6.28E-01
CE-143	33.0 H	2.26E+00	2.44E+00	3.01E+00	2.43E+00	2.11E+00	1.92E+00	3.07E+00	2.21E+00	2.23E+00
CE-144	284.3 D	1.48E-01	1.63E-01	2.58E-01	1.38E-01	1.27E-01	1.18E-01	2.65E-01	1.45E-01	1.45E-01
PR-142	19.13 H	5.69E-01	6.00E-01	6.23E-01	6.05E-01	5.30E-01	4.94E-01	6.33E-01	5.48E-01	5.53E-01
PR-143	13.56 D	8.18E-08	8.75E-08	9.60E-08	8.90E-08	7.96E-08	7.06E-08	9.76E-08	7.95E-08	8.10E-08
PR-144	17.28 M	3.25E-01	3.43E-01	3.60E-01	3.49E-01	3.01E-01	2.83E-01	3.66E-01	3.13E-01	3.19E-01
PR-144M	7.2 M	3.32E-02	3.79E-02	6.66E-02	1.53E-02	1.82E-02	1.82E-02	6.80E-02	2.61E-02	2.89E-02
ND-147	10.98 D	1.14E+00	1.23E+00	1.60E+00	1.15E+00	1.05E+00	9.35E-01	1.63E+00	1.10E+00	1.11E+00
ND-149	1.73 H	3.28E+00	3.54E+00	4.52E+00	3.53E+00	3.02E+00	2.79E+00	4.61E+00	3.22E+00	3.23E+00
PM-143	265 D	2.71E+00	2.90E+00	3.25E+00	2.88E+00	2.62E+00	2.30E+00	3.31E+00	2.61E+00	2.67E+00
PM-144	363 D	1.39E+01	1.48E+01	1.67E+01	1.51E+01	1.34E+01	1.19E+01	1.70E+01	1.35E+01	1.37E+01
PM-145	17.7 Y	1.12E-01	1.26E-01	2.23E-01	5.56E-02	9.19E-02	6.33E-02	2.28E-01	9.02E-02	9.83E-02
PM-146	2020 D	6.68E+00	7.16E+00	8.11E+00	7.27E+00	6.43E+00	5.74E+00	8.25E+00	6.50E+00	6.59E+00
PM-147	2.6234 Y	3.02E-05	3.34E-05	5.29E-05	2.89E-05	2.60E-05	2.44E-05	5.44E-05	3.00E-05	2.98E-05
PM-148	5.37 D	5.38E+00	5.71E+00	6.11E+00	5.78E+00	5.12E+00	4.65E+00	6.21E+00	5.20E+00	5.27E+00
PM-148M	41.3 D	1.80E+01	1.93E+01	2.16E+01	1.97E+01	1.74E+01	1.55E+01	2.20E+01	1.75E+01	1.78E+01
PM-149	53.08 H	1.01E-01	1.09E-01	1.36E-01	1.12E-01	9.34E-02	8.73E-02	1.38E-01	9.98E-02	1.00E-01
PM-151	28.40 H	2.90E+00	3.13E+00	3.89E+00	3.14E+00	2.70E+00	2.48E+00	3.97E+00	2.84E+00	2.86E+00
SM-147	1.069E11 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM-151	90 Y	1.27E-06	3.27E-06	4.75E-06	1.12E-06	2.14E-06	1.70E-06	5.44E-06	1.71E-06	1.95E-06
SM-153	46.7 H	4.07E-01	4.52E-01	7.61E-01	3.14E-01	3.43E-01	2.91E-01	7.81E-01	3.78E-01	3.86E-01
EU-152	13.6 Y	1.06E+01	1.13E+01	1.25E+01	1.13E+01	1.00E+01	9.08E+00	1.27E+01	1.02E+01	1.04E+01
EU-152M	9.32 H	2.89E+00	3.09E+00	3.41E+00	3.09E+00	2.78E+00	2.48E+00	3.47E+00	2.80E+00	2.85E+00
EU-154	8.8 Y	1.17E+01	1.24E+01	1.36E+01	1.25E+01	1.11E+01	1.00E+01	1.38E+01	1.13E+01	1.15E+01
EU-155	4.96 Y	4.68E-01	5.19E-01	8.77E-01	3.76E-01	3.94E-01	3.44E-01	9.02E-01	4.45E-01	4.50E-01
EU-156	15.19 D	1.34E+01	1.41E+01	1.49E+01	1.43E+01	1.25E+01	1.16E+01	1.51E+01	1.29E+01	1.31E+01
GD-152	1.1E14 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GD-153	241.6 D	6.99E-01	7.77E-01	1.32E+00	5.21E-01	5.86E-01	4.90E-01	1.36E+00	6.43E-01	6.59E-01
GD-159	18.56 H	3.21E-01	3.47E-01	4.51E-01	3.33E-01	2.94E-01	2.66E-01	4.59E-01	3.10E-01	3.13E-01
GD-162	9.7 M	3.68E+00	3.96E+00	4.71E+00	4.07E+00	3.48E+00	3.17E+00	4.79E+00	3.61E+00	3.63E+00
TB-157	150 Y	1.87E-02	2.07E-02	3.72E-02	9.17E-03	1.50E-02	1.04E-02	3.80E-02	1.51E-02	1.63E-02
TB-160	72.3 D	1.01E+01	1.07E+01	1.18E+01	1.08E+01	9.63E+00	8.66E+00	1.20E+01	9.75E+00	9.90E+00
TB-162	7.76 M	1.00E+01	1.08E+01	1.22E+01	1.09E+01	9.58E+00	8.64E+00	1.25E+01	9.77E+00	9.92E+00
DY-157	8.06 H	2.90E+00	3.14E+00	4.03E+00	3.12E+00	2.65E+00	2.45E+00	4.11E+00	2.83E+00	2.84E+00
DY-165	2.334 H	2.12E-01	2.29E-01	2.98E-01	2.12E-01	1.96E-01	1.73E-01	3.04E-01	2.03E-01	2.07E-01
DY-166	81.6 H	2.56E-01	2.83E-01	4.78E-01	1.78E-01	2.14E-01	1.71E-01	4.90E-01	2.29E-01	2.37E-01
HO-166	26.80 H	2.49E-01	2.67E-01	3.35E-01	2.37E-01	2.26E-01	2.01E-01	3.42E-01	2.35E-01	2.39E-01
HO-166M	1.20E3 Y	1.45E+01	1.55E+01	1.78E+01	1.56E+01	1.38E+01	1.24E+01	1.81E+01	1.41E+01	1.43E+01
ER-169	9.40 D	1.37E-05	1.54E-05	2.47E-05	1.27E-05	1.18E-05	1.10E-05	2.56E-05	1.36E-05	1.35E-05

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/CUBIC M

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
CE-139	137.66 D	1.95E+00	1.45E+00	1.87E+00	1.06E+00	1.69E+00	2.20E+00	8.29E-02	2.28E+00
CE-141	32.50 D	9.96E-01	7.58E-01	9.73E-01	5.55E-01	8.71E-01	1.09E+00	7.49E-01	1.84E+00
CE-143	33.0 H	3.39E+00	2.56E+00	3.17E+00	1.96E+00	2.89E+00	3.89E+00	3.06E+00	6.96E+00
CE-144	284.3 D	2.42E-01	1.81E-01	2.34E-01	1.26E-01	2.08E-01	2.68E-01	2.40E-01	5.08E-01
PR-142	19.13 H	7.82E-01	6.22E-01	7.33E-01	5.10E-01	6.72E-01	8.93E-01	6.83E+00	7.72E+00
PR-143	13.56 D	1.16E-07	9.13E-08	1.10E-07	7.11E-08	9.93E-08	1.34E-07	2.18E+00	2.18E+00
PR-144	17.28 M	4.48E-01	3.53E-01	4.16E-01	2.91E-01	3.86E-01	5.09E-01	1.03E+01	1.08E+01
PR-144M	7.2 H	9.15E-02	5.33E-02	7.31E-02	1.97E-02	6.78E-02	1.32E-01	0.0	1.32E-01
ND-147	10.98 D	1.75E+00	1.31E+00	1.64E+00	9.71E-01	1.48E+00	2.01E+00	1.48E+00	3.49E+00
ND-149	1.73 H	4.86E+00	3.69E+00	4.59E+00	2.86E+00	4.19E+00	5.47E+00	3.47E+00	8.94E+00
PM-143	265 D	3.96E+00	3.07E+00	3.72E+00	2.33E+00	3.35E+00	4.63E+00	7.87E-03	4.64E+00
PM-144	363 D	1.99E+01	1.54E+01	1.87E+01	1.20E+01	1.70E+01	2.30E+01	6.22E-02	2.30E+01
PM-145	17.7 Y	2.79E-01	1.74E-01	2.33E-01	7.18E-02	2.11E-01	3.81E-01	7.75E-06	3.81E-01
PM-146	2020 D	9.63E+00	7.42E+00	9.02E+00	5.81E+00	8.22E+00	1.11E+01	6.14E-01	1.17E+01
PM-147	2.6234 Y	4.71E-05	3.64E-05	4.69E-05	2.62E-05	4.15E-05	5.02E-05	1.01E-01	1.01E-01
PM-148	5.37 D	7.52E+00	5.95E+00	7.09E+00	4.76E+00	6.45E+00	8.63E+00	5.89E+00	1.45E+01
PM-148M	41.3 D	2.57E+01	1.99E+01	2.42E+01	1.57E+01	2.20E+01	2.96E+01	8.22E-01	3.04E+01
PM-149	53.08 H	1.48E-01	1.13E-01	1.39E-01	8.91E-02	1.28E-01	1.67E-01	2.62E+00	2.79E+00
PM-151	28.40 H	4.28E+00	3.26E+00	4.03E+00	2.53E+00	3.68E+00	4.85E+00	1.91E+00	6.76E+00
SM-147	1.069E11 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM-151	90 Y	1.55E-05	1.39E-06	6.42E-06	1.80E-07	1.18E-05	5.93E-05	4.15E-06	6.34E-05
SM-153	46.7 H	7.33E-01	5.37E-01	6.96E-01	3.24E-01	6.10E-01	8.44E-01	1.38E+00	2.23E+00
EU-152	13.6 Y	1.50E+01	1.18E+01	1.42E+01	9.26E+00	1.28E+01	1.73E+01	6.46E-01	1.79E+01
EU-152M	9.32 H	4.13E+00	3.27E+00	3.93E+00	2.51E+00	3.53E+00	4.78E+00	3.91E+00	8.69E+00
EU-154	8.8 Y	1.65E+01	1.31E+01	1.57E+01	1.02E+01	1.41E+01	1.89E+01	1.51E+00	2.04E+01
EU-155	4.96 Y	7.89E-01	6.00E-01	7.74E-01	3.86E-01	6.72E-01	8.65E-01	4.13E-02	9.06E-01
EU-156	15.19 D	1.85E+01	1.47E+01	1.73E+01	1.19E+01	1.59E+01	2.11E+01	2.92E+00	2.41E+01
GD-152	1.1E14 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GD-153	241.6 D	1.29E+00	9.36E-01	1.21E+00	5.49E-01	1.06E+00	1.50E+00	7.84E-03	1.51E+00
GD-159	18.56 H	4.94E-01	3.67E-01	4.58E-01	2.75E-01	4.19E-01	5.67E-01	2.15E+00	2.72E+00
GD-162	9.7 M	5.34E+00	4.02E+00	4.95E+00	3.23E+00	4.59E+00	6.07E+00	2.26E+00	8.33E+00
TB-157	150 Y	4.19E-02	2.82E-02	3.68E-02	1.24E-02	3.26E-02	5.52E-02	0.0	5.52E-02
TB-160	72.3 D	1.42E+01	1.13E+01	1.36E+01	8.80E+00	1.22E+01	1.64E+01	1.43E+00	1.78E+01
TB-162	7.76 M	1.44E+01	1.13E+01	1.37E+01	8.76E+00	1.23E+01	1.65E+01	3.73E+00	2.02E+01
DY-157	8.06 H	4.37E+00	3.27E+00	4.08E+00	2.52E+00	3.75E+00	4.96E+00	2.25E-02	4.98E+00
DY-165	2.334 H	3.25E-01	2.47E-01	3.06E-01	1.80E-01	2.75E-01	3.72E-01	3.30E+00	3.67E+00
DY-166	81.6 H	4.68E-01	3.42E-01	4.40E-01	1.96E-01	3.84E-01	5.46E-01	4.92E-01	1.04E+00
HO-166	26.80 H	3.74E-01	2.92E-01	3.55E-01	2.13E-01	3.16E-01	4.27E-01	5.46E+00	5.89E+00
HO-166M	1.20E3 Y	2.08E+01	1.62E+01	1.97E+01	1.26E+01	1.78E+01	2.38E+01	3.83E-01	2.42E+01
ER-169	9.40 D	2.34E-05	1.67E-05	2.17E-05	1.18E-05	2.22E-05	6.17E-05	3.42E-01	3.42E-01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/CUBIC Ml

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
ER-171	7.52 H	3.41E+00	3.19E+00	3.44E+00	4.85E+00	3.08E+00	2.76E+00	3.28E+00	3.05E+00	3.30E+00
TM-170	128.6 D	3.59E-02	3.88E-02	3.72E-02	8.13E-02	3.35E-02	3.02E-02	3.66E-02	3.23E-02	4.11E-02
TM-171	1.92 Y	3.76E-03	4.41E-03	3.88E-03	1.00E-02	3.44E-03	3.23E-03	3.86E-03	3.38E-03	4.85E-03
YB-169	31.97 D	2.42E+00	2.41E+00	2.42E+00	4.46E+00	2.19E+00	1.97E+00	2.37E+00	2.16E+00	2.54E+00
YB-175	4.19 D	3.62E-01	3.40E-01	3.69E-01	4.99E-01	3.29E-01	2.95E-01	3.49E-01	3.24E-01	3.52E-01
LU-177	6.71 D	3.16E-01	2.95E-01	3.11E-01	4.95E-01	2.84E-01	2.52E-01	3.03E-01	2.80E-01	3.04E-01
LU-177M	160.10 D	9.04E+00	8.46E+00	9.08E+00	1.31E+01	8.16E+00	7.30E+00	8.68E+00	8.07E+00	8.75E+00
HF-181	42.39 D	5.03E+00	4.76E+00	5.24E+00	6.75E+00	4.63E+00	4.15E+00	4.92E+00	4.55E+00	4.93E+00
TA-182	114.74 D	1.22E+01	1.21E+01	1.35E+01	1.57E+01	1.19E+01	1.09E+01	1.27E+01	1.17E+01	1.27E+01
W-181	120.95 D	2.40E-01	2.76E-01	2.52E-01	6.06E-01	2.23E-01	2.07E-01	2.45E-01	2.16E-01	2.98E-01
W-185	75.1 D	2.48E-04	2.31E-04	2.46E-04	4.08E-04	2.27E-04	1.97E-04	2.44E-04	2.21E-04	2.34E-04
W-187	23.83 H	4.45E+00	4.27E+00	4.74E+00	5.76E+00	4.17E+00	3.75E+00	4.43E+00	4.07E+00	4.44E+00
W-188	69.4 D	1.64E-02	1.52E-02	1.63E-02	2.30E-02	1.47E-02	1.32E-02	1.56E-02	1.46E-02	1.56E-02
RE-182	64.0 H	1.63E+01	1.60E+01	1.76E+01	2.19E+01	1.56E+01	1.42E+01	1.66E+01	1.53E+01	1.67E+01
RE-182M	12.7 H	1.12E+01	1.12E+01	1.24E+01	1.47E+01	1.09E+01	1.00E+01	1.17E+01	1.07E+01	1.17E+01
RE-183	70 D	1.19E+00	1.20E+00	1.20E+00	2.27E+00	1.09E+00	9.77E-01	1.17E+00	1.06E+00	1.26E+00
RE-184	38.0 D	8.46E+00	8.23E+00	9.17E+00	1.09E+01	8.06E+00	7.30E+00	8.59E+00	7.88E+00	8.62E+00
RE-184M	169 D	3.54E+00	3.44E+00	3.74E+00	5.00E+00	3.32E+00	3.00E+00	3.54E+00	3.25E+00	3.59E+00
RE-186	90.64 H	1.75E-01	1.70E-01	1.76E-01	3.12E-01	1.61E-01	1.42E-01	1.73E-01	1.57E-01	1.75E-01
RE-187	4.7E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RE-188	16.98 H	5.44E-01	5.18E-01	5.67E-01	7.63E-01	5.07E-01	4.53E-01	5.40E-01	4.96E-01	5.36E-01
OS-185	93.6 D	6.60E+00	6.37E+00	7.08E+00	8.49E+00	6.21E+00	5.61E+00	6.61E+00	6.07E+00	6.65E+00
OS-186	2.0E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OS-190M	9.9 M	1.49E+01	1.41E+01	1.56E+01	1.92E+01	1.38E+01	1.24E+01	1.46E+01	1.35E+01	1.46E+01
OS-191	15.4 D	5.76E-01	5.81E-01	5.90E-01	1.12E+00	5.35E-01	4.74E-01	5.75E-01	5.17E-01	6.00E-01
OS-191M	13.03 H	3.10E-02	3.45E-02	3.28E-02	7.54E-02	2.92E-02	2.66E-02	3.15E-02	2.80E-02	3.65E-02
OS-193	30.0 H	6.04E-01	5.79E-01	6.26E-01	8.76E-01	5.56E-01	4.98E-01	5.91E-01	5.45E-01	5.99E-01
IR-190	11.78 D	1.31E+01	1.24E+01	1.37E+01	1.71E+01	1.21E+01	1.09E+01	1.29E+01	1.19E+01	1.29E+01
IR-190M	1.2 H	4.12E-05	2.91E-08	3.29E-06	3.22E-03	5.37E-06	8.16E-08	1.34E-07	1.69E-05	1.02E-07
IR-190M	3.2 H	3.19E-01	3.57E-01	3.39E-01	7.51E-01	3.01E-01	2.74E-01	3.25E-01	2.88E-01	3.76E-01
IR-192	74.02 D	7.69E+00	7.18E+00	7.90E+00	1.01E+01	7.01E+00	6.30E+00	7.42E+00	6.91E+00	7.43E+00
IR-193M	11.9 D	2.35E-03	2.56E-03	2.46E-03	8.43E-03	2.19E-03	1.98E-03	2.36E-03	2.11E-03	2.68E-03
IR-194	19.15 H	8.65E-01	8.19E-01	9.06E-01	1.11E+00	8.03E-01	7.26E-01	8.52E-01	7.91E-01	8.52E-01
IR-194M	171 D	2.20E+01	2.09E+01	2.32E+01	2.80E+01	2.04E+01	1.84E+01	2.16E+01	2.00E+01	2.16E+01
PT-191	2.71 D	2.49E+00	2.44E+00	2.60E+00	3.87E+00	2.30E+00	2.07E+00	2.45E+00	2.25E+00	2.54E+00
PT-193	50 Y	4.01E-05	7.23E-12	3.20E-06	3.14E-03	5.22E-06	6.74E-08	9.92E-08	1.65E-05	4.81E-08
PT-193M	4.33 D	7.53E-02	8.21E-02	7.99E-02	1.72E-01	7.12E-02	6.42E-02	7.65E-02	6.80E-02	8.57E-02
PT-195M	4.02 D	5.21E-01	5.51E-01	5.45E-01	1.12E+00	4.90E-01	4.37E-01	5.27E-01	4.69E-01	5.73E-01
PT-197	18.3 H	1.91E-01	1.92E-01	1.97E-01	3.58E-01	1.78E-01	1.58E-01	1.89E-01	1.72E-01	1.97E-01
PT-197M	94.4 H	6.75E-01	6.66E-01	6.96E-01	1.12E+00	6.20E-01	5.58E-01	6.60E-01	6.06E-01	6.91E-01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
ER-171	7.52 H	3.17E+00	3.44E+00	4.52E+00	3.39E+00	2.88E+00	2.68E+00	4.61E+00	3.11E+00	3.12E+00
TM-170	128.6 D	3.80E-02	4.22E-02	7.39E-02	2.63E-02	3.14E-02	2.56E-02	7.59E-02	3.47E-02	3.56E-02
TM-171	1.92 Y	4.24E-03	4.72E-03	8.50E-03	2.45E-03	3.44E-03	2.59E-03	8.72E-03	3.67E-03	3.85E-03
YB-169	31.97 D	2.37E+00	2.61E+00	4.03E+00	2.12E+00	2.03E+00	1.82E+00	4.13E+00	2.25E+00	2.28E+00
YB-175	4.19 D	3.38E-01	3.65E-01	4.66E-01	3.64E-01	3.11E-01	2.87E-01	4.74E-01	3.31E-01	3.32E-01
LU-177	6.71 D	2.93E-01	3.21E-01	4.68E-01	2.99E-01	2.56E-01	2.42E-01	4.79E-01	2.89E-01	2.88E-01
LU-177M	160.10 D	8.41E+00	9.14E+00	1.23E+01	8.90E+00	7.57E+00	7.07E+00	1.26E+01	8.26E+00	8.27E+00
HF-181	42.39 D	4.73E+00	5.11E+00	6.30E+00	5.09E+00	4.44E+00	4.03E+00	6.41E+00	4.63E+00	4.66E+00
TA-182	114.74 D	1.20E+01	1.28E+01	1.41E+01	1.27E+01	1.14E+01	1.03E+01	1.44E+01	1.16E+01	1.18E+01
W-181	120.95 D	2.68E-01	2.97E-01	5.34E-01	1.66E-01	2.18E-01	1.66E-01	5.47E-01	2.35E-01	2.45E-01
W-185	75.1 D	2.30E-04	2.55E-04	4.00E-04	2.23E-04	1.99E-04	1.88E-04	4.11E-04	2.29E-04	2.28E-04
W-187	23.83 H	4.24E+00	4.55E+00	5.31E+00	4.54E+00	4.06E+00	3.61E+00	5.40E+00	4.12E+00	4.18E+00
W-188	69.4 D	1.51E-02	1.64E-02	2.16E-02	1.65E-02	1.36E-02	1.29E-02	2.20E-02	1.49E-02	1.49E-02
RE-182	64.0 H	1.59E+01	1.70E+01	1.99E+01	1.66E+01	1.48E+01	1.35E+01	2.03E+01	1.54E+01	1.55E+01
RE-182M	12.7 H	1.11E+01	1.18E+01	1.32E+01	1.16E+01	1.05E+01	9.45E+00	1.35E+01	1.07E+01	1.09E+01
RE-183	70 D	1.19E+00	1.30E+00	2.09E+00	1.00E+00	1.01E+00	8.80E-01	2.14E+00	1.12E+00	1.13E+00
RE-184	38.0 D	8.18E+00	8.75E+00	9.88E+00	8.65E+00	7.86E+00	6.96E+00	1.01E+01	7.90E+00	8.06E+00
RE-184M	169 D	3.41E+00	3.68E+00	4.60E+00	3.51E+00	3.17E+00	2.84E+00	4.69E+00	3.30E+00	3.35E+00
RE-186	90.64 H	1.69E-01	1.87E-01	2.97E-01	1.52E-01	1.44E-01	1.31E-01	3.05E-01	1.64E-01	1.64E-01
RE-187	4.7E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RE-188	16.98 H	5.15E-01	5.57E-01	7.16E-01	5.38E-01	4.74E-01	4.35E-01	7.32E-01	5.05E-01	5.08E-01
OS-185	93.6 D	6.33E+00	6.78E+00	7.78E+00	6.74E+00	6.08E+00	5.38E+00	7.92E+00	6.12E+00	6.23E+00
OS-186	2.0E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OS-190M	9.9 M	1.40E+01	1.51E+01	1.78E+01	1.53E+01	1.33E+01	1.20E+01	1.81E+01	1.37E+01	1.38E+01
OS-191	15.4 D	5.76E-01	6.36E-01	1.06E+00	4.71E-01	4.84E-01	4.24E-01	1.09E+00	5.46E-01	5.52E-01
OS-191M	13.03 H	3.39E-02	3.75E-02	6.68E-02	2.16E-02	2.76E-02	2.18E-02	6.85E-02	3.03E-02	3.13E-02
OS-193	30.0 H	5.75E-01	6.23E-01	8.20E-01	5.91E-01	5.27E-01	4.76E-01	8.37E-01	5.59E-01	5.63E-01
IR-190	11.78 D	1.23E+01	1.33E+01	1.58E+01	1.33E+01	1.17E+01	1.05E+01	1.61E+01	1.20E+01	1.22E+01
IR-190M	1.2 H	4.19E-07	3.26E-05	1.96E-05	1.07E-05	1.61E-05	2.41E-05	5.29E-05	9.30E-06	8.41E-06
IR-190M	3.2 H	3.50E-01	3.86E-01	6.89E-01	2.23E-01	2.85E-01	2.24E-01	7.07E-01	3.12E-01	3.23E-01
IR-192	74.02 D	7.15E+00	7.70E+00	9.39E+00	7.89E+00	6.67E+00	6.15E+00	9.56E+00	7.02E+00	7.05E+00
IR-193M	11.9 D	2.52E-03	2.81E-03	4.95E-03	1.65E-03	2.07E-03	1.66E-03	5.11E-03	2.27E-03	2.34E-03
IR-194	19.15 H	8.15E-01	8.75E-01	1.03E+00	8.94E-01	7.65E-01	7.04E-01	1.05E+00	7.98E-01	8.04E-01
IR-194M	171 D	2.07E+01	2.23E+01	2.59E+01	2.28E+01	1.98E+01	1.78E+01	2.64E+01	2.03E+01	2.05E+01
PT-191	2.71 D	2.42E+00	2.63E+00	3.61E+00	2.34E+00	2.19E+00	1.93E+00	3.69E+00	2.32E+00	2.35E+00
PT-193	50 Y	3.90E-07	3.17E-05	1.90E-05	1.04E-05	1.57E-05	2.34E-05	5.15E-05	9.05E-06	8.18E-06
PT-193M	4.33 D	8.11E-02	8.94E-02	1.58E-01	5.43E-02	6.63E-02	5.34E-02	1.62E-01	7.34E-02	7.53E-02
PT-195M	4.02 D	5.45E-01	6.02E-01	1.05E+00	3.93E-01	4.50E-01	3.75E-01	1.07E+00	5.03E-01	5.13E-01
PT-197	18.3 H	1.91E-01	2.09E-01	3.41E-01	1.60E-01	1.61E-01	1.42E-01	3.50E-01	1.81E-01	1.83E-01
PT-197M	94.4 M	6.60E-01	7.19E-01	1.04E+00	6.19E-01	5.82E-01	5.17E-01	1.07E+00	6.30E-01	6.37E-01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
ER-171	7.52 H	4.74E+00	3.58E+00	4.49E+00	2.77E+00	4.10E+00	5.31E+00	2.63E+00	7.94E+00
TM-170	128.6 D	6.67E-02	5.04E-02	6.49E-02	2.98E-02	5.59E-02	7.49E-02	2.19E+00	2.26E+00
TM-171	1.92 Y	8.04E-03	5.88E-03	7.61E-03	3.08E-03	6.54E-03	9.37E-03	3.76E-04	9.75E-03
YB-169	31.97 D	3.90E+00	2.92E+00	3.73E+00	1.96E+00	3.31E+00	4.38E+00	1.86E-01	4.56E+00
YB-175	4.19 D	5.00E-01	3.77E-01	4.70E-01	2.95E-01	4.31E-01	5.63E-01	5.86E-01	1.15E+00
LU-177	6.71 D	4.51E-01	3.44E-01	4.37E-01	2.55E-01	3.94E-01	4.95E-01	6.42E-01	1.14E+00
LU-177M	160.10 D	1.26E+01	9.58E+00	1.20E+01	7.33E+00	1.10E+01	1.41E+01	5.08E-01	1.46E+01
HF-181	42.39 D	6.94E+00	5.25E+00	6.50E+00	4.13E+00	5.96E+00	7.85E+00	6.87E-01	8.54E+00
TA-182	114.74 D	1.70E+01	1.36E+01	1.63E+01	1.06E+01	1.46E+01	1.95E+01	6.16E-01	2.02E+01
W-181	120.95 D	4.91E-01	3.68E-01	4.72E-01	2.00E-01	4.04E-01	5.61E-01	0.0	5.61E-01
W-185	75.1 D	3.58E-04	2.77E-04	3.56E-04	2.01E-04	3.16E-04	3.82E-04	5.54E-01	5.55E-01
W-187	23.83 H	6.14E+00	4.74E+00	5.78E+00	3.68E+00	5.25E+00	7.03E+00	1.80E+00	8.83E+00
W-188	69.4 D	2.24E-02	1.70E-02	2.12E-02	1.33E-02	1.95E-02	2.49E-02	3.43E-01	3.67E-01
RE-182	64.0 H	2.29E+01	1.80E+01	2.18E+01	1.39E+01	1.96E+01	2.60E+01	2.79E-01	2.63E+01
RE-182M	12.7 H	1.58E+01	1.26E+01	1.50E+01	9.73E+00	1.35E+01	1.81E+01	1.56E-01	1.83E+01
RE-183	70 D	1.96E+00	1.49E+00	1.90E+00	9.75E-01	1.66E+00	2.19E+00	7.84E-02	2.27E+00
RE-184	38.0 D	1.17E+01	9.29E+00	1.12E+01	7.07E+00	1.00E+01	1.35E+01	7.67E-02	1.36E+01
RE-184M	169 D	5.05E+00	3.93E+00	4.83E+00	2.94E+00	4.32E+00	5.73E+00	8.66E-02	5.82E+00
RE-186	90.64 H	2.71E-01	2.08E-01	2.66E-01	1.43E-01	2.34E-01	2.95E-01	2.35E+00	2.64E+00
RE-187	4.7E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RE-188	16.98 H	7.59E-01	5.91E-01	7.30E-01	4.50E-01	6.57E-01	8.50E-01	6.28E+00	7.13E+00
OS-185	93.6 D	9.14E+00	7.11E+00	8.62E+00	5.47E+00	7.79E+00	1.05E+01	4.37E-02	1.06E+01
OS-186	2.0E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OS-190M	9.9 M	2.03E+01	1.54E+01	1.90E+01	1.22E+01	1.74E+01	2.31E+01	4.04E-01	2.35E+01
OS-191	15.4 D	9.46E-01	7.30E-01	9.33E-01	4.77E-01	8.11E-01	1.04E+00	5.84E-02	1.10E+00
OS-191M	13.03 H	5.98E-02	4.57E-02	5.83E-02	2.62E-02	5.02E-02	7.24E-02	4.33E-04	7.28E-02
OS-193	30.0 H	8.62E-01	6.56E-01	8.16E-01	4.97E-01	7.40E-01	9.69E-01	2.48E+00	3.45E+00
IR-190	11.78 D	1.79E+01	1.37E+01	1.68E+01	1.08E+01	1.54E+01	2.04E+01	2.65E-01	2.07E+01
IR-190M	1.2 H	2.99E-04	3.52E-08	2.07E-05	9.06E-09	5.72E-04	6.88E-03	0.0	6.88E-03
IR-190M	3.2 H	6.15E-01	4.72E-01	6.01E-01	2.71E-01	5.13E-01	6.88E-01	1.94E-02	7.07E-01
IR-192	74.02 D	1.04E+01	7.87E+00	9.73E+00	6.27E+00	8.98E+00	1.18E+01	1.23E+00	1.30E+01
IR-193M	11.9 D	4.66E-03	3.37E-03	4.31E-03	1.97E-03	4.21E-03	1.15E-02	3.59E-03	1.51E-02
IR-194	19.15 H	1.17E+00	9.05E-01	1.11E+00	7.17E-01	1.01E+00	1.33E+00	6.66E+00	7.99E+00
IR-194M	171 D	2.99E+01	2.28E+01	2.79E+01	1.81E+01	2.56E+01	3.41E+01	5.70E-01	3.47E+01
PT-191	2.71 D	3.72E+00	2.84E+00	3.53E+00	2.06E+00	3.17E+00	4.18E+00	1.03E-01	4.29E+00
PT-193	50 Y	2.91E-04	6.70E-09	2.01E-05	2.93E-09	5.58E-04	6.70E-03	0.0	6.70E-03
PT-193M	4.33 D	1.39E-01	1.08E-01	1.37E-01	6.40E-02	1.18E-01	1.60E-01	3.00E-01	4.61E-01
PT-195M	4.02 D	9.24E-01	7.12E-01	9.10E-01	4.38E-01	7.83E-01	1.03E+00	2.77E-01	1.31E+00
PT-197	18.3 H	3.07E-01	2.38E-01	3.03E-01	1.59E-01	2.64E-01	3.39E-01	1.15E+00	1.49E+00
PT-197M	94.4 M	1.03E+00	7.86E-01	9.87E-01	5.58E-01	8.82E-01	1.16E+00	1.76E+00	2.92E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
AU-194	39.5 H	1.03E+01	1.02E+01	1.14E+01	1.35E+01	1.01E+01	9.22E+00	1.07E+01	9.88E+00	1.08E+01
AU-195	183 D	6.01E-01	6.44E-01	6.33E-01	1.31E+00	5.67E-01	5.08E-01	6.10E-01	5.42E-01	6.70E-01
AU-195M	30.6 S	1.84E+00	1.70E+00	1.83E+00	2.63E+00	1.65E+00	1.48E+00	1.75E+00	1.64E+00	1.76E+00
AU-196	6.183 D	4.33E+00	4.08E+00	4.43E+00	6.02E+00	3.94E+00	3.54E+00	4.17E+00	3.88E+00	4.22E+00
AU-198	2.696 D	3.79E+00	3.55E+00	3.92E+00	4.88E+00	3.47E+00	3.11E+00	3.67E+00	3.41E+00	3.67E+00
AU-199	3.139 D	8.15E-01	7.60E-01	8.06E-01	1.29E+00	7.37E-01	6.50E-01	7.84E-01	7.24E-01	7.77E-01
HG-197	64.14 H	4.96E-01	5.32E-01	5.26E-01	1.08E+00	4.70E-01	4.21E-01	5.03E-01	4.48E-01	5.51E-01
HG-197M	23.8 H	7.92E-01	7.64E-01	8.00E-01	1.37E+00	7.28E-01	6.41E-01	7.78E-01	7.08E-01	7.82E-01
HG-203	46.60 D	2.14E+00	1.97E+00	2.13E+00	2.97E+00	1.92E+00	1.72E+00	2.03E+00	1.90E+00	2.03E+00
TL-200	26.1 H	1.24E+01	1.21E+01	1.35E+01	1.59E+01	1.18E+01	1.08E+01	1.26E+01	1.16E+01	1.26E+01
TL-201	73.06 H	7.14E-01	7.35E-01	7.42E-01	1.42E+00	6.68E-01	5.95E-01	7.14E-01	6.42E-01	7.58E-01
TL-202	12.23 D	4.24E+00	4.05E+00	4.43E+00	5.81E+00	3.91E+00	3.52E+00	4.15E+00	3.83E+00	4.19E+00
TL-204	3.779 Y	8.03E-03	8.61E-03	8.52E-03	1.74E-02	7.63E-03	6.82E-03	8.16E-03	7.26E-03	8.92E-03
TL-207	4.77 M	2.12E-02	2.05E-02	2.31E-02	2.58E-02	2.03E-02	1.84E-02	2.16E-02	1.98E-02	2.15E-02
TL-208	3.053 M	3.53E+01	3.60E+01	3.99E+01	4.56E+01	3.59E+01	3.35E+01	3.81E+01	3.53E+01	3.87E+01
TL-209	2.20 M	2.01E+01	2.00E+01	2.24E+01	2.59E+01	1.98E+01	1.82E+01	2.11E+01	1.94E+01	2.11E+01
TL-210	1.30 M	2.72E+01	2.69E+01	3.01E+01	3.43E+01	2.67E+01	2.45E+01	2.84E+01	2.62E+01	2.84E+01
PB-203	52.02 H	2.72E+00	2.58E+00	2.75E+00	4.09E+00	2.47E+00	2.21E+00	2.62E+00	2.43E+00	2.66E+00
PB-204M	66.9 M	2.02E+01	1.95E+01	2.18E+01	2.50E+01	1.92E+01	1.74E+01	2.04E+01	1.88E+01	2.04E+01
PB-205	1.51E7 Y	5.53E-05	2.60E-11	4.56E-06	4.05E-03	7.38E-06	1.16E-07	9.84E-08	2.33E-05	9.08E-08
PB-209	3.253 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB-210	22.26 Y	8.17E-03	1.06E-02	7.67E-03	3.11E-02	6.88E-03	6.96E-03	8.66E-03	7.21E-03	1.26E-02
PB-211	36.1 M	4.86E-01	4.64E-01	5.18E-01	6.07E-01	4.56E-01	4.11E-01	4.84E-01	4.47E-01	4.84E-01
PB-212	10.643 H	1.34E+00	1.26E+00	1.34E+00	2.03E+00	1.21E+00	1.08E+00	1.28E+00	1.19E+00	1.29E+00
PB-214	26.8 M	2.31E+00	2.16E+00	2.35E+00	3.16E+00	2.10E+00	1.89E+00	2.23E+00	2.07E+00	2.23E+00
BI-206	6.243 D	3.15E+01	3.08E+01	3.45E+01	3.98E+01	3.04E+01	2.76E+01	3.23E+01	2.97E+01	3.23E+01
BI-207	33.4 Y	1.47E+01	1.43E+01	1.60E+01	1.85E+01	1.41E+01	1.28E+01	1.50E+01	1.38E+01	1.50E+01
BI-208	3.68E5 Y	2.83E+01	2.94E+01	3.25E+01	3.71E+01	2.94E+01	2.76E+01	3.12E+01	2.90E+01	3.18E+01
BI-210	5.013 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BI-211	2.13 M	4.43E-01	4.13E-01	4.51E-01	5.92E-01	4.01E-01	3.60E-01	4.25E-01	3.96E-01	4.26E-01
BI-212	60.55 M	1.76E+00	1.73E+00	1.94E+00	2.19E+00	1.71E+00	1.56E+00	1.82E+00	1.67E+00	1.82E+00
BI-213	45.65 M	1.30E+00	1.23E+00	1.36E+00	1.68E+00	1.20E+00	1.08E+00	1.27E+00	1.18E+00	1.27E+00
BI-214	19.9 M	1.48E+01	1.47E+01	1.65E+01	1.85E+01	1.46E+01	1.34E+01	1.55E+01	1.43E+01	1.56E+01
PO-209	102 Y	3.30E-02	3.17E-02	3.50E-02	4.32E-02	3.10E-02	2.80E-02	3.30E-02	3.04E-02	3.30E-02
PO-210	138.378 D	8.25E-05	7.96E-05	8.94E-05	1.01E-04	7.84E-05	7.10E-05	8.34E-05	7.67E-05	8.32E-05
PO-211	0.516 S	7.48E-02	7.20E-02	8.08E-02	9.20E-02	7.09E-02	6.41E-02	7.54E-02	6.94E-02	7.52E-02
PO-212	2.98E-7 S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PO-213	4.2E-6 S	2.95E-04	2.84E-04	3.19E-04	3.60E-04	2.80E-04	2.53E-04	2.97E-04	2.74E-04	2.97E-04
PO-214	1.637E-4 S	8.08E-04	7.79E-04	8.75E-04	9.87E-04	7.68E-04	6.94E-04	8.17E-04	7.51E-04	8.14E-04
PO-215	1.778E-3 S	1.39E-03	1.31E-03	1.45E-03	1.78E-03	1.28E-03	1.15E-03	1.36E-03	1.26E-03	1.36E-03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/ICUBIC Ml

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
AU-194	39.5 H	1.02E+01	1.09E+01	1.22E+01	1.08E+01	9.47E+00	8.76E+00	1.24E+01	9.87E+00	9.99E+00
AU-195	183 D	6.37E-01	7.03E-01	1.23E+00	4.45E-01	5.24E-01	4.30E-01	1.26E+00	5.83E-01	5.96E-01
AU-195M	30.6 S	1.70E+00	1.84E+00	2.47E+00	1.83E+00	1.52E+00	1.44E+00	2.53E+00	1.67E+00	1.67E+00
AU-196	6.183 D	4.06E+00	4.39E+00	5.62E+00	4.34E+00	3.73E+00	3.42E+00	5.73E+00	3.97E+00	3.98E+00
AU-198	2.696 D	3.53E+00	3.80E+00	4.54E+00	3.91E+00	3.33E+00	3.05E+00	4.61E+00	3.47E+00	3.49E+00
AU-199	3.139 D	7.58E-01	8.30E-01	1.24E+00	7.60E-01	6.55E-01	6.22E-01	1.27E+00	7.48E-01	7.44E-01
HG-197	64.14 H	5.27E-01	5.80E-01	1.02E+00	3.67E-01	4.33E-01	3.55E-01	1.05E+00	4.82E-01	4.93E-01
HG-197M	23.8 H	7.61E-01	8.36E-01	1.31E+00	6.99E-01	6.52E-01	5.96E-01	1.35E+00	7.39E-01	7.40E-01
HG-203	46.60 D	1.96E+00	2.13E+00	2.79E+00	2.15E+00	1.77E+00	1.68E+00	2.85E+00	1.94E+00	1.94E+00
TL-200	26.1 H	1.20E+01	1.28E+01	1.45E+01	1.28E+01	1.14E+01	1.03E+01	1.48E+01	1.17E+01	1.18E+01
TL-201	73.06 H	7.29E-01	8.03E-01	1.36E+00	5.68E-01	6.07E-01	5.21E-01	1.39E+00	6.83E-01	6.92E-01
TL-202	12.23 D	4.03E+00	4.34E+00	5.41E+00	4.26E+00	3.76E+00	3.39E+00	5.51E+00	3.92E+00	3.95E+00
TL-204	3.779 Y	8.53E-03	9.41E-03	1.65E-02	5.92E-03	7.00E-03	5.74E-03	1.70E-02	7.81E-03	7.98E-03
TL-207	4.77 M	2.04E-02	2.18E-02	2.34E-02	2.21E-02	1.98E-02	1.76E-02	2.39E-02	1.98E-02	2.02E-02
TL-208	3.053 M	3.61E+01	3.79E+01	3.95E+01	3.88E+01	3.26E+01	3.16E+01	4.02E+01	3.47E+01	3.57E+01
TL-209	2.20 M	2.00E+01	2.12E+01	2.32E+01	2.13E+01	1.87E+01	1.73E+01	2.36E+01	1.94E+01	1.95E+01
TL-210	1.30 M	2.69E+01	2.85E+01	3.07E+01	2.89E+01	2.52E+01	2.33E+01	3.12E+01	2.60E+01	2.64E+01
PB-203	52.02 H	2.57E+00	2.79E+00	3.86E+00	2.63E+00	2.29E+00	2.11E+00	3.94E+00	2.50E+00	2.51E+00
PB-204M	66.9 M	1.94E+01	2.07E+01	2.28E+01	2.10E+01	1.87E+01	1.67E+01	2.32E+01	1.88E+01	1.91E+01
PB-205	1.51E7 Y	6.40E-07	4.45E-05	2.83E-05	1.47E-05	2.21E-05	3.25E-05	7.23E-05	1.31E-05	1.20E-05
PB-209	3.253 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB-210	22.26 Y	9.51E-03	1.06E-02	1.91E-02	4.83E-03	7.69E-03	5.43E-03	1.96E-02	7.83E-03	8.40E-03
PB-211	36.1 M	4.61E-01	4.94E-01	5.58E-01	5.04E-01	4.44E-01	3.98E-01	5.68E-01	4.49E-01	4.56E-01
PB-212	10.643 H	1.25E+00	1.36E+00	1.92E+00	1.30E+00	1.10E+00	1.04E+00	1.96E+00	1.23E+00	1.23E+00
PB-214	26.8 M	2.15E+00	2.32E+00	2.96E+00	2.34E+00	1.98E+00	1.83E+00	3.01E+00	2.11E+00	2.12E+00
BI-206	6.243 D	3.07E+01	3.27E+01	3.61E+01	3.29E+01	2.92E+01	2.64E+01	3.67E+01	2.97E+01	3.02E+01
BI-207	33.4 Y	1.43E+01	1.52E+01	1.69E+01	1.52E+01	1.36E+01	1.22E+01	1.71E+01	1.38E+01	1.40E+01
BI-208	3.68E5 Y	2.96E+01	3.09E+01	3.17E+01	3.15E+01	2.62E+01	2.59E+01	3.23E+01	2.83E+01	2.92E+01
BI-210	5.013 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BI-211	2.13 M	4.11E-01	4.43E-01	5.54E-01	4.51E-01	3.80E-01	3.52E-01	5.64E-01	4.04E-01	4.05E-01
BI-212	60.55 M	1.72E+00	1.83E+00	1.98E+00	1.86E+00	1.65E+00	1.49E+00	2.01E+00	1.67E+00	1.69E+00
BI-213	45.65 M	1.22E+00	1.31E+00	1.56E+00	1.34E+00	1.16E+00	1.05E+00	1.58E+00	1.19E+00	1.20E+00
BI-214	19.9 M	1.47E+01	1.56E+01	1.65E+01	1.58E+01	1.38E+01	1.28E+01	1.68E+01	1.42E+01	1.44E+01
PO-209	102 Y	3.15E-02	3.38E-02	3.99E-02	3.35E-02	2.97E-02	2.68E-02	4.06E-02	3.06E-02	3.10E-02
PO-210	138.378 D	7.90E-05	8.44E-05	9.19E-05	8.57E-05	7.69E-05	6.82E-05	9.34E-05	7.67E-05	7.82E-05
PO-211	0.516 S	7.16E-02	7.65E-02	8.40E-02	7.78E-02	6.93E-02	6.17E-02	8.54E-02	6.95E-02	7.07E-02
PO-212	2.98E-7 S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PO-213	4.2E-6 S	2.82E-04	3.01E-04	3.29E-04	3.06E-04	2.74E-04	2.43E-04	3.34E-04	2.74E-04	2.79E-04
PO-214	1.637E-4 S	7.74E-04	8.26E-04	9.00E-04	8.39E-04	7.52E-04	6.67E-04	9.15E-04	7.51E-04	7.66E-04
PO-215	1.778E-3 S	1.30E-03	1.40E-03	1.65E-03	1.44E-03	1.24E-03	1.12E-03	1.68E-03	1.28E-03	1.29E-03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
AU-194	39.5 H	1.44E+01	1.13E+01	1.35E+01	9.05E+00	1.24E+01	1.64E+01	1.87E-01	1.66E+01
AU-195	183 D	1.08E+00	8.38E-01	1.07E+00	5.08E-01	9.17E-01	1.20E+00	1.07E-02	1.21E+00
AU-195M	30.6 S	2.53E+00	1.92E+00	2.41E+00	1.49E+00	2.21E+00	2.82E+00	3.11E-01	3.13E+00
AU-196	6.183 D	6.02E+00	4.55E+00	5.65E+00	3.54E+00	5.18E+00	6.77E+00	1.56E-01	6.93E+00
AU-198	2.696 D	5.12E+00	3.86E+00	4.76E+00	3.10E+00	4.41E+00	5.81E+00	2.26E+00	8.07E+00
AU-199	3.139 D	1.16E+00	8.95E-01	1.14E+00	6.61E-01	1.02E+00	1.26E+00	4.21E-01	1.69E+00
HG-197	64.14 H	8.91E-01	6.93E-01	8.82E-01	4.22E-01	7.55E-01	9.84E-01	2.05E-03	9.86E-01
HG-197M	23.8 H	1.20E+00	9.26E-01	1.18E+00	6.50E-01	1.04E+00	1.31E+00	6.50E-01	1.96E+00
HG-203	46.60 D	2.91E+00	2.20E+00	2.75E+00	1.73E+00	2.53E+00	3.24E+00	3.51E-01	3.59E+00
TL-200	26.1 H	1.71E+01	1.34E+01	1.62E+01	1.06E+01	1.47E+01	1.96E+01	1.72E-01	1.97E+01
TL-201	73.06 H	1.20E+00	9.33E-01	1.19E+00	5.99E-01	1.03E+00	1.32E+00	3.32E-02	1.35E+00
TL-202	12.23 D	5.94E+00	4.49E+00	5.55E+00	3.50E+00	5.09E+00	6.72E+00	9.34E-02	6.82E+00
TL-204	3.779 Y	1.44E-02	1.12E-02	1.43E-02	6.84E-03	1.22E-02	1.59E-02	1.71E+00	1.73E+00
TL-207	4.77 M	2.88E-02	2.30E-02	2.75E-02	1.78E-02	2.46E-02	3.33E-02	3.79E+00	3.82E+00
TL-208	3.053 M	4.95E+01	3.87E+01	4.51E+01	3.24E+01	4.27E+01	5.53E+01	4.59E+00	5.99E+01
TL-209	2.20 M	2.80E+01	2.20E+01	2.63E+01	1.78E+01	2.41E+01	3.19E+01	5.43E+00	3.73E+01
TL-210	1.30 M	3.75E+01	2.96E+01	3.52E+01	2.38E+01	3.22E+01	4.28E+01	5.52E+00	4.83E+01
PB-203	52.02 H	3.88E+00	2.96E+00	3.71E+00	2.22E+00	3.36E+00	4.31E+00	2.81E-01	4.60E+00
PB-204M	66.9 M	2.75E+01	2.17E+01	2.61E+01	1.69E+01	2.35E+01	3.17E+01	7.78E-01	3.24E+01
PB-205	1.51E7 Y	3.99E-04	1.42E-08	3.00E-05	3.73E-09	7.27E-04	8.49E-03	0.0	8.49E-03
PB-209	3.253 H	0.0	0.0	0.0	0.0	0.0	0.0	1.15E+00	1.15E+00
PB-210	22.26 Y	2.09E-02	1.40E-02	1.83E-02	6.44E-03	1.68E-02	3.52E-02	0.0	3.52E-02
PB-211	36.1 M	6.60E-01	5.13E-01	6.22E-01	4.03E-01	5.65E-01	7.57E-01	3.44E+00	4.19E+00
PB-212	10.643 H	1.89E+00	1.45E+00	1.82E+00	1.09E+00	1.65E+00	2.09E+00	6.68E-01	2.76E+00
PB-214	26.8 M	3.17E+00	2.40E+00	2.98E+00	1.89E+00	2.74E+00	3.56E+00	1.72E+00	5.28E+00
BI-206	6.243 D	4.34E+01	3.42E+01	4.10E+01	2.69E+01	3.72E+01	4.98E+01	6.55E-01	5.04E+01
BI-207	33.4 Y	2.02E+01	1.59E+01	1.91E+01	1.25E+01	1.73E+01	2.32E+01	8.59E-01	2.41E+01
BI-208	3.68E5 Y	4.01E+01	3.15E+01	3.64E+01	2.67E+01	3.47E+01	4.45E+01	3.59E-02	4.46E+01
BI-210	5.013 D	0.0	0.0	0.0	0.0	0.0	0.0	2.85E+00	2.85E+00
BI-211	2.13 M	6.02E-01	4.54E-01	5.63E-01	3.61E-01	5.20E-01	6.77E-01	6.22E-02	7.39E-01
BI-212	60.55 M	2.42E+00	1.91E+00	2.28E+00	1.52E+00	2.07E+00	2.79E+00	3.75E+00	6.54E+00
BI-213	45.65 M	1.77E+00	1.34E+00	1.65E+00	1.07E+00	1.52E+00	2.01E+00	3.28E+00	5.29E+00
BI-214	19.9 M	2.04E+01	1.62E+01	1.91E+01	1.31E+01	1.75E+01	2.34E+01	5.17E+00	2.85E+01
PO-209	102 Y	4.54E-02	3.57E-02	4.34E-02	2.74E-02	3.90E-02	5.18E-02	1.05E-03	5.28E-02
PO-210	138.378 D	1.12E-04	8.86E-05	1.06E-04	6.87E-05	9.57E-05	1.29E-04	0.0	1.29E-04
PO-211	0.516 S	1.02E-01	7.98E-02	9.61E-02	6.23E-02	8.69E-02	1.17E-01	0.0	1.17E-01
PO-212	2.98E-7 S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PO-213	4.2E-6 S	4.00E-04	3.16E-04	3.79E-04	2.45E-04	3.42E-04	4.62E-04	0.0	4.62E-04
PO-214	1.637E-4 S	1.10E-03	8.67E-04	1.04E-03	6.73E-04	9.37E-04	1.27E-03	0.0	1.27E-03
PO-215	1.778E-3 S	1.89E-03	1.42E-03	1.75E-03	1.14E-03	1.62E-03	2.14E-03	0.0	2.14E-03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
PO-216	0.146 S	1.41E-04	1.36E-04	1.52E-04	1.72E-04	1.34E-04	1.21E-04	1.42E-04	1.31E-04	1.42E-04
PO-218	3.05 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AT-211	7.214 H	3.03E-01	3.11E-01	3.18E-01	6.00E-01	2.87E-01	2.53E-01	3.07E-01	2.74E-01	3.19E-01
AT-217	0.0323 S	2.25E-03	2.14E-03	2.40E-03	2.79E-03	2.10E-03	1.89E-03	2.23E-03	2.06E-03	2.23E-03
RN-218	0.035 S	7.15E-03	6.83E-03	7.64E-03	8.87E-03	6.69E-03	6.03E-03	7.11E-03	6.55E-03	7.10E-03
RN-219	3.96 S	5.37E-01	4.98E-01	5.43E-01	7.21E-01	4.85E-01	4.35E-01	5.14E-01	4.80E-01	5.14E-01
RN-220	55.61 S	4.92E-03	4.68E-03	5.22E-03	6.15E-03	4.58E-03	4.12E-03	4.86E-03	4.48E-03	4.86E-03
RN-222	3.8235 D	3.65E-03	3.46E-03	3.86E-03	4.59E-03	3.38E-03	3.04E-03	3.59E-03	3.31E-03	3.59E-03
FR-221	4.8 M	2.87E-01	2.64E-01	2.82E-01	4.20E-01	2.56E-01	2.29E-01	2.72E-01	2.55E-01	2.72E-01
FR-223	21.8 M	3.86E-01	3.90E-01	3.93E-01	7.20E-01	3.52E-01	3.19E-01	3.82E-01	3.46E-01	4.13E-01
RA-222	38.0 S	8.65E-02	8.01E-02	8.74E-02	1.15E-01	7.80E-02	7.00E-02	8.26E-02	7.72E-02	8.26E-02
RA-223	11.434 D	1.21E+00	1.14E+00	1.22E+00	1.88E+00	1.10E+00	9.76E-01	1.17E+00	1.08E+00	1.17E+00
RA-224	3.62 D	9.39E-02	8.61E-02	9.25E-02	1.33E-01	8.38E-02	7.50E-02	8.87E-02	8.33E-02	8.87E-02
RA-225	14.8 D	3.83E-02	5.61E-02	3.15E-02	1.56E-01	2.91E-02	3.21E-02	4.32E-02	3.31E-02	7.27E-02
RA-226	1600 Y	6.27E-02	5.76E-02	6.14E-02	9.45E-02	5.61E-02	4.97E-02	5.96E-02	5.55E-02	5.90E-02
RA-228	5.75 Y	5.77E-11	1.04E-17	4.60E-12	4.52E-09	7.51E-12	9.69E-14	1.43E-13	2.37E-11	6.91E-14
AC-225	10.0 D	1.18E-01	1.13E-01	1.19E-01	2.07E-01	1.08E-01	9.50E-02	1.16E-01	1.06E-01	1.15E-01
AC-227	21.773 Y	1.06E-03	9.88E-04	1.05E-03	2.18E-03	9.68E-04	8.35E-04	1.04E-03	9.43E-04	1.00E-03
AC-228	6.13 H	8.92E+00	8.69E+00	9.74E+00	1.11E+01	8.57E+00	7.80E+00	9.12E+00	8.40E+00	9.10E+00
TH-226	30.9 M	7.00E-02	6.57E-02	6.97E-02	1.16E-01	6.38E-02	5.59E-02	6.84E-02	6.24E-02	6.71E-02
TH-227	18.718 D	9.60E-01	8.92E-01	9.54E-01	1.40E+00	8.61E-01	7.71E-01	9.14E-01	8.54E-01	9.22E-01
TH-228	1.9132 Y	1.69E-02	1.63E-02	1.70E-02	3.17E-02	1.55E-02	1.36E-02	1.65E-02	1.51E-02	1.66E-02
TH-229	7.34E3 Y	7.43E-01	7.18E-01	7.49E-01	1.33E+00	6.84E-01	5.99E-01	7.34E-01	6.64E-01	7.35E-01
TH-230	7.7E4 Y	2.97E-03	3.01E-03	3.02E-03	8.14E-03	2.72E-03	2.43E-03	2.91E-03	2.65E-03	3.12E-03
TH-231	25.52 H	9.09E-02	9.10E-02	9.15E-02	2.19E-01	8.34E-02	7.31E-02	9.20E-02	8.11E-02	9.59E-02
TH-232	1.405E10 Y	1.24E-03	1.27E-03	1.23E-03	4.94E-03	1.11E-03	9.97E-04	1.20E-03	1.10E-03	1.34E-03
TH-233	22.3 M	3.10E-01	2.96E-01	3.25E-01	4.26E-01	2.87E-01	2.58E-01	3.06E-01	2.82E-01	3.07E-01
TH-234	24.10 D	6.31E-02	6.44E-02	6.51E-02	1.29E-01	5.91E-02	5.20E-02	6.37E-02	5.67E-02	6.63E-02
PA-230	17.4 D	6.28E+00	6.08E+00	6.78E+00	8.07E+00	5.98E+00	5.40E+00	6.37E+00	5.84E+00	6.35E+00
PA-231	3.276E4 Y	2.76E-01	2.56E-01	2.75E-01	4.13E-01	2.47E-01	2.21E-01	2.64E-01	2.45E-01	2.66E-01
PA-233	27.0 D	1.97E+00	1.83E+00	1.99E+00	2.81E+00	1.78E+00	1.59E+00	1.89E+00	1.76E+00	1.89E+00
PA-234	6.70 H	1.88E+01	1.82E+01	2.04E+01	2.38E+01	1.80E+01	1.63E+01	1.91E+01	1.76E+01	1.91E+01
PA-234M	1.17 M	1.11E-01	1.07E-01	1.21E-01	1.37E-01	1.06E-01	9.63E-02	1.13E-01	1.04E-01	1.13E-01
U-230	20.8 D	9.22E-03	8.87E-03	9.23E-03	1.96E-02	8.37E-03	7.43E-03	8.89E-03	8.20E-03	9.12E-03
U-231	4.2 D	5.82E-01	5.66E-01	5.89E-01	1.11E+00	5.40E-01	4.68E-01	5.84E-01	5.21E-01	5.80E-01
U-232	72 Y	1.79E-03	1.73E-03	1.73E-03	7.27E-03	1.57E-03	1.39E-03	1.68E-03	1.56E-03	1.82E-03
U-233	1.592E5 Y	1.96E-03	1.81E-03	1.93E-03	4.55E-03	1.78E-03	1.53E-03	1.91E-03	1.74E-03	1.84E-03
U-234	2.445E5 Y	8.76E-04	8.34E-04	8.12E-04	5.11E-03	7.41E-04	6.56E-04	8.00E-04	7.54E-04	8.88E-04
U-235	7.038E8 Y	1.41E+00	1.29E+00	1.38E+00	2.13E+00	1.26E+00	1.11E+00	1.34E+00	1.25E+00	1.32E+00
U-236	2.3415E7 Y	6.24E-04	6.01E-04	5.93E-04	4.47E-03	5.33E-04	4.71E-04	5.58E-04	5.35E-04	6.29E-04

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/ICUBIC MI

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
PO-216	0.146 S	1.35E-04	1.44E-04	1.57E-04	1.46E-04	1.31E-04	1.16E-04	1.59E-04	1.31E-04	1.33E-04
PO-218	3.05 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AT-211	7.214 H	3.09E-01	3.41E-01	5.79E-01	2.39E-01	2.59E-01	2.22E-01	5.95E-01	2.91E-01	2.95E-01
AT-217	0.0323 S	2.13E-03	2.28E-03	2.57E-03	2.33E-03	2.06E-03	1.83E-03	2.61E-03	2.08E-03	2.11E-03
RN-218	0.035 S	6.78E-03	7.27E-03	8.17E-03	7.42E-03	6.57E-03	5.84E-03	8.30E-03	6.60E-03	6.70E-03
RN-219	3.96 S	4.96E-01	5.35E-01	6.76E-01	5.46E-01	4.56E-01	4.26E-01	6.89E-01	4.89E-01	4.89E-01
RN-220	55.61 S	4.65E-03	4.99E-03	5.68E-03	5.10E-03	4.48E-03	4.00E-03	5.77E-03	4.53E-03	4.59E-03
RN-222	3.8235 D	3.44E-03	3.69E-03	4.25E-03	3.78E-03	3.31E-03	2.96E-03	4.32E-03	3.36E-03	3.39E-03
FR-221	4.8 M	2.63E-01	2.86E-01	3.97E-01	2.82E-01	2.32E-01	2.23E-01	4.06E-01	2.61E-01	2.59E-01
FR-223	21.8 M	3.83E-01	4.21E-01	6.36E-01	3.37E-01	3.35E-01	2.91E-01	6.52E-01	3.61E-01	3.67E-01
RA-222	38.0 S	7.97E-02	8.60E-02	1.08E-01	8.85E-02	7.33E-02	6.87E-02	1.10E-01	7.87E-02	7.87E-02
RA-223	11.434 D	1.14E+00	1.24E+00	1.79E+00	1.13E+00	1.01E+00	9.28E-01	1.84E+00	1.11E+00	1.11E+00
RA-224	3.62 D	8.57E-02	9.31E-02	1.25E-01	9.38E-02	7.64E-02	7.34E-02	1.28E-01	8.51E-02	8.46E-02
RA-225	14.8 D	4.54E-02	5.06E-02	9.00E-02	2.11E-02	3.68E-02	2.47E-02	9.19E-02	3.57E-02	3.92E-02
RA-226	1600 Y	5.74E-02	6.27E-02	9.03E-02	6.03E-02	5.00E-02	4.83E-02	9.24E-02	5.71E-02	5.66E-02
RA-228	5.75 Y	5.60E-13	4.56E-11	2.74E-11	1.50E-11	2.26E-11	3.37E-11	7.40E-11	1.30E-11	1.18E-11
AC-225	10.0 D	1.12E-01	1.24E-01	1.95E-01	1.05E-01	9.67E-02	8.91E-02	2.00E-01	1.10E-01	1.10E-01
AC-227	21.773 Y	9.86E-04	1.10E-03	1.76E-03	9.27E-04	8.52E-04	7.97E-04	1.82E-03	9.80E-04	9.75E-04
AC-228	6.13 H	8.65E+00	9.22E+00	1.01E+01	9.32E+00	8.27E+00	7.46E+00	1.03E+01	8.39E+00	8.52E+00
TH-226	30.9 M	6.54E-02	7.21E-02	1.10E-01	6.40E-02	5.68E-02	5.33E-02	1.13E-01	6.47E-02	6.44E-02
TH-227	18.718 D	8.87E-01	9.64E-01	1.30E+00	9.48E-01	7.93E-01	7.49E-01	1.33E+00	8.74E-01	8.73E-01
TH-228	1.9132 Y	1.62E-02	1.78E-02	2.81E-02	1.48E-02	1.39E-02	1.27E-02	2.89E-02	1.57E-02	1.58E-02
TH-229	7.34E3 Y	7.14E-01	7.89E-01	1.27E+00	6.41E-01	6.10E-01	5.56E-01	1.30E+00	6.95E-01	6.96E-01
TH-230	7.7E4 Y	2.98E-03	3.32E-03	5.50E-03	2.37E-03	2.51E-03	2.17E-03	5.68E-03	2.80E-03	2.84E-03
TH-231	25.52 H	8.94E-02	1.01E-01	1.70E-01	7.17E-02	7.61E-02	6.63E-02	1.75E-01	8.56E-02	8.66E-02
TH-232	1.405E10 Y	1.25E-03	1.42E-03	2.40E-03	9.26E-04	1.05E-03	8.88E-04	2.50E-03	1.16E-03	1.18E-03
TH-233	22.3 M	2.94E-01	3.17E-01	3.91E-01	3.12E-01	2.76E-01	2.48E-01	3.99E-01	2.87E-01	2.89E-01
TH-234	24.10 D	6.38E-02	7.07E-02	1.21E-01	4.96E-02	5.34E-02	4.60E-02	1.24E-01	6.03E-02	6.10E-02
PA-230	17.4 D	6.04E+00	6.47E+00	7.39E+00	6.43E+00	5.78E+00	5.16E+00	7.53E+00	5.86E+00	5.96E+00
PA-231	3.276E4 Y	2.54E-01	2.76E-01	3.63E-01	2.75E-01	2.30E-01	2.16E-01	3.71E-01	2.50E-01	2.50E-01
PA-233	27.0 D	1.83E+00	1.98E+00	2.64E+00	1.95E+00	1.66E+00	1.55E+00	2.70E+00	1.80E+00	1.80E+00
PA-234	6.70 H	1.81E+01	1.94E+01	2.16E+01	1.95E+01	1.74E+01	1.56E+01	2.20E+01	1.76E+01	1.79E+01
PA-234M	1.17 M	1.07E-01	1.14E-01	1.25E-01	1.15E-01	1.03E-01	9.20E-02	1.27E-01	1.04E-01	1.06E-01
U-230	20.8 D	8.83E-03	9.75E-03	1.51E-02	8.13E-03	7.59E-03	6.93E-03	1.55E-02	8.54E-03	8.57E-03
U-231	4.2 D	5.63E-01	6.26E-01	1.04E+00	4.86E-01	4.79E-01	4.32E-01	1.07E+00	5.47E-01	5.49E-01
U-232	72 Y	1.71E-03	1.97E-03	3.19E-03	1.41E-03	1.48E-03	1.30E-03	3.33E-03	1.63E-03	1.65E-03
U-233	1.592E5 Y	1.81E-03	2.03E-03	3.24E-03	1.70E-03	1.57E-03	1.47E-03	3.36E-03	1.80E-03	1.79E-03
U-234	2.445E5 Y	8.18E-04	9.79E-04	1.60E-03	6.48E-04	7.20E-04	6.25E-04	1.69E-03	7.83E-04	7.98E-04
U-235	7.038E8 Y	1.29E+00	1.41E+00	2.04E+00	1.35E+00	1.12E+00	1.08E+00	2.09E+00	1.28E+00	1.27E+00
U-236	2.3415E7 Y	5.97E-04	7.25E-04	1.23E-03	4.16E-04	5.21E-04	4.35E-04	1.31E-03	5.61E-04	5.76E-04

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
PO-216	0.146 S	1.91E-04	1.51E-04	1.81E-04	1.17E-04	1.63E-04	2.21E-04	0.0	2.21E-04
PO-218	3.05 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AT-211	7.214 H	5.07E-01	3.96E-01	5.04E-01	2.55E-01	4.35E-01	5.54E-01	0.0	5.54E-01
AT-217	0.0323 S	3.05E-03	2.35E-03	2.85E-03	1.86E-03	2.61E-03	3.51E-03	0.0	3.51E-03
RN-218	0.035 S	9.71E-03	7.48E-03	9.08E-03	5.91E-03	8.29E-03	1.12E-02	0.0	1.12E-02
RN-219	3.96 S	7.27E-01	5.49E-01	6.83E-01	4.36E-01	6.30E-01	8.15E-01	3.45E-02	8.50E-01
RN-220	55.61 S	6.68E-03	5.09E-03	6.21E-03	4.06E-03	5.71E-03	7.66E-03	0.0	7.66E-03
RN-222	3.8235 D	4.96E-03	3.75E-03	4.59E-03	3.01E-03	4.24E-03	5.67E-03	0.0	5.67E-03
FR-221	4.8 M	3.94E-01	3.01E-01	3.80E-01	2.32E-01	3.46E-01	4.35E-01	3.91E-02	4.74E-01
FR-223	21.8 M	6.32E-01	4.71E-01	6.01E-01	3.14E-01	5.33E-01	7.33E-01	2.47E+00	3.20E+00
RA-222	38.0 S	1.17E-01	8.79E-02	1.09E-01	7.02E-02	1.01E-01	1.31E-01	4.40E-03	1.35E-01
RA-223	11.434 D	1.74E+00	1.33E+00	1.68E+00	9.86E-01	1.51E+00	1.92E+00	2.09E-01	2.13E+00
RA-224	3.62 D	1.27E-01	9.67E-02	1.22E-01	7.57E-02	1.11E-01	1.41E-01	1.12E-02	1.52E-01
RA-225	14.8 D	1.14E-01	7.17E-02	9.47E-02	2.87E-02	8.61E-02	1.61E-01	3.03E-01	4.64E-01
RA-226	1600 Y	8.68E-02	6.65E-02	8.44E-02	5.06E-02	7.64E-02	9.49E-02	1.36E-02	1.08E-01
RA-228	5.75 Y	4.18E-10	9.63E-15	2.88E-11	4.21E-15	8.02E-10	9.63E-09	0.0	9.63E-09
AC-225	10.0 D	1.78E-01	1.36E-01	1.75E-01	9.64E-02	1.55E-01	2.01E-01	3.14E-03	2.04E-01
AC-227	21.773 Y	1.62E-03	1.20E-03	1.55E-03	8.52E-04	1.44E-03	2.37E-03	0.0	2.37E-03
AC-228	6.13 H	1.22E+01	9.67E+00	1.16E+01	7.58E+00	1.05E+01	1.40E+01	2.76E+00	1.68E+01
TH-226	30.9 M	1.02E-01	7.79E-02	9.97E-02	5.68E-02	8.93E-02	1.13E-01	2.12E-02	1.35E-01
TH-227	18.718 D	1.33E+00	1.01E+00	1.27E+00	7.76E-01	1.16E+00	1.50E+00	5.97E-02	1.56E+00
TH-228	1.9132 Y	2.59E-02	1.97E-02	2.52E-02	1.38E-02	2.27E-02	3.26E-02	1.35E-03	3.39E-02
TH-229	7.34E3 Y	1.14E+00	8.78E-01	1.13E+00	6.08E-01	9.93E-01	1.27E+00	8.15E-02	1.35E+00
TH-230	7.7E4 Y	5.26E-03	3.80E-03	4.88E-03	2.44E-03	4.64E-03	9.84E-03	0.0	9.84E-03
TH-231	25.52 H	1.61E-01	1.14E-01	1.50E-01	7.33E-02	1.37E-01	2.28E-01	2.02E-01	4.31E-01
TH-232	1.405E10 Y	2.49E-03	1.63E-03	2.13E-03	9.86E-04	2.26E-03	6.83E-03	1.93E-04	7.03E-03
TH-233	22.3 M	4.33E-01	3.29E-01	4.07E-01	2.55E-01	3.72E-01	4.98E-01	2.97E+00	3.46E+00
TH-234	24.10 D	1.07E-01	8.18E-02	1.05E-01	5.24E-02	9.13E-02	1.20E-01	3.90E-02	1.59E-01
PA-230	17.4 D	8.66E+00	6.84E+00	8.26E+00	5.26E+00	7.42E+00	9.95E+00	1.24E-01	1.01E+01
PA-231	3.276E4 Y	3.86E-01	2.85E-01	3.60E-01	2.22E-01	3.34E-01	4.62E-01	3.21E-02	4.94E-01
PA-233	27.0 D	2.72E+00	2.06E+00	2.58E+00	1.60E+00	2.37E+00	3.05E+00	6.79E-01	3.73E+00
PA-234	6.70 H	2.58E+01	2.03E+01	2.45E+01	1.59E+01	2.21E+01	2.96E+01	2.21E+00	3.18E+01
PA-234M	1.17 M	1.51E-01	1.21E-01	1.45E-01	9.31E-02	1.29E-01	1.75E-01	6.83E+00	7.00E+00
U-230	20.8 D	1.45E-02	1.07E-02	1.37E-02	7.51E-03	1.28E-02	2.23E-02	6.87E-04	2.30E-02
U-231	4.2 D	9.21E-01	7.01E-01	9.07E-01	4.75E-01	7.99E-01	1.05E+00	8.14E-04	1.05E+00
U-232	72 Y	3.49E-03	2.17E-03	2.88E-03	1.39E-03	3.20E-03	1.03E-02	3.60E-04	1.06E-02
U-233	1.592E5 Y	3.06E-03	2.20E-03	2.87E-03	1.56E-03	2.76E-03	5.35E-03	1.74E-05	5.37E-03
U-234	2.445E5 Y	1.97E-03	1.06E-03	1.45E-03	6.46E-04	1.86E-03	7.80E-03	1.92E-04	7.99E-03
U-235	7.038E8 Y	1.95E+00	1.49E+00	1.90E+00	1.13E+00	1.72E+00	2.13E+00	2.21E-02	2.15E+00
U-236	2.3415E7 Y	1.54E-03	7.91E-04	1.08E-03	4.68E-04	1.50E-03	7.01E-03	1.25E-04	7.14E-03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/CUBIC M

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
U-237	6.75 D	1.17E+00	1.12E+00	1.17E+00	2.03E+00	1.07E+00	9.42E-01	1.14E+00	1.04E+00	1.16E+00
U-238	4.468E9 Y	5.22E-04	5.04E-04	4.92E-04	3.91E-03	4.43E-04	3.92E-04	4.64E-04	4.46E-04	5.30E-04
U-239	23.40 M	3.83E-01	3.99E-01	4.06E-01	7.38E-01	3.62E-01	3.24E-01	3.88E-01	3.48E-01	4.14E-01
U-240	14.1 H	3.26E-03	3.86E-03	2.60E-03	2.63E-02	2.38E-03	2.41E-03	3.07E-03	2.71E-03	4.72E-03
NP-235	396.1 D	1.57E-02	1.48E-02	1.56E-02	4.15E-02	1.43E-02	1.23E-02	1.54E-02	1.40E-02	1.51E-02
NP-236	1.15E6 Y	1.15E+00	1.08E+00	1.14E+00	1.99E+00	1.05E+00	9.14E-01	1.13E+00	1.02E+00	1.10E+00
NP-236M	22.5 H	4.48E-01	4.31E-01	4.59E-01	7.58E-01	4.17E-01	3.64E-01	4.49E-01	4.04E-01	4.42E-01
NP-237	2.14E6 Y	1.88E-01	1.86E-01	1.89E-01	3.90E-01	1.73E-01	1.52E-01	1.88E-01	1.68E-01	1.95E-01
NP-238	2.117 D	5.37E+00	5.24E+00	5.90E+00	6.57E+00	5.18E+00	4.71E+00	5.51E+00	5.07E+00	5.50E+00
NP-239	2.355 D	1.51E+00	1.41E+00	1.51E+00	2.38E+00	1.37E+00	1.21E+00	1.47E+00	1.35E+00	1.45E+00
NP-240	65 M	1.10E+01	1.06E+01	1.18E+01	1.39E+01	1.04E+01	9.43E+00	1.11E+01	1.02E+01	1.11E+01
NP-240M	7.4 M	3.13E+00	3.01E+00	3.37E+00	3.91E+00	2.96E+00	2.68E+00	3.14E+00	2.90E+00	3.14E+00
PU-236	2.851 Y	4.48E-04	3.70E-04	3.58E-04	5.54E-03	3.26E-04	2.82E-04	3.31E-04	3.59E-04	3.99E-04
PU-237	45.3 D	4.10E-01	3.96E-01	4.13E-01	7.61E-01	3.80E-01	3.29E-01	4.11E-01	3.67E-01	4.03E-01
PU-238	87.75 Y	2.60E-04	1.78E-04	1.69E-04	4.62E-03	1.58E-04	1.32E-04	1.55E-04	1.94E-04	1.99E-04
PU-239	24131 Y	5.37E-04	4.68E-04	5.00E-04	2.46E-03	4.64E-04	3.95E-04	4.92E-04	4.65E-04	4.76E-04
PU-240	6537 Y	2.64E-04	1.90E-04	1.78E-04	4.44E-03	1.65E-04	1.40E-04	1.64E-04	2.00E-04	2.13E-04
PU-241	14.4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU-242	3.758E5 Y	2.34E-04	1.73E-04	1.65E-04	3.71E-03	1.52E-04	1.29E-04	1.52E-04	1.79E-04	1.92E-04
PU-243	4.956 H	1.94E-01	1.95E-01	2.01E-01	3.71E-01	1.82E-01	1.60E-01	1.95E-01	1.75E-01	2.00E-01
PU-244	8.26E7 Y	1.23E-04	6.59E-05	5.25E-05	3.05E-03	5.28E-05	4.22E-05	5.24E-05	8.22E-05	8.27E-05
PU-245	10.57 H	3.96E+00	3.77E+00	4.18E+00	5.13E+00	3.70E+00	3.33E+00	3.93E+00	3.63E+00	3.92E+00
PU-246	10.85 D	8.66E-01	8.14E-01	8.42E-01	1.35E+00	7.67E-01	6.90E-01	8.25E-01	7.66E-01	8.51E-01
AM-241	432.2 Y	1.37E-01	1.57E-01	1.43E-01	3.61E-01	1.27E-01	1.18E-01	1.40E-01	1.23E-01	1.69E-01
AM-242	16.02 H	1.18E-01	1.12E-01	1.18E-01	2.22E-01	1.09E-01	9.39E-02	1.18E-01	1.05E-01	1.14E-01
AM-242M	152 Y	2.50E-03	2.12E-03	2.15E-03	1.75E-02	2.00E-03	1.71E-03	2.11E-03	2.10E-03	2.26E-03
AM-243	7.38E3 Y	4.03E-01	4.29E-01	4.25E-01	6.73E-01	3.81E-01	3.40E-01	4.09E-01	3.63E-01	4.44E-01
AM-244	10.1 H	7.68E+00	7.39E+00	8.29E+00	9.60E+00	7.29E+00	6.58E+00	7.75E+00	7.13E+00	7.72E+00
AM-245	122.4 M	2.85E-01	2.64E-01	2.82E-01	4.41E-01	2.57E-01	2.27E-01	2.75E-01	2.53E-01	2.70E-01
AM-246	25.0 M	9.44E+00	9.22E+00	1.04E+01	1.16E+01	9.11E+00	8.30E+00	9.70E+00	8.92E+00	9.67E+00
CM-242	163.2 D	2.84E-04	1.66E-04	1.70E-04	5.14E-03	1.61E-04	1.27E-04	1.47E-04	2.08E-04	1.86E-04
CM-243	28.5 Y	1.15E+00	1.07E+00	1.14E+00	1.79E+00	1.04E+00	9.19E-01	1.11E+00	1.02E+00	1.10E+00
CM-244	18.11 Y	2.22E-04	1.13E-04	1.18E-04	4.52E-03	1.14E-04	8.63E-05	9.93E-05	1.57E-04	1.30E-04
CM-245	8.5E3 Y	6.23E-01	5.87E-01	6.21E-01	1.08E+00	5.71E-01	4.95E-01	6.15E-01	5.56E-01	5.98E-01
CM-246	4.75E3 Y	1.60E-04	6.63E-05	5.95E-05	3.97E-03	6.19E-05	4.43E-05	5.32E-05	1.05E-04	8.63E-05
CM-247	1.56E7 Y	2.96E+00	2.77E+00	3.05E+00	3.85E+00	2.70E+00	2.43E+00	2.86E+00	2.66E+00	2.86E+00
CM-248	3.39E5 Y	1.75E-04	1.02E-04	1.02E-04	3.24E-03	9.73E-05	7.71E-05	8.94E-05	1.27E-04	1.16E-04
CM-249	64.15 M	1.78E-01	1.69E-01	1.89E-01	2.23E-01	1.66E-01	1.49E-01	1.76E-01	1.62E-01	1.76E-01
CM-250	6.9E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BK-249	320 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
U-237	6.75 D	1.11E+00	1.23E+00	1.90E+00	1.05E+00	9.61E-01	8.84E-01	1.95E+00	1.39E+00	1.09E+00
U-238	4.468E9 Y	5.00E-04	6.10E-04	1.03E-03	3.43E-04	4.37E-04	3.62E-04	1.10E-03	4.68E-04	4.82E-04
U-239	23.40 M	3.94E-01	4.32E-01	6.94E-01	3.13E-01	3.38E-01	2.84E-01	7.11E-01	3.67E-01	3.75E-01
U-240	14.1 H	3.35E-03	4.12E-03	7.06E-03	1.77E-03	2.91E-03	2.12E-03	7.47E-03	2.84E-03	3.07E-03
NP-235	396.1 D	1.48E-02	1.67E-02	2.75E-02	1.31E-02	1.28E-02	1.17E-02	2.85E-02	1.46E-02	1.46E-02
NP-236	1.15E6 Y	1.08E+00	1.19E+00	1.89E+00	1.01E+00	9.28E-01	8.65E-01	1.95E+00	1.07E+00	1.06E+00
NP-236M	22.5 H	4.29E-01	4.73E-01	7.22E-01	3.99E-01	3.78E-01	3.42E-01	7.42E-01	4.19E-01	4.21E-01
NP-237	2.14E6 Y	1.83E-01	2.05E-01	3.38E-01	1.55E-01	1.56E-01	1.39E-01	3.48E-01	1.77E-01	1.78E-01
NP-238	2.117 D	5.21E+00	5.54E+00	5.92E+00	5.61E+00	5.04E+00	4.50E+00	6.03E+00	5.04E+00	5.14E+00
NP-239	2.355 D	1.41E+00	1.54E+00	2.26E+00	1.42E+00	1.24E+00	1.16E+00	2.32E+00	1.39E+00	1.39E+00
NP-240	65 M	1.05E+01	1.13E+01	1.27E+01	1.14E+01	1.01E+01	9.07E+00	1.30E+01	1.03E+01	1.04E+01
NP-240M	7.4 M	2.99E+00	3.20E+00	3.57E+00	3.26E+00	2.88E+00	2.58E+00	3.63E+00	2.91E+00	2.95E+00
PU-236	2.851 Y	3.68E-04	5.17E-04	8.32E-04	2.59E-04	3.55E-04	3.01E-04	9.27E-04	3.62E-04	3.75E-04
PU-237	45.3 D	3.93E-01	4.37E-01	7.21E-01	3.46E-01	3.36E-01	3.06E-01	7.43E-01	3.85E-01	3.85E-01
PU-238	87.75 Y	1.77E-04	2.94E-04	4.45E-04	1.32E-04	1.94E-04	1.70E-04	5.22E-04	1.87E-04	1.95E-04
PU-239	24131 Y	4.68E-04	5.57E-04	8.72E-04	4.47E-04	4.22E-04	3.98E-04	9.22E-04	4.76E-04	4.75E-04
PU-240	6537 Y	1.88E-04	3.02E-04	4.64E-04	1.36E-04	2.00E-04	1.73E-04	5.38E-04	1.94E-04	2.03E-04
PU-241	14.4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU-242	3.758E5 Y	1.72E-04	2.68E-04	4.16E-04	1.24E-04	1.79E-04	1.54E-04	4.78E-04	1.76E-04	1.83E-04
PU-243	4.956 H	1.94E-01	2.14E-01	3.55E-01	1.59E-01	1.64E-01	1.43E-01	3.64E-01	1.85E-01	1.86E-01
PU-244	8.26E7 Y	6.09E-05	1.34E-04	1.83E-04	5.17E-05	8.36E-05	7.72E-05	2.32E-04	7.26E-05	7.68E-05
PU-245	10.57 H	3.75E+00	4.03E+00	4.74E+00	4.06E+00	3.55E+00	3.22E+00	4.82E+00	3.66E+00	3.70E+00
PU-246	10.85 D	8.01E-01	8.73E-01	1.23E+00	8.36E-01	7.02E-01	6.67E-01	1.26E+00	7.86E-01	7.85E-01
AM-241	432.2 Y	1.53E-01	1.69E-01	3.04E-01	9.15E-02	1.24E-01	9.49E-02	3.12E-01	1.34E-01	1.39E-01
AM-242	16.02 H	1.12E-01	1.25E-01	2.03E-01	1.01E-01	9.59E-02	8.83E-02	2.10E-01	1.10E-01	1.10E-01
AM-242M	152 Y	2.11E-03	2.72E-03	4.30E-03	1.83E-03	1.98E-03	1.78E-03	4.64E-03	2.13E-03	2.17E-03
AM-243	7.38E3 Y	4.24E-01	4.68E-01	8.18E-01	3.00E-01	3.49E-01	2.89E-01	8.40E-01	3.90E-01	3.98E-01
AM-244	10.1 H	7.35E+00	7.86E+00	8.75E+00	7.94E+00	7.10E+00	6.33E+00	8.90E+00	7.14E+00	7.27E+00
AM-245	122.4 M	2.63E-01	2.88E-01	4.19E-01	2.70E-01	2.32E-01	2.19E-01	4.29E-01	2.61E-01	2.60E-01
AM-246	25.0 M	9.18E+00	9.77E+00	1.05E+01	9.88E+00	8.85E+00	7.93E+00	1.07E+01	8.89E+00	9.05E+00
CM-242	163.2 D	1.72E-04	3.16E-04	4.64E-04	1.42E-04	2.05E-04	1.85E-04	5.53E-04	1.95E-04	2.03E-04
CM-243	28.5 Y	1.07E+00	1.17E+00	1.70E+00	1.09E+00	9.39E-01	8.86E-01	1.74E+00	1.06E+00	1.05E+00
CM-244	18.11 Y	1.18E-04	2.44E-04	3.46E-04	1.05E-04	1.55E-04	1.43E-04	4.24E-04	1.43E-04	1.49E-04
CM-245	8.5E3 Y	5.85E-01	6.48E-01	1.03E+00	5.50E-01	5.03E-01	4.69E-01	1.06E+00	5.79E-01	5.76E-01
CM-246	4.75E3 Y	6.57E-05	1.73E-04	2.28E-04	6.50E-05	1.06E-04	1.00E-04	2.96E-04	8.94E-05	9.46E-05
CM-247	1.56E7 Y	2.75E+00	2.97E+00	3.59E+00	3.05E+00	2.58E+00	2.37E+00	3.65E+00	2.71E+00	2.72E+00
CM-248	3.39E5 Y	1.05E-04	1.96E-04	2.87E-04	8.57E-05	1.27E-04	1.14E-04	3.43E-04	1.19E-04	1.24E-04
CM-249	64.15 M	1.68E-01	1.80E-01	2.06E-01	1.84E-01	1.62E-01	1.45E-01	2.09E-01	1.64E-01	1.66E-01
CM-250	6.9E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BK-249	320 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/CUBIC M

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
U-237	6.75 D	1.77E+00	1.35E+00	1.73E+00	9.50E-01	1.53E+00	1.98E+00	3.27E-01	2.30E+00
U-238	4.468E9 Y	1.32E-03	6.65E-04	9.12E-04	3.88E-04	1.29E-03	6.17E-03	8.98E-05	6.25E-03
U-239	23.40 M	6.43E-01	4.99E-01	6.30E-01	3.23E-01	5.46E-01	7.15E-01	2.92E+00	3.64E+00
U-240	14.1 H	1.05E-02	5.05E-03	7.07E-03	2.21E-03	9.16E-03	3.85E-02	5.47E-01	5.85E-01
NP-235	396.1 D	2.62E-02	1.83E-02	2.41E-02	1.25E-02	2.35E-02	4.96E-02	1.05E-06	4.96E-02
NP-236	1.15E6 Y	1.71E+00	1.31E+00	1.68E+00	9.31E-01	1.50E+00	1.91E+00	3.26E-01	2.23E+00
NP-236M	22.5 H	6.73E-01	5.19E-01	6.61E-01	3.67E-01	5.85E-01	7.47E-01	3.87E-01	1.13E+00
NP-237	2.14E6 Y	3.12E-01	2.30E-01	3.00E-01	1.53E-01	2.68E-01	3.84E-01	6.33E-03	3.90E-01
NP-238	2.117 D	7.32E+00	5.87E+00	7.00E+00	4.55E+00	6.27E+00	8.49E+00	1.49E+00	9.98E+00
NP-239	2.355 D	2.16E+00	1.65E+00	2.09E+00	1.22E+00	1.89E+00	2.39E+00	8.13E-01	3.20E+00
NP-240	65 M	1.50E+01	1.18E+01	1.43E+01	9.20E+00	1.29E+01	1.73E+01	1.95E+00	1.93E+01
NP-240M	7.4 M	4.26E+00	3.31E+00	4.00E+00	2.62E+00	3.65E+00	4.91E+00	4.73E+00	9.65E+00
PU-236	2.851 Y	1.49E-03	4.93E-04	7.64E-04	2.73E-04	1.50E-03	9.14E-03	0.0	9.14E-03
PU-237	45.3 D	6.37E-01	4.88E-01	6.31E-01	3.34E-01	5.55E-01	7.12E-01	4.23E-05	7.12E-01
PU-238	87.75 Y	1.07E-03	2.38E-04	4.27E-04	1.24E-04	1.12E-03	7.84E-03	0.0	7.84E-03
PU-239	24131 Y	1.02E-03	5.68E-04	7.79E-04	4.02E-04	9.74E-04	3.63E-03	0.0	3.63E-03
PU-240	6537 Y	1.06E-03	2.55E-04	4.43E-04	1.31E-04	1.10E-03	7.51E-03	0.0	7.51E-03
PU-241	14.4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU-242	3.758E5 Y	9.05E-04	2.32E-04	3.93E-04	1.22E-04	9.32E-04	6.25E-03	0.0	6.25E-03
PU-243	4.956 H	3.16E-01	2.44E-01	3.12E-01	1.62E-01	2.71E-01	3.48E-01	8.47E-01	1.19E+00
PU-244	8.26E7 Y	6.41E-04	8.66E-05	1.94E-04	3.77E-05	6.87E-04	5.28E-03	0.0	5.28E-03
PU-245	10.57 H	5.41E+00	4.19E+00	5.12E+00	3.28E+00	4.65E+00	6.17E+00	2.02E+00	8.19E+00
PU-246	10.85 D	1.24E+00	9.34E-01	1.18E+00	6.95E-01	1.08E+00	1.40E+00	9.09E-02	1.49E+00
AM-241	432.2 Y	2.82E-01	2.09E-01	2.69E-01	1.14E-01	2.33E-01	3.46E-01	1.11E-04	3.46E-01
AM-242	16.02 H	1.82E-01	1.38E-01	1.78E-01	9.55E-02	1.59E-01	2.15E-01	9.19E-01	1.13E+00
AM-242M	152 Y	6.29E-03	2.66E-03	3.97E-03	1.69E-03	5.83E-03	2.64E-02	0.0	2.64E-02
AM-243	7.38E3 Y	7.18E-01	5.56E-01	7.09E-01	3.41E-01	6.09E-01	8.03E-01	6.76E-05	8.03E-01
AM-244	10.1 H	1.05E+01	8.25E+00	9.95E+00	6.39E+00	8.97E+00	1.21E+01	9.75E-01	1.31E+01
AM-245	122.4 M	4.02E-01	3.06E-01	3.90E-01	2.30E-01	3.52E-01	4.45E-01	1.80E+00	2.24E+00
AM-246	25.0 M	1.29E+01	1.03E+01	1.23E+01	8.03E+00	1.10E+01	1.49E+01	3.26E+00	1.82E+01
CM-242	163.2 D	1.24E-03	2.23E-04	4.54E-04	1.20E-04	1.25E-03	8.54E-03	0.0	8.54E-03
CM-243	28.5 Y	1.63E+00	1.24E+00	1.58E+00	9.30E-01	1.43E+00	1.82E+00	3.32E-01	2.15E+00
CM-244	18.11 Y	1.05E-03	1.53E-04	3.47E-04	8.00E-05	1.07E-03	7.56E-03	0.0	7.56E-03
CM-245	8.5E3 Y	9.27E-01	7.10E-01	9.16E-01	5.04E-01	8.14E-01	1.03E+00	1.12E-01	1.14E+00
CM-246	4.75E3 Y	8.81E-04	8.83E-05	2.49E-04	3.83E-05	9.01E-04	6.69E-03	0.0	6.69E-03
CM-247	1.56E7 Y	4.00E+00	3.02E+00	3.73E+00	2.42E+00	3.45E+00	4.53E+00	6.35E-02	4.60E+00
CM-248	3.39E5 Y	7.81E-04	1.37E-04	2.83E-04	7.17E-05	7.84E-04	5.38E-03	0.0	5.38E-03
CM-249	64.15 M	2.41E-01	1.86E-01	2.26E-01	1.47E-01	2.07E-01	2.77E-01	1.82E+00	2.09E+00
CM-250	6.9E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BK-249	320 D	0.0	0.0	0.0	0.0	0.0	0.0	6.16E-03	6.16E-03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/CUBIC M

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
BK-250	3.222 H	8.63E+00	8.42E+00	9.49E+00	1.06E+01	8.33E+00	7.58E+00	8.87E+00	8.15E+00	8.84E+00
BK-251	57.0 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CF-248	333.5 D	1.47E-04	3.55E-05	4.02E-05	3.79E-03	4.55E-05	2.54E-05	2.84E-05	9.20E-05	5.43E-05
CF-249	350.6 Y	3.07E+00	2.86E+00	3.14E+00	4.04E+00	2.79E+00	2.51E+00	2.96E+00	2.75E+00	2.96E+00
CF-250	13.08 Y	3.13E-04	2.03E-04	2.22E-04	4.05E-03	2.08E-04	1.67E-04	1.96E-04	2.43E-04	2.19E-04
CF-251	9.0E2 Y	1.05E+00	9.81E-01	1.04E+00	1.71E+00	9.57E-01	8.38E-01	1.02E+00	9.38E-01	1.00E+00
CF-252	2.639 Y	2.45E-04	1.46E-04	1.58E-04	3.70E-03	1.49E-04	1.17E-04	1.36E-04	1.85E-04	1.62E-04
CF-253	17.81 D	2.56E-06	5.79E-07	8.34E-07	6.38E-05	8.99E-07	5.00E-07	5.25E-07	1.64E-06	7.95E-07
CF-254	60.5 D	7.77E-08	1.09E-07	6.88E-08	2.78E-07	6.25E-08	6.65E-08	8.59E-08	6.81E-08	1.35E-07
ES-253	20.467 D	2.83E-03	2.51E-03	2.69E-03	6.23E-03	2.46E-03	2.19E-03	2.60E-03	2.48E-03	2.59E-03
ES-254	275.7 D	2.41E-02	2.24E-02	2.30E-02	8.86E-02	2.08E-02	1.85E-02	2.19E-02	2.10E-02	2.36E-02
ES-254M	39.3 H	5.32E+00	5.09E+00	5.71E+00	6.59E+00	5.00E+00	4.51E+00	5.32E+00	4.90E+00	5.31E+00
ES-255	39.8 D	1.21E-05	3.48E-06	3.60E-06	2.88E-04	4.00E-06	2.43E-06	2.77E-06	7.75E-06	5.32E-06
FM-254	3.240 H	4.76E-04	3.32E-04	3.64E-04	4.74E-03	3.41E-04	2.76E-04	3.31E-04	3.83E-04	3.58E-04
FM-255	20.07 H	1.37E-02	1.31E-02	1.32E-02	5.81E-02	1.20E-02	1.05E-02	1.27E-02	1.20E-02	1.38E-02
FM-256	157.6 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
BK-250	3.222 H	8.38E+00	8.92E+00	9.52E+00	9.02E+00	8.10E+00	7.24E+00	9.68E+00	8.11E+00	8.27E+00
BK-251	57.0 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CF-248	333.5 D	4.13E-05	1.55E-04	1.93E-04	5.54E-05	9.18E-05	9.09E-05	2.60E-04	7.37E-05	7.84E-05
CF-249	350.6 Y	2.85E+00	3.07E+00	3.77E+00	3.15E+00	2.65E+00	2.45E+00	3.83E+00	2.80E+00	2.81E+00
CF-250	13.08 Y	2.13E-04	3.43E-04	5.20E-04	1.86E-04	2.33E-04	2.13E-04	5.96E-04	2.36E-04	2.42E-04
CF-251	9.0E2 Y	9.77E-01	1.08E+00	1.62E+00	9.75E-01	8.50E-01	8.05E-01	1.67E+00	9.69E-01	9.64E-01
CF-252	2.639 Y	1.54E-04	2.71E-04	4.05E-04	1.33E-04	1.80E-04	1.63E-04	4.73E-04	1.76E-04	1.82E-04
CF-253	17.81 D	7.54E-07	2.69E-06	3.38E-06	1.04E-06	1.60E-06	1.61E-06	4.52E-06	1.34E-06	1.40E-06
CF-254	60.5 D	9.24E-08	1.02E-07	1.84E-07	4.44E-08	7.43E-08	5.08E-08	1.87E-07	7.38E-08	8.02E-08
ES-253	20.467 D	2.51E-03	2.80E-03	3.86E-03	2.75E-03	2.24E-03	2.19E-03	3.99E-03	2.53E-03	2.51E-03
ES-254	275.7 D	2.23E-02	2.59E-02	3.89E-02	2.03E-02	2.00E-02	1.79E-02	4.06E-02	2.16E-02	2.19E-02
ES-254M	39.3 H	5.06E+00	5.42E+00	6.03E+00	5.52E+00	4.91E+00	4.36E+00	6.13E+00	4.92E+00	5.01E+00
ES-255	39.8 D	3.90E-06	1.30E-05	1.67E-05	4.67E-06	7.81E-06	7.49E-06	2.19E-05	6.35E-06	6.80E-06
FM-254	3.240 H	3.47E-04	5.19E-04	8.02E-04	3.09E-04	3.63E-04	3.30E-04	8.95E-04	3.78E-04	3.85E-04
FM-255	20.07 H	1.31E-02	1.55E-02	2.60E-02	1.01E-02	1.14E-02	9.79E-03	2.72E-02	1.25E-02	1.28E-02
FM-256	157.6 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER
IN MREM/YR PER MICROCURIE/(CUBIC M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
BK-250	3.222 H	1.18E+01	9.44E+00	1.13E+01	7.32E+00	1.01E+01	1.36E+01	1.88E+00	1.55E+01
BK-251	57.0 M	0.0	0.0	0.0	0.0	0.0	0.0	2.61E+00	2.61E+00
CF-248	333.5 D	8.79E-04	4.86E-05	2.24E-04	1.95E-05	8.64E-04	6.26E-03	0.0	6.26E-03
CF-249	350.6 Y	4.15E+00	3.13E+00	3.87E+00	2.50E+00	3.59E+00	4.70E+00	7.47E-02	4.78E+00
CF-250	13.08 Y	1.14E-03	2.66E-04	4.96E-04	1.64E-04	1.08E-03	6.45E-03	1.04E-05	6.46E-03
CF-251	9.0E2 Y	1.51E+00	1.16E+00	1.48E+00	8.52E-01	1.33E+00	1.67E+00	5.46E-01	2.22E+00
CF-252	2.639 Y	9.94E-04	1.94E-04	3.95E-04	1.13E-04	9.51E-04	5.95E-03	1.16E-05	5.96E-03
CF-253	17.81 D	1.47E-05	8.12E-07	3.75E-06	4.19E-07	1.46E-05	1.06E-04	2.02E-01	2.02E-01
CF-254	60.5 D	2.12E-07	1.42E-07	1.85E-07	6.09E-08	1.63E-07	2.74E-07	0.0	2.74E-07
ES-253	20.467 D	4.26E-03	2.86E-03	3.72E-03	2.21E-03	3.79E-03	7.82E-03	0.0	7.82E-03
ES-254	275.7 D	4.68E-02	2.71E-02	3.66E-02	1.84E-02	4.11E-02	1.20E-01	4.84E-05	1.20E-01
ES-254M	39.3 H	7.23E+00	5.62E+00	6.80E+00	4.40E+00	6.17E+00	8.36E+00	1.01E+00	9.37E+00
ES-255	39.8 D	7.06E-05	4.74E-06	1.93E-05	1.88E-06	6.73E-05	4.69E-04	1.73E-01	1.74E-01
FM-254	3.240 H	1.53E-03	4.26E-04	7.61E-04	2.73E-04	1.39E-03	7.23E-03	1.94E-04	7.43E-03
FM-255	20.07 H	2.96E-02	1.68E-02	2.33E-02	1.05E-02	2.57E-02	7.58E-02	1.48E-03	7.73E-02
FM-256	157.6 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

A.3 Dose-Rate Factors for Exposure to a Contaminated Ground Surface

The following tables give the dose-rate conversion factors for external exposure to photons and electrons from an infinite, uniformly contaminated ground surface. Exposure is assumed to occur at a height of 1 m above ground. Dose-reduction factors which can be applied to these results to take into account external exposure to a contaminated ground surface during indoor residence, the effects of ground roughness on external dose equivalents, and external exposure to contaminated shorelines are discussed in Sections 3.2.1, 3.2.2, and 3.2.4, respectively. Dose-rate factors for external exposure to radionuclides that are distributed with depth in soil are discussed in Section 3.3.

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
H-3	12.28 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE-7	53.44 D	4.44E+00	4.20E+00	4.67E+00	5.63E+00	4.10E+00	3.69E+00	4.35E+00	4.03E+00	4.35E+00
BE-10	1.6E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C-11	20.48 M	9.05E+01	8.59E+01	9.57E+01	1.14E+02	8.40E+01	7.55E+01	8.91E+01	8.23E+01	8.91E+01
C-14	5.73E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N-13	9.97 M	9.05E+01	8.60E+01	9.58E+01	1.14E+02	8.40E+01	7.56E+01	8.91E+01	8.23E+01	8.91E+01
N-16	7.13 S	2.71E+02	2.75E+02	2.91E+02	3.50E+02	2.70E+02	2.59E+02	2.89E+02	2.71E+02	3.07E+02
O-15	122.24 S	9.06E+01	8.60E+01	9.59E+01	1.14E+02	8.41E+01	7.56E+01	8.92E+01	8.24E+01	8.92E+01
F-18	109.74 M	8.77E+01	8.33E+01	9.28E+01	1.11E+02	8.14E+01	7.32E+01	8.64E+01	7.98E+01	8.64E+01
NA-22	2.602 Y	1.79E+02	1.74E+02	1.95E+02	2.23E+02	1.71E+02	1.56E+02	1.82E+02	1.68E+02	1.82E+02
NA-24	15.00 H	2.94E+02	3.01E+02	3.35E+02	3.78E+02	3.00E+02	2.81E+02	3.19E+02	2.96E+02	3.24E+02
MG-27	9.458 H	7.63E+01	7.39E+01	8.32E+01	9.31E+01	7.30E+01	6.63E+01	7.77E+01	7.14E+01	7.75E+01
MG-28	20.91 H	1.08E+02	1.06E+02	1.19E+02	1.38E+02	1.05E+02	9.60E+01	1.12E+02	1.03E+02	1.12E+02
AL-26	7.2E5 Y	2.10E+02	2.10E+02	2.35E+02	2.66E+02	2.07E+02	1.91E+02	2.21E+02	2.04E+02	2.21E+02
AL-28	2.240 M	1.31E+02	1.34E+02	1.50E+02	1.67E+02	1.34E+02	1.24E+02	1.42E+02	1.31E+02	1.43E+02
SI-31	157.3 M	6.77E-02	6.73E-02	7.60E-02	8.39E-02	6.66E-02	6.14E-02	7.10E-02	6.54E-02	7.08E-02
SI-32	3.3E2 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P-32	14.29 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P-33	25.4 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S-35	87.44 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL-36	3.01E5 Y	3.36E-07	6.05E-14	2.67E-08	2.63E-05	4.37E-08	5.63E-10	8.29E-10	1.38E-07	4.02E-10
CL-38	37.21 M	1.09E+02	1.12E+02	1.26E+02	1.40E+02	1.12E+02	1.05E+02	1.19E+02	1.10E+02	1.20E+02
AR-37	35.02 D	5.66E-05	1.02E-11	4.52E-06	4.44E-03	7.37E-06	9.51E-08	1.40E-07	2.32E-05	6.79E-08
AR-39	269 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AR-41	1.827 H	9.74E+01	9.70E+01	1.09E+02	1.21E+02	9.60E+01	8.86E+01	1.02E+02	9.42E+01	1.02E+02
K-40	1.277E9 Y	1.15E+01	1.15E+01	1.30E+01	1.44E+01	1.14E+01	1.06E+01	1.22E+01	1.12E+01	1.22E+01
K-42	12.36 H	2.02E+01	2.04E+01	2.30E+01	2.54E+01	2.02E+01	1.88E+01	2.16E+01	1.99E+01	2.16E+01
K-43	22.6 H	8.68E+01	8.21E+01	9.13E+01	1.10E+02	8.04E+01	7.24E+01	8.53E+01	7.90E+01	8.52E+01
CA-41	1.03E5 Y	1.48E-04	2.67E-11	1.18E-05	1.16E-02	1.93E-05	2.49E-07	3.67E-07	6.09E-05	1.78E-07
CA-45	162.7 D	2.30E-09	2.12E-13	2.47E-10	1.10E-07	3.75E-10	1.98E-11	3.01E-12	1.14E-09	2.86E-11
CA-47	4.536 D	8.17E+01	8.11E+01	9.14E+01	1.01E+02	8.02E+01	7.38E+01	8.54E+01	7.86E+01	8.52E+01
CA-49	8.719 H	2.12E+02	2.19E+02	2.41E+02	2.78E+02	2.19E+02	2.07E+02	2.33E+02	2.17E+02	2.40E+02
SC-44	3.927 H	1.78E+02	1.73E+02	1.93E+02	2.22E+02	1.70E+02	1.54E+02	1.80E+02	1.66E+02	1.80E+02
SC-46	83.80 D	1.66E+02	1.62E+02	1.83E+02	2.03E+02	1.60E+02	1.46E+02	1.71E+02	1.57E+02	1.70E+02
SC-46M	18.72 S	8.40E+00	7.74E+00	8.29E+00	1.33E+01	7.64E+00	6.65E+00	8.15E+00	7.47E+00	7.86E+00
SC-47	3.422 D	1.02E+01	9.38E+00	1.01E+01	1.57E+01	9.23E+00	8.10E+00	9.83E+00	9.09E+00	9.55E+00
SC-48	43.67 H	2.69E+02	2.64E+02	2.98E+02	3.31E+02	2.62E+02	2.39E+02	2.79E+02	2.56E+02	2.78E+02
SC-49	57.4 M	7.67E-02	7.84E-02	8.80E-02	9.74E-02	7.80E-02	7.25E-02	8.30E-02	7.66E-02	8.32E-02
TI-44	47.3 Y	1.12E+01	1.19E+01	1.18E+01	2.39E+01	1.06E+01	9.45E+00	1.13E+01	1.01E+01	1.23E+01
TI-45	3.08 H	7.72E+01	7.33E+01	8.17E+01	9.73E+01	7.17E+01	6.45E+01	7.61E+01	7.03E+01	7.61E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/ISQUARE M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
H-3	12.28 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE-7	53.44 D	4.18E+00	4.49E+00	5.22E+00	4.60E+00	3.99E+00	3.60E+00	5.31E+00	4.09E+00	4.12E+00
BE-10	1.6E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C-11	20.48 M	8.54E+01	9.17E+01	1.06E+02	9.38E+01	8.20E+01	7.35E+01	1.07E+02	8.34E+01	8.43E+01
C-14	5.73E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N-13	9.97 M	8.55E+01	9.17E+01	1.06E+02	9.39E+01	8.21E+01	7.35E+01	1.07E+02	8.34E+01	8.43E+01
N-16	7.13 S	2.73E+02	2.81E+02	2.95E+02	3.05E+02	2.46E+02	2.52E+02	2.98E+02	2.67E+02	2.79E+02
O-15	122.24 S	8.55E+01	9.18E+01	1.06E+02	9.39E+01	8.22E+01	7.36E+01	1.07E+02	8.35E+01	8.44E+01
F-18	109.74 M	8.28E+01	8.89E+01	1.02E+02	9.10E+01	7.95E+01	7.13E+01	1.04E+02	8.09E+01	8.17E+01
NA-22	2.602 Y	1.73E+02	1.85E+02	2.02E+02	1.87E+02	1.66E+02	1.50E+02	2.06E+02	1.68E+02	1.70E+02
NA-24	15.00 H	3.02E+02	3.16E+02	3.26E+02	3.23E+02	2.73E+02	2.65E+02	3.31E+02	2.90E+02	2.98E+02
MG-27	9.458 M	7.35E+01	7.84E+01	8.45E+01	7.95E+01	7.13E+01	6.35E+01	8.60E+01	7.12E+01	7.27E+01
MG-28	20.91 H	1.06E+02	1.13E+02	1.21E+02	1.13E+02	1.01E+02	9.14E+01	1.23E+02	1.02E+02	1.04E+02
AL-26	7.2E5 Y	2.10E+02	2.22E+02	2.38E+02	2.25E+02	1.95E+02	1.82E+02	2.42E+02	2.02E+02	2.05E+02
AL-28	2.240 M	1.35E+02	1.42E+02	1.46E+02	1.43E+02	1.24E+02	1.17E+02	1.48E+02	1.29E+02	1.31E+02
SI-31	157.3 M	6.72E-02	7.11E-02	7.48E-02	7.18E-02	6.40E-02	5.82E-02	7.61E-02	6.49E-02	6.57E-02
SI-32	3.3E2 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P-32	14.29 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P-33	25.4 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S-35	87.44 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL-36	3.01E5 Y	3.26E-09	2.65E-07	1.59E-07	8.70E-08	1.31E-07	1.96E-07	4.30E-07	7.57E-08	6.84E-08
CL-38	37.21 M	1.13E+02	1.19E+02	1.22E+02	1.20E+02	1.03E+02	9.84E+01	1.24E+02	1.08E+02	1.10E+02
AR-37	35.02 D	5.50E-07	4.48E-05	2.69E-05	1.47E-05	2.22E-05	3.31E-05	7.27E-05	1.28E-05	1.15E-05
AR-39	269 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AR-41	1.827 H	9.68E+01	1.02E+02	1.08E+02	1.03E+02	9.20E+01	8.39E+01	1.09E+02	9.35E+01	9.46E+01
K-40	1.277E9 Y	1.15E+01	1.22E+01	1.27E+01	1.23E+01	1.08E+01	1.00E+01	1.29E+01	1.11E+01	1.12E+01
K-42	12.36 H	2.04E+01	2.16E+01	2.25E+01	2.17E+01	1.91E+01	1.77E+01	2.28E+01	1.97E+01	1.99E+01
K-43	22.6 H	8.16E+01	8.77E+01	1.02E+02	8.99E+01	7.80E+01	7.04E+01	1.03E+02	7.98E+01	8.07E+01
CA-41	1.03E5 Y	1.44E-06	1.17E-04	7.04E-05	3.85E-05	5.81E-05	8.66E-05	1.90E-04	3.35E-05	3.02E-05
CA-45	162.7 D	7.88E-11	2.08E-09	1.80E-09	6.95E-10	1.07E-09	1.39E-09	3.39E-09	7.24E-10	7.12E-10
CA-47	4.536 D	8.08E+01	8.57E+01	9.05E+01	8.65E+01	7.70E+01	7.00E+01	9.20E+01	7.82E+01	7.91E+01
CA-49	8.719 M	2.20E+02	2.29E+02	2.35E+02	2.37E+02	1.94E+02	1.96E+02	2.38E+02	2.12E+02	2.20E+02
SC-44	3.927 H	1.72E+02	1.83E+02	2.02E+02	1.86E+02	1.65E+02	1.48E+02	2.05E+02	1.67E+02	1.69E+02
SC-46	83.80 D	1.61E+02	1.72E+02	1.83E+02	1.74E+02	1.56E+02	1.39E+02	1.86E+02	1.56E+02	1.59E+02
SC-46M	18.72 S	7.73E+00	8.51E+00	1.29E+01	7.80E+00	6.69E+00	6.42E+00	1.33E+01	7.72E+00	7.65E+00
SC-47	3.422 D	9.36E+00	1.03E+01	1.52E+01	9.73E+00	8.13E+00	7.87E+00	1.56E+01	9.36E+00	9.27E+00
SC-48	43.67 H	2.63E+02	2.80E+02	2.97E+02	2.83E+02	2.53E+02	2.28E+02	3.02E+02	2.55E+02	2.59E+02
SC-49	57.4 M	7.86E-02	8.28E-02	8.54E-02	8.35E-02	7.24E-02	6.83E-02	8.69E-02	7.55E-02	7.65E-02
TI-44	47.3 Y	1.18E+01	1.30E+01	2.28E+01	8.28E+00	9.70E+00	8.00E+00	2.34E+01	1.08E+01	1.11E+01
TI-45	3.08 H	7.29E+01	7.83E+01	9.01E+01	8.01E+01	7.00E+01	6.27E+01	9.15E+01	7.12E+01	7.19E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
H-3	12.28 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE-7	53.44 D	6.03E+00	4.55E+00	5.58E+00	3.66E+00	5.17E+00	6.88E+00	0.0	6.88E+00
BE-10	1.6E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	5.07E+01	5.07E+01
C-11	20.48 M	1.23E+02	9.31E+01	1.14E+02	7.46E+01	1.05E+02	1.41E+02	3.15E+02	4.56E+02
C-14	5.73E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N-13	9.97 M	1.23E+02	9.32E+01	1.14E+02	7.47E+01	1.05E+02	1.41E+02	4.63E+02	6.03E+02
N-16	7.13 S	3.76E+02	3.05E+02	3.40E+02	2.42E+02	3.25E+02	3.94E+02	2.86E+03	3.26E+03
O-15	122.24 S	1.23E+02	9.33E+01	1.14E+02	7.47E+01	1.05E+02	1.41E+02	7.68E+02	9.09E+02
F-18	109.74 M	1.19E+02	9.03E+01	1.10E+02	7.24E+01	1.02E+02	1.36E+02	1.03E+02	2.39E+02
NA-22	2.602 Y	2.45E+02	1.91E+02	2.30E+02	1.53E+02	2.10E+02	2.81E+02	4.98E+01	3.31E+02
NA-24	15.00 H	4.12E+02	3.26E+02	3.78E+02	2.71E+02	3.56E+02	4.62E+02	5.41E+02	1.00E+03
MG-27	9.458 M	1.04E+02	8.26E+01	9.89E+01	6.40E+01	8.87E+01	1.20E+02	7.23E+02	8.43E+02
MG-28	20.91 H	1.50E+02	1.18E+02	1.41E+02	9.31E+01	1.28E+02	1.74E+02	1.06E+01	1.84E+02
AL-26	7.2E5 Y	2.91E+02	2.27E+02	2.70E+02	1.87E+02	2.50E+02	3.32E+02	3.75E+02	7.07E+02
AL-28	2.240 M	1.84E+02	1.45E+02	1.71E+02	1.21E+02	1.58E+02	2.09E+02	1.34E+03	1.55E+03
SI-31	157.3 M	9.34E-02	7.48E-02	8.87E-02	5.95E-02	8.01E-02	1.07E-01	5.93E+02	5.94E+02
SI-32	3.3E2 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P-32	14.29 D	0.0	0.0	0.0	0.0	0.0	0.0	7.15E+02	7.15E+02
P-33	25.4 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S-35	87.44 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL-36	3.01E5 Y	2.43E-06	5.60E-11	1.68E-07	2.45E-11	4.66E-06	5.60E-05	1.26E+02	1.26E+02
CL-38	37.21 M	1.54E+02	1.21E+02	1.42E+02	1.02E+02	1.33E+02	1.74E+02	1.62E+03	1.79E+03
AR-37	35.02 D	4.11E-04	9.46E-09	2.83E-05	4.13E-09	7.87E-04	9.46E-03	0.0	9.46E-03
AR-39	269 Y	0.0	0.0	0.0	0.0	0.0	0.0	7.66E+01	7.66E+01
AR-41	1.827 H	1.35E+02	1.08E+02	1.28E+02	8.58E+01	1.15E+02	1.55E+02	4.25E+02	5.80E+02
K-40	1.277E9 Y	1.59E+01	1.27E+01	1.50E+01	1.03E+01	1.37E+01	1.82E+01	4.32E+02	4.50E+02
K-42	12.36 H	2.82E+01	2.24E+01	2.65E+01	1.83E+01	2.42E+01	3.22E+01	1.55E+03	1.58E+03
K-43	22.6 H	1.18E+02	8.99E+01	1.10E+02	7.14E+01	1.01E+02	1.34E+02	2.06E+02	3.40E+02
CA-41	1.03E5 Y	1.08E-03	2.48E-08	7.42E-05	1.08E-08	2.06E-03	2.48E-02	0.0	2.48E-02
CA-45	162.7 D	1.60E-08	7.26E-12	2.02E-09	2.70E-13	2.14E-08	2.06E-07	0.0	2.06E-07
CA-47	4.536 D	1.13E+02	8.99E+01	1.07E+02	7.16E+01	9.65E+01	1.29E+02	2.48E+02	3.77E+02
CA-49	8.719 M	3.00E+02	2.36E+02	2.69E+02	1.97E+02	2.59E+02	3.28E+02	9.21E+02	1.25E+03
SC-44	3.927 H	2.43E+02	1.90E+02	2.29E+02	1.51E+02	2.08E+02	2.79E+02	6.10E+02	8.89E+02
SC-46	83.80 D	2.27E+02	1.81E+02	2.16E+02	1.41E+02	1.94E+02	2.62E+02	2.07E-02	2.62E+02
SC-46M	18.72 S	1.18E+01	9.14E+00	1.17E+01	6.80E+00	1.05E+01	1.27E+01	0.0	1.27E+01
SC-47	3.422 D	1.42E+01	1.09E+01	1.39E+01	8.27E+00	1.26E+01	1.53E+01	2.49E+01	4.02E+01
SC-48	43.67 H	3.68E+02	2.95E+02	3.51E+02	2.31E+02	3.16E+02	4.25E+02	8.66E+01	5.11E+02
SC-49	57.4 M	1.07E-01	8.52E-02	1.00E-01	7.09E-02	9.25E-02	1.22E-01	8.66E+02	8.66E+02
TI-44	47.3 Y	1.99E+01	1.55E+01	1.97E+01	9.48E+00	1.69E+01	2.16E+01	0.0	2.16E+01
TI-45	3.08 H	1.05E+02	7.95E+01	9.73E+01	6.37E+01	8.98E+01	1.20E+02	3.31E+02	4.52E+02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/ISQUARE M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
TI-51	5.752 M	3.36E+01	3.13E+01	3.44E+01	4.40E+01	3.06E+01	2.76E+01	3.24E+01	3.03E+01	3.24E+01
V-48	15.971 D	2.36E+02	2.31E+02	2.60E+02	2.92E+02	2.28E+02	2.09E+02	2.43E+02	2.24E+02	2.42E+02
V-49	330 D	5.42E-04	9.77E-11	4.32E-05	4.25E-02	7.06E-05	9.10E-07	1.34E-06	2.22E-04	6.50E-07
V-52	3.75 M	1.07E+02	1.07E+02	1.21E+02	1.33E+02	1.06E+02	9.84E+01	1.13E+02	1.04E+02	1.13E+02
CR-49	42.09 M	9.28E+01	8.83E+01	9.78E+01	1.22E+02	8.61E+01	7.72E+01	9.15E+01	8.43E+01	9.15E+01
CR-51	27.704 D	2.92E+00	2.69E+00	2.94E+00	3.93E+00	2.63E+00	2.36E+00	2.78E+00	2.60E+00	2.78E+00
MN-52	5.591 D	2.80E+02	2.74E+02	3.08E+02	3.46E+02	2.71E+02	2.47E+02	2.88E+02	2.65E+02	2.88E+02
MN-52M	21.4 M	1.93E+02	1.89E+02	2.12E+02	2.42E+02	1.86E+02	1.70E+02	1.98E+02	1.82E+02	1.98E+02
MN-53	3.7E6 Y	1.14E-03	2.05E-10	9.08E-05	8.92E-02	1.48E-04	1.91E-06	2.82E-06	4.67E-04	1.36E-06
MN-54	312.7 D	7.24E+01	7.00E+01	7.87E+01	8.85E+01	6.90E+01	6.25E+01	7.34E+01	6.75E+01	7.32E+01
MN-56	2.5785 H	1.35E+02	1.35E+02	1.51E+02	1.69E+02	1.34E+02	1.23E+02	1.42E+02	1.31E+02	1.42E+02
MN-57	1.47 M	6.18E+00	5.92E+00	6.56E+00	8.79E+00	5.82E+00	5.23E+00	6.20E+00	5.71E+00	6.14E+00
FE-52	8.275 H	6.62E+01	6.23E+01	6.88E+01	8.72E+01	6.09E+01	5.45E+01	6.47E+01	5.98E+01	6.43E+01
FE-55	2.7 Y	1.59E-03	2.87E-10	1.27E-04	1.25E-01	2.07E-04	2.67E-06	3.94E-06	6.53E-04	1.91E-06
FE-59	44.63 D	9.32E+01	9.22E+01	1.04E+02	1.15E+02	9.12E+01	8.37E+01	9.71E+01	8.94E+01	9.68E+01
CO-56	78.76 D	2.80E+02	2.79E+02	3.12E+02	3.51E+02	2.76E+02	2.55E+02	2.94E+02	2.71E+02	2.96E+02
CO-57	270.9 D	1.11E+01	1.04E+01	1.11E+01	1.90E+01	1.02E+01	8.82E+00	1.09E+01	9.92E+00	1.05E+01
CO-58	70.80 D	8.49E+01	8.18E+01	9.18E+01	1.04E+02	8.05E+01	7.28E+01	8.57E+01	7.88E+01	8.54E+01
CO-58M	9.15 H	2.69E-03	1.63E-04	2.66E-04	2.00E-01	4.00E-04	7.32E-05	2.10E-04	1.16E-03	3.18E-04
CO-60	5.271 Y	1.92E+02	1.91E+02	2.16E+02	2.38E+02	1.89E+02	1.74E+02	2.01E+02	1.85E+02	2.01E+02
CO-60M	10.47 M	3.35E-01	3.45E-01	3.68E-01	7.32E-01	3.24E-01	2.99E-01	3.47E-01	3.18E-01	3.66E-01
CO-61	1.650 H	7.24E+00	7.59E+00	7.78E+00	1.35E+01	6.89E+00	6.24E+00	7.37E+00	6.64E+00	7.95E+00
NI-56	6.10 D	1.49E+02	1.43E+02	1.59E+02	1.89E+02	1.41E+02	1.27E+02	1.50E+02	1.38E+02	1.49E+02
NI-57	36.08 H	1.49E+02	1.48E+02	1.66E+02	1.88E+02	1.46E+02	1.34E+02	1.55E+02	1.43E+02	1.55E+02
NI-59	7.5E4 Y	3.00E-03	5.40E-10	2.39E-04	2.35E-01	3.90E-04	5.03E-06	7.40E-06	1.23E-03	3.59E-06
NI-63	100.1 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NI-65	2.520 H	4.17E+01	4.16E+01	4.68E+01	5.21E+01	4.12E+01	3.80E+01	4.38E+01	4.04E+01	4.38E+01
CU-61	3.408 H	7.25E+01	6.90E+01	7.69E+01	9.17E+01	6.75E+01	6.08E+01	7.17E+01	6.62E+01	7.17E+01
CU-62	9.74 M	8.93E+01	8.48E+01	9.45E+01	1.13E+02	8.29E+01	7.46E+01	8.80E+01	8.12E+01	8.79E+01
CU-64	12.701 H	1.67E+01	1.59E+01	1.77E+01	2.12E+01	1.55E+01	1.40E+01	1.65E+01	1.52E+01	1.65E+01
CU-67	61.88 D	1.06E+01	9.85E+00	1.05E+01	1.65E+01	9.58E+00	8.47E+00	1.02E+01	9.45E+00	1.01E+01
ZN-62	9.26 H	3.98E+01	3.80E+01	4.20E+01	5.19E+01	3.69E+01	3.33E+01	3.93E+01	3.62E+01	3.97E+01
ZN-65	244.4 D	4.66E+01	4.58E+01	5.16E+01	5.77E+01	4.53E+01	4.15E+01	4.83E+01	4.44E+01	4.81E+01
ZN-69	55.6 M	5.44E-04	5.10E-04	5.64E-04	6.99E-04	4.98E-04	4.47E-04	5.27E-04	4.90E-04	5.28E-04
ZN-69M	13.76 H	3.75E+01	3.53E+01	3.91E+01	4.80E+01	3.44E+01	3.10E+01	3.65E+01	3.39E+01	3.65E+01
GA-66	9.40 H	1.88E+02	1.87E+02	2.08E+02	2.39E+02	1.86E+02	1.72E+02	1.97E+02	1.83E+02	2.00E+02
GA-67	3.261 D	1.33E+01	1.24E+01	1.33E+01	2.05E+01	1.20E+01	1.07E+01	1.28E+01	1.18E+01	1.27E+01
GA-68	68.0 M	8.39E+01	7.98E+01	8.90E+01	1.06E+02	7.80E+01	7.02E+01	8.28E+01	7.65E+01	8.28E+01
GA-72	14.1 H	2.14E+02	2.14E+02	2.39E+02	2.69E+02	2.12E+02	1.95E+02	2.26E+02	2.08E+02	2.26E+02
GE-68	288 D	8.38E-03	1.91E-09	6.72E-04	6.50E-01	1.10E-03	1.47E-05	1.98E-05	3.46E-03	1.07E-05

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/ISQUARE M

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
TI-51	5.752 M	3.12E+01	3.36E+01	4.10E+01	3.46E+01	2.90E+01	2.69E+01	4.17E+01	3.07E+01	3.08E+01
V-48	15.971 D	2.30E+02	2.45E+02	2.63E+02	2.48E+02	2.21E+02	1.99E+02	2.68E+02	2.23E+02	2.26E+02
V-49	330 D	5.27E-06	4.29E-04	2.57E-04	1.41E-04	2.12E-04	3.17E-04	6.96E-04	1.22E-04	1.10E-04
V-52	3.75 M	1.07E+02	1.13E+02	1.18E+02	1.14E+02	1.01E+02	9.30E+01	1.20E+02	1.03E+02	1.04E+02
CR-49	42.09 M	8.78E+01	9.45E+01	1.13E+02	9.46E+01	8.34E+01	7.48E+01	1.15E+02	8.57E+01	8.65E+01
CR-51	27.704 D	2.68E+00	2.89E+00	3.62E+00	2.99E+00	2.46E+00	2.32E+00	3.69E+00	2.65E+00	2.65E+00
MN-52	5.591 D	2.73E+02	2.90E+02	3.12E+02	2.94E+02	2.62E+02	2.36E+02	3.17E+02	2.65E+02	2.68E+02
MN-52M	21.4 M	1.88E+02	2.00E+02	2.19E+02	2.03E+02	1.79E+02	1.63E+02	2.22E+02	1.83E+02	1.84E+02
MN-53	3.7E6 Y	1.11E-05	9.00E-04	5.40E-04	2.95E-04	4.46E-04	6.65E-04	1.46E-03	2.57E-04	2.32E-04
MN-54	312.7 D	6.95E+01	7.42E+01	8.05E+01	7.53E+01	6.76E+01	6.00E+01	8.18E+01	6.74E+01	6.88E+01
MN-56	2.5785 H	1.35E+02	1.43E+02	1.51E+02	1.45E+02	1.27E+02	1.17E+02	1.53E+02	1.30E+02	1.32E+02
MN-57	1.47 H	5.89E+00	6.35E+00	7.68E+00	6.25E+00	5.53E+00	5.03E+00	7.85E+00	5.76E+00	5.82E+00
FE-52	8.275 H	6.20E+01	6.68E+01	8.16E+01	6.74E+01	5.82E+01	5.31E+01	8.31E+01	6.08E+01	6.12E+01
FE-55	2.7 Y	1.55E-05	1.26E-03	7.56E-04	4.13E-04	6.23E-04	9.30E-04	2.04E-03	3.59E-04	3.24E-04
FE-59	44.63 D	9.18E+01	9.74E+01	1.03E+02	9.83E+01	8.79E+01	7.95E+01	1.05E+02	8.88E+01	9.01E+01
CO-56	78.76 D	2.78E+02	2.94E+02	3.11E+02	2.99E+02	2.61E+02	2.42E+02	3.16E+02	2.69E+02	2.74E+02
CO-57	270.9 D	1.04E+01	1.15E+01	1.80E+01	9.99E+00	8.94E+00	8.43E+00	1.85E+01	1.03E+01	1.02E+01
CO-58	70.80 D	8.13E+01	8.69E+01	9.53E+01	8.83E+01	7.89E+01	7.01E+01	9.69E+01	7.89E+01	8.04E+01
CO-58M	9.15 H	1.34E-04	2.20E-03	1.51E-03	7.27E-04	1.13E-03	1.58E-03	3.59E-03	6.84E-04	6.45E-04
CO-60	5.271 Y	1.91E+02	2.02E+02	2.12E+02	2.04E+02	1.82E+02	1.65E+02	2.16E+02	1.84E+02	1.86E+02
CO-60M	10.47 M	3.42E-01	3.69E-01	4.65E-01	3.20E-01	3.12E-01	2.74E-01	4.77E-01	3.22E-01	3.28E-01
CO-61	1.650 H	7.51E+00	8.18E+00	1.25E+01	6.09E+00	6.55E+00	5.47E+00	1.28E+01	6.95E+00	7.13E+00
NI-56	6.10 D	1.42E+02	1.52E+02	1.74E+02	1.54E+02	1.35E+02	1.22E+02	1.77E+02	1.39E+02	1.40E+02
NI-57	36.08 H	1.48E+02	1.57E+02	1.68E+02	1.58E+02	1.39E+02	1.28E+02	1.71E+02	1.43E+02	1.44E+02
NI-59	7.5E4 Y	2.91E-05	2.37E-03	1.42E-03	7.77E-04	1.17E-03	1.75E-03	3.84E-03	6.75E-04	6.10E-04
NI-63	100.1 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NI-65	2.520 H	4.15E+01	4.40E+01	4.64E+01	4.44E+01	3.93E+01	3.60E+01	4.71E+01	4.01E+01	4.06E+01
CU-61	3.408 H	6.86E+01	7.36E+01	8.46E+01	7.52E+01	6.58E+01	5.91E+01	8.60E+01	6.70E+01	6.77E+01
CU-62	9.74 M	8.43E+01	9.05E+01	1.04E+02	9.26E+01	8.10E+01	7.26E+01	1.06E+02	8.23E+01	8.32E+01
CU-64	12.701 H	1.58E+01	1.69E+01	1.95E+01	1.73E+01	1.52E+01	1.36E+01	1.98E+01	1.54E+01	1.56E+01
CU-67	61.88 D	9.81E+00	1.07E+01	1.57E+01	1.01E+01	8.54E+00	8.17E+00	1.61E+01	9.73E+00	9.67E+00
ZN-62	9.26 H	3.77E+01	4.05E+01	4.69E+01	4.09E+01	3.61E+01	3.22E+01	4.77E+01	3.66E+01	3.71E+01
ZN-65	244.4 D	4.56E+01	4.85E+01	5.15E+01	4.90E+01	4.39E+01	3.95E+01	5.24E+01	4.41E+01	4.49E+01
ZN-69	55.6 M	5.07E-04	5.46E-04	6.51E-04	5.62E-04	4.79E-04	4.38E-04	6.62E-04	4.98E-04	5.01E-04
ZN-69M	13.76 H	3.51E+01	3.77E+01	4.46E+01	3.88E+01	3.33E+01	3.03E+01	4.53E+01	3.44E+01	3.46E+01
GA-66	9.40 H	1.87E+02	1.98E+02	2.11E+02	2.03E+02	1.73E+02	1.64E+02	2.14E+02	1.81E+02	1.86E+02
GA-67	3.261 D	1.23E+01	1.35E+01	1.89E+01	1.27E+01	1.10E+01	1.03E+01	1.94E+01	1.22E+01	1.21E+01
GA-68	68.0 M	7.93E+01	8.51E+01	9.77E+01	8.71E+01	7.62E+01	6.83E+01	9.93E+01	7.74E+01	7.83E+01
GA-72	14.1 H	2.14E+02	2.26E+02	2.38E+02	2.30E+02	2.00E+02	1.85E+02	2.42E+02	2.06E+02	2.10E+02
GE-68	288 D	8.40E-05	6.65E-03	4.03E-03	2.18E-03	3.29E-03	4.90E-03	1.08E-02	1.91E-03	1.73E-03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/1 SQUARE M

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
TI-51	5.752 M	4.53E+01	3.45E+01	4.26E+01	2.74E+01	3.92E+01	5.11E+01	9.15E+02	9.66E+02
V-48	15.971 D	3.23E+02	2.56E+02	3.06E+02	2.03E+02	2.77E+02	3.72E+02	8.18E+01	4.54E+02
V-49	330 D	3.93E-03	9.05E-08	2.71E-04	3.95E-08	7.54E-03	9.05E-02	0.0	9.05E-02
V-52	3.75 M	1.48E+02	1.18E+02	1.40E+02	9.56E+01	1.27E+02	1.70E+02	1.15E+03	1.32E+03
CR-49	42.09 M	1.28E+02	9.70E+01	1.19E+02	7.65E+01	1.10E+02	1.45E+02	6.07E+02	7.52E+02
CR-51	27.704 D	3.92E+00	2.95E+00	3.67E+00	2.36E+00	3.41E+00	4.53E+00	0.0	4.53E+00
MN-52	5.591 D	3.83E+02	3.04E+02	3.63E+02	2.40E+02	3.28E+02	4.41E+02	2.39E+01	4.65E+02
MN-52M	21.4 M	2.65E+02	2.07E+02	2.48E+02	1.66E+02	2.27E+02	3.03E+02	1.23E+03	1.53E+03
MN-53	3.7E6 Y	8.26E-03	1.90E-07	5.69E-04	8.31E-01	1.58E-02	1.90E-01	0.0	1.90E-01
MN-54	312.7 D	9.83E+01	7.80E+01	9.36E+01	6.05E+01	8.41E+01	1.14E+02	0.0	1.14E+02
MN-56	2.5785 H	1.87E+02	1.48E+02	1.75E+02	1.19E+02	1.60E+02	2.14E+02	8.46E+02	1.06E+03
MN-57	1.47 M	8.62E+00	6.64E+00	8.15E+00	5.16E+00	7.46E+00	1.06E+01	1.18E+03	1.19E+03
FE-52	8.275 H	9.02E+01	6.85E+01	8.46E+01	5.43E+01	7.78E+01	1.02E+02	1.35E+02	2.37E+02
FE-55	2.7 Y	1.16E-02	2.66E-07	7.96E-04	1.16E-07	2.21E-02	2.66E-01	0.0	2.66E-01
FE-59	44.63 D	1.28E+02	1.03E+02	1.22E+02	8.10E+01	1.10E+02	1.48E+02	7.00E+00	1.55E+02
CO-56	78.76 D	3.86E+02	3.06E+02	3.61E+02	2.47E+02	3.32E+02	4.40E+02	1.21E+02	5.61E+02
CO-57	270.9 D	1.62E+01	1.24E+01	1.60E+01	9.01E+00	1.43E+01	1.85E+01	0.0	1.85E+01
CO-58	70.80 D	1.15E+02	9.07E+01	1.09E+02	7.08E+01	9.87E+01	1.33E+02	3.65E+00	1.37E+02
CO-58M	9.15 H	1.92E-02	1.51E-04	1.67E-03	2.88E-05	3.58E-02	4.26E-01	0.0	4.26E-01
CO-60	5.271 Y	2.65E+02	2.12E+02	2.52E+02	1.69E+02	2.27E+02	3.05E+02	0.0	3.05E+02
CO-60M	10.47 M	5.36E-01	4.05E-01	4.94E-01	2.90E-01	4.73E-01	1.04E+00	1.41E+00	2.44E+00
CO-61	1.650 H	1.21E+01	9.45E+00	1.18E+01	6.13E+00	1.02E+01	1.36E+01	4.24E+02	4.37E+02
NI-56	6.10 D	2.03E+02	1.59E+02	1.93E+02	1.24E+02	1.74E+02	2.32E+02	0.0	2.32E+02
NI-57	36.08 H	2.06E+02	1.62E+02	1.93E+02	1.31E+02	1.77E+02	2.36E+02	1.00E+02	3.36E+02
NI-59	7.5E4 Y	2.17E-02	5.00E-07	1.50E-03	2.18E-07	4.16E-02	5.00E-01	0.0	5.00E-01
NI-63	100.1 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NI-65	2.520 H	5.77E+01	4.60E+01	5.45E+01	3.69E+01	4.95E+01	6.61E+01	6.18E+02	6.84E+02
CU-61	3.408 H	9.87E+01	7.52E+01	9.18E+01	6.00E+01	8.45E+01	1.13E+02	2.90E+02	4.03E+02
CU-62	9.74 M	1.21E+02	9.19E+01	1.12E+02	7.37E+01	1.04E+02	1.39E+02	1.39E+03	1.53E+03
CU-64	12.701 H	2.27E+01	1.72E+01	2.11E+01	1.38E+01	1.95E+01	2.63E+01	4.37E+01	7.00E+01
CU-67	61.88 D	1.50E+01	1.15E+01	1.46E+01	8.60E+00	1.31E+01	1.64E+01	1.35E+01	2.99E+01
ZN-62	9.26 H	5.49E+01	4.16E+01	5.09E+01	3.27E+01	4.68E+01	6.40E+01	7.98E+00	7.20E+01
ZN-65	244.4 D	6.39E+01	5.12E+01	6.09E+01	4.01E+01	5.48E+01	7.45E+01	0.0	7.45E+01
ZN-69	55.6 M	7.35E-04	5.54E-04	6.82E-04	4.45E-04	6.32E-04	8.34E-04	2.31E+02	2.31E+02
ZN-69M	13.76 H	5.08E+01	3.83E+01	4.71E+01	3.08E+01	4.36E+01	5.78E+01	2.40E+01	8.18E+01
GA-66	9.40 H	2.60E+02	2.04E+02	2.40E+02	1.66E+02	2.24E+02	2.93E+02	1.03E+03	1.32E+03
GA-67	3.261 D	1.87E+01	1.42E+01	1.80E+01	1.08E+01	1.64E+01	2.20E+01	0.0	2.20E+01
GA-68	68.0 M	1.14E+02	8.66E+01	1.06E+02	6.93E+01	9.76E+01	1.31E+02	7.84E+02	9.14E+02
GA-72	14.1 H	2.96E+02	2.34E+02	2.76E+02	1.90E+02	2.54E+02	3.37E+02	4.46E+02	7.84E+02
GE-68	288 D	6.08E-02	1.52E-06	4.25E-03	6.04E-07	1.15E-01	1.38E+00	0.0	1.38E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
GE-71	11.8 D	8.48E-03	1.93E-09	6.80E-04	6.57E-01	1.11E-03	1.48E-05	2.00E-05	3.50E-03	1.08E-05
GE-77	11.30 H	9.23E+01	8.79E+01	9.74E+01	1.19E+02	8.63E+01	7.81E+01	9.17E+01	8.50E+01	9.15E+01
AS-72	26.0 H	1.55E+02	1.49E+02	1.66E+02	1.93E+02	1.46E+02	1.32E+02	1.55E+02	1.43E+02	1.55E+02
AS-73	80.30 D	3.93E-01	4.40E-01	3.80E-01	2.80E+00	3.38E-01	3.17E-01	3.79E-01	3.41E-01	4.90E-01
AS-74	17.77 D	6.78E+01	6.45E+01	7.21E+01	8.49E+01	6.32E+01	5.69E+01	6.71E+01	6.19E+01	6.71E+01
AS-76	26.32 H	3.66E+01	3.53E+01	3.95E+01	4.56E+01	3.47E+01	3.15E+01	3.69E+01	3.40E+01	3.68E+01
AS-77	38.8 H	7.89E-01	7.33E-01	7.98E-01	1.07E+00	7.15E-01	6.40E-01	7.57E-01	7.07E-01	7.56E-01
SE-73	7.15 H	9.74E+01	9.24E+01	1.02E+02	1.29E+02	8.98E+01	8.08E+01	9.53E+01	8.81E+01	9.58E+01
SE-75	119.78 D	3.59E+01	3.31E+01	3.58E+01	5.24E+01	3.24E+01	2.88E+01	3.44E+01	3.20E+01	3.40E+01
SE-79	6.5E4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BR-77	57.04 H	2.83E+01	2.66E+01	2.94E+01	3.79E+01	2.60E+01	2.34E+01	2.76E+01	2.56E+01	2.76E+01
BR-80	17.4 H	6.60E+00	6.29E+00	7.04E+00	8.29E+00	6.17E+00	5.56E+00	6.55E+00	6.04E+00	6.55E+00
BR-80M	4.42 H	5.66E-01	7.83E-01	4.03E-01	4.49E+00	3.80E-01	4.24E-01	5.98E-01	4.68E-01	1.07E+00
BR-82	35.30 H	2.23E+02	2.16E+02	2.42E+02	2.75E+02	2.13E+02	1.93E+02	2.26E+02	2.08E+02	2.26E+02
BR-83	2.39 H	6.61E-01	6.28E-01	7.00E-01	8.30E-01	6.14E-01	5.53E-01	6.52E-01	6.02E-01	6.52E-01
BR-84	31.80 M	1.33E+02	1.34E+02	1.49E+02	1.69E+02	1.33E+02	1.24E+02	1.42E+02	1.31E+02	1.43E+02
BR-85	172 S	5.58E+00	5.44E+00	6.12E+00	6.85E+00	5.37E+00	4.89E+00	5.72E+00	5.26E+00	5.70E+00
KR-79	35.04 H	2.25E+01	2.12E+01	2.35E+01	3.04E+01	2.08E+01	1.87E+01	2.20E+01	2.04E+01	2.20E+01
KR-81	2.1E5 Y	9.54E-01	8.49E-01	9.23E-01	2.68E+00	8.32E-01	7.42E-01	8.75E-01	8.36E-01	8.75E-01
KR-83M	1.83 H	1.29E-02	8.08E-04	1.74E-03	5.77E-01	2.43E-03	5.42E-04	6.59E-04	6.71E-03	1.51E-03
KR-85	10.72 Y	1.98E-01	1.88E-01	2.10E-01	2.49E-01	1.84E-01	1.65E-01	1.95E-01	1.80E-01	1.95E-01
KR-85M	4.48 H	1.48E+01	1.36E+01	1.46E+01	2.23E+01	1.33E+01	1.17E+01	1.42E+01	1.31E+01	1.39E+01
KR-87	76.3 H	6.20E+01	6.17E+01	6.86E+01	7.96E+01	6.13E+01	5.65E+01	6.50E+01	6.03E+01	6.56E+01
KR-88	2.84 H	1.46E+02	1.49E+02	1.66E+02	1.88E+02	1.49E+02	1.38E+02	1.58E+02	1.46E+02	1.59E+02
KR-89	3.16 M	1.40E+02	1.40E+02	1.56E+02	1.78E+02	1.39E+02	1.28E+02	1.47E+02	1.36E+02	1.49E+02
KR-90	32.32 S	1.01E+02	9.97E+01	1.12E+02	1.29E+02	9.86E+01	9.03E+01	1.05E+02	9.67E+01	1.05E+02
RB-81	4.58 H	5.45E+01	5.12E+01	5.65E+01	7.28E+01	5.00E+01	4.49E+01	5.31E+01	4.92E+01	5.30E+01
RB-82	1.25 M	9.68E+01	9.21E+01	1.03E+02	1.22E+02	9.01E+01	8.11E+01	9.56E+01	8.83E+01	9.56E+01
RB-83	86.2 D	4.42E+01	4.20E+01	4.68E+01	5.72E+01	4.11E+01	3.70E+01	4.36E+01	4.03E+01	4.36E+01
RB-84	32.9 D	7.76E+01	7.47E+01	8.38E+01	9.69E+01	7.36E+01	6.66E+01	7.82E+01	7.20E+01	7.81E+01
RB-86	18.66 D	7.68E+00	7.53E+00	8.49E+00	9.40E+00	7.45E+00	6.81E+00	7.94E+00	7.30E+00	7.91E+00
RB-87	4.73E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RB-88	17.8 H	4.81E+01	4.87E+01	5.46E+01	6.09E+01	4.85E+01	4.50E+01	5.16E+01	4.76E+01	5.18E+01
RB-89	15.44 M	1.60E+02	1.60E+02	1.80E+02	2.00E+02	1.59E+02	1.47E+02	1.69E+02	1.56E+02	1.70E+02
RB-90	157 S	1.46E+02	1.48E+02	1.63E+02	1.89E+02	1.48E+02	1.39E+02	1.57E+02	1.46E+02	1.62E+02
RB-90M	258 S	2.43E+02	2.44E+02	2.72E+02	3.08E+02	2.43E+02	2.26E+02	2.58E+02	2.39E+02	2.62E+02
SR-82	25.0 D	5.25E-02	8.59E-05	6.69E-03	1.99E+00	9.76E-03	1.01E-03	1.89E-04	2.83E-02	2.16E-03
SR-85	64.84 D	4.53E+01	4.30E+01	4.79E+01	5.91E+01	4.20E+01	3.78E+01	4.46E+01	4.12E+01	4.46E+01
SR-85M	67.66 M	2.02E+01	1.84E+01	1.98E+01	2.89E+01	1.80E+01	1.61E+01	1.90E+01	1.79E+01	1.89E+01
SR-87M	2.805 H	2.91E+01	2.72E+01	3.00E+01	3.81E+01	2.65E+01	2.39E+01	2.81E+01	2.62E+01	2.81E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/ISQUARE M

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	PED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
GE-71	11.8 D	8.50E-05	6.73E-03	4.08E-03	2.21E-03	3.33E-03	4.96E-03	1.09E-02	1.93E-03	1.75E-03
GE-77	11.30 H	8.76E+01	9.39E+01	1.10E+02	9.55E+01	8.21E+01	7.56E+01	1.12E+02	8.56E+01	8.63E+01
AS-72	26.0 H	1.48E+02	1.58E+02	1.76E+02	1.61E+02	1.42E+02	1.27E+02	1.79E+02	1.44E+02	1.46E+02
AS-73	80.30 D	4.21E-01	4.88E-01	8.60E-01	2.41E-01	3.50E-01	2.66E-01	9.01E-01	3.66E-01	3.85E-01
AS-74	17.77 D	6.42E+01	6.88E+01	7.81E+01	7.03E+01	6.19E+01	5.52E+01	7.93E+01	6.25E+01	6.34E+01
AS-76	26.32 H	3.51E+01	3.75E+01	4.16E+01	3.82E+01	3.37E+01	3.03E+01	4.23E+01	3.41E+01	3.46E+01
AS-77	38.8 H	7.29E-01	7.89E-01	1.01E+00	7.99E-01	6.68E-01	6.26E-01	1.03E+00	7.20E-01	7.20E-01
SE-73	7.15 H	9.19E+01	9.89E+01	1.19E+02	9.94E+01	8.68E+01	7.83E+01	1.21E+02	8.96E+01	9.04E+01
SE-75	119.78 D	3.30E+01	3.59E+01	4.88E+01	3.55E+01	2.96E+01	2.81E+01	4.98E+01	3.27E+01	3.26E+01
SE-79	6.5E4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BR-77	57.04 H	2.65E+01	2.85E+01	3.40E+01	2.91E+01	2.50E+01	2.28E+01	3.47E+01	2.60E+01	2.62E+01
BR-80	17.4 H	6.26E+00	6.70E+00	7.56E+00	6.85E+00	6.05E+00	5.39E+00	7.69E+00	6.09E+00	6.18E+00
BR-80M	4.42 H	6.12E-01	7.32E-01	1.25E+00	2.92E-01	5.24E-01	3.59E-01	1.31E+00	4.90E-01	5.42E-01
BR-82	35.30 H	2.15E+02	2.29E+02	2.50E+02	2.33E+02	2.07E+02	1.85E+02	2.54E+02	2.08E+02	2.12E+02
BR-83	2.39 H	6.24E-01	6.70E-01	7.67E-01	6.85E-01	6.01E-01	5.37E-01	7.79E-01	6.09E-01	6.16E-01
BR-84	31.80 H	1.34E+02	1.41E+02	1.47E+02	1.44E+02	1.23E+02	1.17E+02	1.50E+02	1.29E+02	1.33E+02
BR-85	172 S	5.41E+00	5.76E+00	6.20E+00	5.85E+00	5.22E+00	4.67E+00	6.31E+00	5.24E+00	5.34E+00
KR-79	35.04 H	2.11E+01	2.27E+01	2.69E+01	2.32E+01	2.00E+01	1.82E+01	2.74E+01	2.07E+01	2.09E+01
KR-81	2.1E5 Y	8.46E-01	9.40E-01	1.20E+00	9.49E-01	7.78E-01	7.47E-01	1.25E+00	8.47E-01	8.43E-01
KR-83M	1.83 H	1.12E-03	1.20E-02	1.14E-02	4.06E-03	6.42E-03	7.82E-03	1.97E-02	4.50E-03	4.54E-03
KR-85	10.72 Y	1.87E-01	2.01E-01	2.31E-01	2.05E-01	1.80E-01	1.61E-01	2.34E-01	1.82E-01	1.84E-01
KR-85M	4.48 H	1.35E+01	1.48E+01	2.13E+01	1.42E+01	1.19E+01	1.14E+01	2.18E+01	1.35E+01	1.34E+01
KR-87	76.3 M	6.18E+01	6.54E+01	7.06E+01	6.68E+01	5.67E+01	5.38E+01	7.18E+01	5.97E+01	6.09E+01
KR-88	2.84 H	1.50E+02	1.57E+02	1.64E+02	1.60E+02	1.36E+02	1.30E+02	1.67E+02	1.44E+02	1.47E+02
KR-89	3.16 H	1.40E+02	1.48E+02	1.58E+02	1.51E+02	1.29E+02	1.22E+02	1.60E+02	1.35E+02	1.38E+02
KR-90	32.32 S	9.96E+01	1.06E+02	1.16E+02	1.07E+02	9.37E+01	8.60E+01	1.18E+02	9.64E+01	9.77E+01
RB-81	4.58 H	5.09E+01	5.49E+01	6.63E+01	5.57E+01	4.79E+01	4.38E+01	6.75E+01	5.00E+01	5.03E+01
RB-82	1.25 M	9.16E+01	9.82E+01	1.12E+02	1.00E+02	8.80E+01	7.88E+01	1.14E+02	8.93E+01	9.04E+01
RB-83	86.2 D	4.17E+01	4.48E+01	5.13E+01	4.58E+01	4.02E+01	3.60E+01	5.21E+01	4.07E+01	4.12E+01
RB-84	32.9 D	7.43E+01	7.94E+01	8.74E+01	8.07E+01	7.19E+01	6.41E+01	8.89E+01	7.22E+01	7.34E+01
RB-86	18.66 D	7.50E+00	7.97E+00	8.46E+00	8.05E+00	7.23E+00	6.48E+00	8.61E+00	7.25E+00	7.38E+00
RB-87	4.73E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RB-88	17.8 M	4.88E+01	5.15E+01	5.34E+01	5.21E+01	4.51E+01	4.25E+01	5.43E+01	4.69E+01	4.78E+01
RB-89	15.44 M	1.60E+02	1.69E+02	1.78E+02	1.72E+02	1.50E+02	1.39E+02	1.81E+02	1.54E+02	1.57E+02
RB-90	157 S	1.48E+02	1.55E+02	1.61E+02	1.61E+02	1.34E+02	1.32E+02	1.63E+02	1.44E+02	1.49E+02
RB-90M	258 S	2.45E+02	2.57E+02	2.70E+02	2.63E+02	2.25E+02	2.14E+02	2.74E+02	2.36E+02	2.42E+02
SR-82	25.0 D	3.24E-03	5.02E-02	4.97E-02	1.69E-02	2.68E-02	3.20E-02	8.20E-02	1.91E-02	1.95E-02
SR-85	64.84 D	4.28E+01	4.59E+01	5.28E+01	4.70E+01	4.11E+01	3.68E+01	5.37E+01	4.18E+01	4.22E+01
SR-85M	67.66 M	1.84E+01	2.00E+01	2.71E+01	2.01E+01	1.63E+01	1.58E+01	2.77E+01	1.83E+01	1.81E+01
SR-87M	2.805 H	2.71E+01	2.92E+01	3.52E+01	3.01E+01	2.54E+01	2.34E+01	3.58E+01	2.66E+01	2.67E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/ISQUARE MI

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
GE-71	11.8 D	6.15E-02	1.54E-06	4.30E-03	6.11E-07	1.17E-01	1.40E+00	0.0	1.40E+00
GE-77	11.30 H	1.26E+02	9.73E+01	1.19E+02	7.70E+01	1.08E+02	1.43E+02	6.43E+02	7.86E+02
AS-72	26.0 H	2.11E+02	1.63E+02	1.97E+02	1.29E+02	1.80E+02	2.42E+02	1.12E+03	1.36E+03
AS-73	80.30 D	9.86E-01	5.89E-01	7.78E-01	2.99E-01	9.73E-01	4.72E+00	0.0	4.72E+00
AS-74	17.77 D	9.21E+01	7.04E+01	8.58E+01	5.59E+01	7.87E+01	1.06E+02	2.31E+02	3.37E+02
AS-76	26.32 H	4.99E+01	3.87E+01	4.67E+01	3.08E+01	4.27E+01	5.73E+01	1.14E+03	1.20E+03
AS-77	38.8 H	1.07E+00	8.14E-01	1.01E+00	6.42E-01	9.30E-01	1.20E+00	1.03E+02	1.05E+02
SE-73	7.15 H	1.34E+02	1.01E+02	1.25E+02	8.01E+01	1.15E+02	1.53E+02	3.68E+02	5.22E+02
SE-75	119.78 D	4.93E+01	3.74E+01	4.71E+01	2.91E+01	4.32E+01	5.65E+01	0.0	5.65E+01
SE-79	6.5E4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BR-77	57.04 H	3.85E+01	2.93E+01	3.60E+01	2.32E+01	3.33E+01	4.60E+01	0.0	4.60E+01
BR-80	17.4 M	8.97E+00	6.89E+00	8.37E+00	5.45E+00	7.67E+00	1.04E+01	7.57E+02	7.67E+02
BR-80M	4.42 H	1.98E+00	9.82E-01	1.38E+00	3.63E-01	1.65E+00	6.54E+00	0.0	6.54E+00
BR-82	35.30 H	3.04E+02	2.39E+02	2.87E+02	1.88E+02	2.60E+02	3.50E+02	5.98E+00	3.56E+02
BR-83	2.39 H	8.98E-01	6.82E-01	8.33E-01	5.45E-01	7.68E-01	1.03E+00	2.32E+02	2.33E+02
BR-84	31.80 M	1.85E+02	1.46E+02	1.71E+02	1.19E+02	1.59E+02	2.08E+02	1.32E+03	1.53E+03
BR-85	172 S	7.61E+00	6.05E+00	7.23E+00	4.73E+00	6.52E+00	8.79E+00	1.07E+03	1.08E+03
KR-79	35.04 H	3.07E+01	2.33E+01	2.86E+01	1.85E+01	2.65E+01	3.74E+01	7.78E+00	4.52E+01
KR-81	2.1E5 Y	1.44E+00	9.40E-01	1.20E+00	7.48E-01	1.36E+00	4.08E+00	0.0	4.08E+00
KR-83M	1.83 H	8.78E-02	1.04E-03	1.30E-02	2.95E-04	1.14E-01	1.08E+00	0.0	1.08E+00
KR-85	10.72 Y	2.69E-01	2.04E-01	2.49E-01	1.63E-01	2.30E-01	3.08E-01	1.41E+02	1.42E+02
KR-85M	4.48 H	2.05E+01	1.57E+01	1.99E+01	1.19E+01	1.80E+01	2.25E+01	1.49E+02	1.72E+02
KR-87	76.3 M	8.59E+01	6.69E+01	7.92E+01	5.51E+01	7.40E+01	9.69E+01	1.42E+03	1.52E+03
KR-88	2.84 H	2.05E+02	1.61E+02	1.89E+02	1.34E+02	1.77E+02	2.31E+02	2.69E+02	5.00E+02
KR-89	3.16 M	1.94E+02	1.53E+02	1.80E+02	1.24E+02	1.67E+02	2.20E+02	1.46E+03	1.68E+03
KR-90	32.32 S	1.40E+02	1.10E+02	1.32E+02	8.81E+01	1.20E+02	1.60E+02	1.40E+03	1.56E+03
RB-81	4.58 H	7.42E+01	5.62E+01	6.93E+01	4.46E+01	6.40E+01	8.69E+01	1.33E+02	2.20E+02
RB-82	1.25 M	1.32E+02	1.00E+02	1.22E+02	8.00E+01	1.13E+02	1.51E+02	1.53E+03	1.68E+03
RB-83	86.2 D	6.03E+01	4.56E+01	5.58E+01	3.64E+01	5.17E+01	7.20E+01	0.0	7.20E+01
RB-84	32.9 D	1.06E+02	8.27E+01	9.96E+01	6.48E+01	9.04E+01	1.24E+02	1.51E+02	2.75E+02
RB-86	18.66 D	1.05E+01	8.43E+00	1.00E+01	6.57E+00	8.99E+00	1.21E+01	6.86E+02	6.98E+02
RB-87	4.73E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RB-88	17.8 M	6.70E+01	5.31E+01	6.23E+01	4.37E+01	5.77E+01	7.61E+01	2.24E+03	2.32E+03
RB-89	15.44 M	2.22E+02	1.76E+02	2.08E+02	1.42E+02	1.90E+02	2.53E+02	1.07E+03	1.32E+03
RB-90	157 S	2.04E+02	1.62E+02	1.85E+02	1.31E+02	1.76E+02	2.24E+02	2.10E+03	2.33E+03
RB-90M	258 S	3.38E+02	2.67E+02	3.12E+02	2.17E+02	2.91E+02	3.80E+02	1.49E+03	1.87E+03
SR-82	25.0 D	3.58E-01	6.32E-04	5.83E-02	1.78E-05	4.11E-01	3.53E+00	0.0	3.53E+00
SR-85	64.84 D	6.20E+01	4.66E+01	5.71E+01	3.73E+01	5.31E+01	7.40E+01	3.43E+00	7.75E+01
SR-85M	67.66 M	2.73E+01	2.08E+01	2.61E+01	1.62E+01	2.40E+01	3.06E+01	0.0	3.06E+01
SR-87M	2.805 H	3.94E+01	2.96E+01	3.66E+01	2.38E+01	3.40E+01	4.51E+01	7.17E+01	1.17E+02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/ISQUARE M

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
SR-89	50.55 D	1.17E-02	1.13E-02	1.27E-02	1.42E-02	1.12E-02	1.02E-02	1.19E-02	1.09E-02	1.19E-02
SR-90	28.6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR-91	9.5 H	5.81E+01	5.64E+01	6.34E+01	7.13E+01	5.57E+01	5.06E+01	5.93E+01	5.45E+01	5.91E+01
SR-92	2.71 H	1.01E+02	1.01E+02	1.13E+02	1.25E+02	9.95E+01	9.19E+01	1.06E+02	9.77E+01	1.06E+02
SR-93	7.3 H	1.83E+02	1.79E+02	2.01E+02	2.29E+02	1.77E+02	1.62E+02	1.88E+02	1.74E+02	1.88E+02
Y-86	14.74 H	2.92E+02	2.87E+02	3.21E+02	3.65E+02	2.83E+02	2.59E+02	3.01E+02	2.78E+02	3.01E+02
Y-87	80.3 H	4.08E+01	3.86E+01	4.29E+01	5.38E+01	3.77E+01	3.39E+01	4.00E+01	3.70E+01	4.00E+01
Y-88	106.60 D	2.08E+02	2.09E+02	2.35E+02	2.64E+02	2.08E+02	1.92E+02	2.21E+02	2.04E+02	2.22E+02
Y-90	64.1 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-90M	3.19 H	5.75E+01	5.38E+01	5.90E+01	7.64E+01	5.25E+01	4.71E+01	5.56E+01	5.17E+01	5.56E+01
Y-91	58.51 D	2.81E-01	2.78E-01	3.14E-01	3.47E-01	2.75E-01	2.53E-01	2.93E-01	2.70E-01	2.92E-01
Y-91M	49.71 H	4.70E+01	4.47E+01	5.00E+01	5.88E+01	4.38E+01	3.94E+01	4.65E+01	4.29E+01	4.65E+01
Y-92	3.54 H	2.07E+01	2.02E+01	2.28E+01	2.55E+01	2.00E+01	1.82E+01	2.13E+01	1.96E+01	2.12E+01
Y-93	10.1 H	7.20E+00	7.08E+00	7.89E+00	9.23E+00	7.01E+00	6.42E+00	7.45E+00	6.89E+00	7.45E+00
ZR-86	16.5 H	2.54E+01	2.33E+01	2.51E+01	3.99E+01	2.26E+01	2.03E+01	2.40E+01	2.26E+01	2.42E+01
ZR-88	83.4 D	3.49E+01	3.26E+01	3.59E+01	4.74E+01	3.18E+01	2.85E+01	3.36E+01	3.14E+01	3.37E+01
ZR-89	78.43 H	9.92E+01	9.59E+01	1.08E+02	1.24E+02	9.45E+01	8.56E+01	1.01E+02	9.25E+01	1.00E+02
ZR-93	1.53E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR-95	64.02 D	6.45E+01	6.20E+01	6.96E+01	7.90E+01	6.10E+01	5.51E+01	6.49E+01	5.97E+01	6.47E+01
ZR-97	16.90 H	1.48E+01	1.44E+01	1.62E+01	1.85E+01	1.42E+01	1.30E+01	1.51E+01	1.40E+01	1.51E+01
NB-90	14.60 H	3.21E+02	3.22E+02	3.60E+02	4.12E+02	3.21E+02	2.96E+02	3.41E+02	3.15E+02	3.42E+02
NB-91	1E4 Y	2.43E-01	1.44E-01	1.74E-01	2.61E+00	1.60E-01	1.30E-01	1.50E-01	1.92E-01	1.65E-01
NB-91M	61 D	3.42E+00	3.30E+00	3.73E+00	6.08E+00	3.28E+00	3.00E+00	3.48E+00	3.25E+00	3.49E+00
NB-92	3.6E7 Y	1.29E+02	1.24E+02	1.40E+02	1.61E+02	1.23E+02	1.11E+02	1.30E+02	1.20E+02	1.30E+02
NB-92M	10.15 D	8.14E+01	7.91E+01	8.90E+01	1.02E+02	7.82E+01	7.10E+01	8.32E+01	7.65E+01	8.30E+01
NB-93M	14.6 Y	1.87E-02	1.03E-03	3.59E-03	4.25E-01	4.74E-03	1.54E-03	1.35E-03	1.17E-02	5.83E-03
NB-94	2.03E4 Y	1.37E+02	1.32E+02	1.48E+02	1.68E+02	1.30E+02	1.18E+02	1.38E+02	1.27E+02	1.38E+02
NB-94M	6.26 H	4.28E-01	3.50E-01	4.02E-01	2.05E+00	3.59E-01	3.15E-01	3.68E-01	3.78E-01	3.86E-01
NB-95	35.06 D	6.69E+01	6.44E+01	7.23E+01	8.19E+01	6.34E+01	5.73E+01	6.75E+01	6.20E+01	6.73E+01
NB-95M	86.6 H	5.62E+00	5.07E+00	5.46E+00	9.32E+00	4.95E+00	4.42E+00	5.23E+00	4.96E+00	5.24E+00
NB-96	23.35 H	2.10E+02	2.03E+02	2.28E+02	2.59E+02	2.00E+02	1.82E+02	2.13E+02	1.96E+02	2.13E+02
NB-97	72.1 H	5.86E+01	5.61E+01	6.29E+01	7.22E+01	5.51E+01	4.97E+01	5.85E+01	5.39E+01	5.84E+01
NB-97M	60 S	6.39E+01	6.14E+01	6.89E+01	7.83E+01	6.04E+01	5.46E+01	6.43E+01	5.91E+01	6.41E+01
MO-91	15.49 H	8.64E+01	8.22E+01	9.16E+01	1.09E+02	8.03E+01	7.23E+01	8.53E+01	7.87E+01	8.53E+01
MO-93	3.5E3 Y	1.05E-01	5.79E-03	2.01E-02	2.38E+00	2.66E-02	8.65E-03	7.59E-03	6.58E-02	3.27E-02
MO-99	66.02 H	1.36E+01	1.30E+01	1.45E+01	1.74E+01	1.28E+01	1.16E+01	1.36E+01	1.26E+01	1.36E+01
MO-101	14.61 H	1.20E+02	1.19E+02	1.33E+02	1.52E+02	1.17E+02	1.07E+02	1.25E+02	1.15E+02	1.25E+02
TC-95	20.0 H	6.85E+01	6.59E+01	7.41E+01	8.62E+01	6.49E+01	5.87E+01	6.91E+01	6.36E+01	6.89E+01
TC-95M	61 D	5.88E+01	5.59E+01	6.21E+01	7.72E+01	5.49E+01	4.95E+01	5.83E+01	5.39E+01	5.82E+01
TC-96	4.28 D	2.16E+02	2.08E+02	2.34E+02	2.66E+02	2.06E+02	1.86E+02	2.19E+02	2.01E+02	2.18E+02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
SR-89	50.55 D	1.13E-02	1.20E-02	1.29E-02	1.22E-02	1.09E-02	9.72E-03	1.31E-02	1.09E-02	1.11E-02
SR-90	28.6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR-91	9.5 H	5.61E+01	5.98E+01	6.47E+01	6.07E+01	5.43E+01	4.84E+01	6.58E+01	5.44E+01	5.54E+01
SR-92	2.71 H	1.00E+02	1.06E+02	1.12E+02	1.07E+02	9.50E+01	8.70E+01	1.13E+02	9.70E+01	9.80E+01
SR-93	7.3 H	1.79E+02	1.90E+02	2.06E+02	1.93E+02	1.69E+02	1.55E+02	2.09E+02	1.73E+02	1.76E+02
Y-86	14.74 H	2.86E+02	3.04E+02	3.27E+02	3.08E+02	2.72E+02	2.47E+02	3.33E+02	2.77E+02	2.81E+02
Y-87	80.3 H	3.83E+01	4.12E+01	4.79E+01	4.22E+01	3.67E+01	3.30E+01	4.87E+01	3.75E+01	3.78E+01
Y-88	106.60 D	2.10E+02	2.22E+02	2.31E+02	2.24E+02	1.96E+02	1.82E+02	2.35E+02	2.02E+02	2.05E+02
Y-90	64.1 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-90M	3.19 H	5.35E+01	5.77E+01	7.11E+01	5.87E+01	4.98E+01	4.59E+01	7.24E+01	5.26E+01	5.28E+01
Y-91	58.51 D	2.77E-01	2.94E-01	3.10E-01	2.97E-01	2.65E-01	2.40E-01	3.15E-01	2.68E-01	2.72E-01
Y-91M	49.71 M	4.45E+01	4.77E+01	5.42E+01	4.87E+01	4.29E+01	3.83E+01	5.51E+01	4.34E+01	4.39E+01
Y-92	3.54 H	2.01E+01	2.14E+01	2.30E+01	2.17E+01	1.94E+01	1.74E+01	2.34E+01	1.95E+01	1.98E+01
Y-93	10.1 H	7.08E+00	7.52E+00	8.31E+00	7.64E+00	6.57E+00	6.13E+00	8.45E+00	6.86E+00	6.95E+00
ZR-86	16.5 H	2.31E+01	2.52E+01	3.29E+01	2.55E+01	2.10E+01	2.00E+01	3.37E+01	2.30E+01	2.29E+01
ZR-88	83.4 D	3.24E+01	3.49E+01	4.21E+01	3.60E+01	3.05E+01	2.80E+01	4.28E+01	3.19E+01	3.20E+01
ZR-89	78.43 H	9.53E+01	1.02E+02	1.11E+02	1.03E+02	9.23E+01	8.23E+01	1.13E+02	9.25E+01	9.42E+01
ZR-93	1.53E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR-95	64.02 D	6.16E+01	6.58E+01	7.22E+01	6.69E+01	5.99E+01	5.31E+01	7.34E+01	5.98E+01	6.09E+01
ZR-97	16.90 H	1.44E+01	1.53E+01	1.68E+01	1.56E+01	1.37E+01	1.24E+01	1.71E+01	1.40E+01	1.41E+01
NB-90	14.60 H	3.23E+02	3.41E+02	3.64E+02	3.46E+02	2.98E+02	2.81E+02	3.70E+02	3.11E+02	3.17E+02
NB-91	1E4 Y	1.54E-01	2.49E-01	2.90E-01	1.87E-01	1.91E-01	1.79E-01	3.37E-01	1.80E-01	1.84E-01
NB-91M	61 D	3.30E+00	3.58E+00	3.83E+00	3.54E+00	3.19E+00	2.89E+00	3.93E+00	3.22E+00	3.27E+00
NB-92	3.6E7 Y	1.24E+02	1.32E+02	1.45E+02	1.34E+02	1.20E+02	1.07E+02	1.48E+02	1.20E+02	1.22E+02
NB-92M	10.15 D	7.87E+01	8.39E+01	9.00E+01	8.49E+01	7.63E+01	6.80E+01	9.16E+01	7.62E+01	7.78E+01
NB-93M	14.6 Y	3.43E-03	2.00E-02	2.48E-02	6.76E-03	1.18E-02	1.15E-02	3.29E-02	9.02E-03	9.85E-03
NB-94	2.03E4 Y	1.31E+02	1.40E+02	1.53E+02	1.42E+02	1.27E+02	1.13E+02	1.55E+02	1.27E+02	1.30E+02
NB-94M	6.26 M	3.57E-01	4.43E-01	4.92E-01	3.97E-01	3.79E-01	3.40E-01	5.30E-01	3.67E-01	3.77E-01
NB-95	35.06 D	6.40E+01	6.84E+01	7.48E+01	6.95E+01	6.22E+01	5.52E+01	7.60E+01	6.21E+01	6.33E+01
NB-95M	86.6 H	5.06E+00	5.55E+00	7.42E+00	5.59E+00	4.53E+00	4.38E+00	7.60E+00	5.05E+00	5.02E+00
NB-96	23.35 H	2.02E+02	2.16E+02	2.36E+02	2.19E+02	1.95E+02	1.75E+02	2.40E+02	1.96E+02	2.00E+02
NB-97	72.1 M	5.57E+01	5.96E+01	6.63E+01	5.41E+01	4.80E+01	4.80E+01	6.74E+01	5.42E+01	5.51E+01
NB-97M	60 S	6.10E+01	6.52E+01	7.15E+01	6.63E+01	5.93E+01	5.26E+01	7.27E+01	5.92E+01	6.04E+01
MO-91	15.49 H	8.17E+01	8.77E+01	1.01E+02	8.97E+01	7.84E+01	7.03E+01	1.02E+02	7.98E+01	8.06E+01
MO-93	3.5E3 Y	1.92E-02	1.12E-01	1.39E-01	3.79E-02	6.62E-02	6.43E-02	1.84E-01	5.05E-02	5.52E-02
MO-99	66.02 H	1.30E+01	1.39E+01	1.59E+01	1.40E+01	1.24E+01	1.11E+01	1.62E+01	1.26E+01	1.28E+01
MO-101	14.61 M	1.18E+02	1.26E+02	1.36E+02	1.27E+02	1.12E+02	1.02E+02	1.39E+02	1.15E+02	1.16E+02
TC-95	20.0 H	6.55E+01	7.01E+01	7.65E+01	7.11E+01	6.37E+01	5.65E+01	7.79E+01	6.36E+01	6.48E+01
TC-95M	61 D	5.56E+01	5.97E+01	6.91E+01	6.04E+01	5.30E+01	4.79E+01	7.04E+01	5.43E+01	5.50E+01
TC-96	4.28 D	2.07E+02	2.21E+02	2.40E+02	2.25E+02	2.01E+02	1.79E+02	2.44E+02	2.01E+02	2.05E+02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
SR-89	50.55 D	1.59E-02	1.27E-02	1.51E-02	9.80E-03	1.36E-02	1.84E-02	5.89E+02	5.89E+02
SR-90	28.6 Y	0.0	0.0	0.0	0.0	0.0	0.0	5.84E+01	5.84E+01
SR-91	9.5 H	7.92E+01	6.28E+01	7.53E+01	4.90E+01	6.77E+01	9.14E+01	6.52E+02	7.44E+02
SR-92	2.71 H	1.39E+02	1.11E+02	1.32E+02	8.93E+01	1.19E+02	1.60E+02	6.85E+01	2.28E+02
SR-93	7.3 M	2.51E+02	1.97E+02	2.36E+02	1.57E+02	2.15E+02	2.88E+02	9.37E+02	1.22E+03
Y-86	14.74 H	4.01E+02	3.15E+02	3.77E+02	2.52E+02	3.44E+02	4.62E+02	2.27E+02	6.89E+02
Y-87	80.3 H	5.58E+01	4.18E+01	5.13E+01	3.35E+01	4.78E+01	6.69E+01	1.24E+00	6.82E+01
Y-88	106.60 D	2.89E+02	2.29E+02	2.71E+02	1.87E+02	2.49E+02	3.34E+02	5.91E-01	3.35E+02
Y-90	64.1 H	0.0	0.0	0.0	0.0	0.0	0.0	1.01E+03	1.01E+03
Y-90M	3.19 H	7.81E+01	5.91E+01	7.32E+01	4.69E+01	6.75E+01	8.84E+01	4.44E+01	1.33E+02
Y-91	58.51 D	3.87E-01	3.10E-01	3.68E-01	2.45E-01	3.31E-01	4.45E-01	6.14E+02	6.14E+02
Y-91M	49.71 M	6.39E+01	4.87E+01	5.94E+01	3.88E+01	5.46E+01	7.34E+01	2.93E+01	1.03E+02
Y-92	3.54 H	2.83E+01	2.25E+01	2.68E+01	1.77E+01	2.42E+01	3.26E+01	1.57E+03	1.60E+03
Y-93	10.1 H	9.91E+00	7.78E+00	9.31E+00	6.30E+00	8.55E+00	1.13E+01	1.27E+03	1.28E+03
ZR-86	16.5 H	3.55E+01	2.60E+01	3.28E+01	2.04E+01	3.09E+01	4.61E+01	0.0	4.61E+01
ZR-88	83.4 D	4.75E+01	3.54E+01	4.38E+01	2.85E+01	4.10E+01	5.72E+01	1.11E+01	6.83E+01
ZR-89	78.43 H	1.35E+02	1.07E+02	1.28E+02	8.31E+01	1.16E+02	1.59E+02	8.22E+01	2.41E+02
ZR-93	1.53E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR-95	64.02 D	8.75E+01	6.87E+01	8.28E+01	5.35E+01	7.47E+01	1.01E+02	2.74E+00	1.04E+02
ZR-97	16.90 H	2.03E+01	1.59E+01	1.91E+01	1.27E+01	1.74E+01	2.32E+01	7.12E+02	7.35E+02
NB-90	14.60 H	4.47E+02	3.51E+02	4.15E+02	2.89E+02	3.85E+02	5.09E+02	3.63E+02	8.72E+02
NB-91	1E4 Y	8.14E-01	1.59E-01	3.34E-01	1.23E-01	7.33E-01	4.12E+00	0.0	4.12E+00
NB-91M	61 D	5.14E+00	3.69E+00	4.52E+00	2.90E+00	4.40E+00	8.30E+00	0.0	8.30E+00
NB-92	3.6E7 Y	1.76E+02	1.38E+02	1.66E+02	1.08E+02	1.51E+02	2.06E+02	1.56E+00	2.08E+02
NB-92M	10.15 D	1.11E+02	8.85E+01	1.06E+02	6.86E+01	9.53E+01	1.32E+02	0.0	1.32E+02
NB-93M	14.6 Y	1.19E-01	1.87E-03	3.20E-02	9.33E-05	1.03E-01	6.60E-01	0.0	6.60E-01
NB-94	2.03E4 Y	1.86E+02	1.47E+02	1.76E+02	1.14E+02	1.59E+02	2.15E+02	1.26E+01	2.27E+02
NB-94M	6.26 M	9.41E-01	3.95E-01	5.86E-01	2.99E-01	8.04E-01	3.07E+00	1.88E+00	4.96E+00
NB-95	35.06 D	9.08E+01	7.15E+01	8.61E+01	5.56E+01	7.76E+01	1.05E+02	1.12E+00	1.06E+02
NB-95M	86.6 H	7.91E+00	5.68E+00	7.25E+00	4.47E+00	6.92E+00	1.07E+01	2.24E+01	3.30E+01
NB-96	23.35 H	2.86E+02	2.25E+02	2.71E+02	1.77E+02	2.45E+02	3.30E+02	1.35E+02	4.65E+02
NB-97	72.1 M	7.95E+01	6.18E+01	7.47E+01	4.85E+01	6.79E+01	9.16E+01	4.31E+02	5.22E+02
NB-97M	60 S	8.67E+01	6.81E+01	8.20E+01	5.30E+01	7.41E+01	1.00E+02	1.57E+01	1.16E+02
MO-91	15.49 M	1.18E+02	8.91E+01	1.09E+02	7.14E+01	1.01E+02	1.35E+02	1.58E+03	1.71E+03
MO-93	3.5E3 Y	6.67E-01	1.05E-02	1.79E-01	5.23E-04	5.78E-01	3.69E+00	0.0	3.69E+00
MO-99	66.02 H	1.86E+01	1.45E+01	1.77E+01	1.13E+01	1.60E+01	2.15E+01	3.33E+02	3.55E+02
MO-101	14.61 M	1.66E+02	1.31E+02	1.56E+02	1.05E+02	1.42E+02	1.90E+02	4.74E+02	6.64E+02
TC-95	20.0 H	9.36E+01	7.32E+01	8.83E+01	5.69E+01	8.00E+01	1.11E+02	9.85E-01	1.12E+02
TC-95M	61 D	8.05E+01	6.22E+01	7.59E+01	4.85E+01	6.91E+01	9.48E+01	8.14E-01	9.57E+01
TC-96	4.28 D	2.94E+02	2.32E+02	2.79E+02	1.80E+02	2.51E+02	3.43E+02	1.03E+00	3.44E+02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/ISQUARE M

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
TC-96M	51.5 M	3.53E+00	3.37E+00	3.79E+00	5.62E+00	3.33E+00	3.02E+00	3.55E+00	3.29E+00	3.57E+00
TC-97	2.6E6 Y	1.26E-01	1.42E-02	2.70E-02	2.50E+00	3.47E-02	1.46E-02	2.10E-02	8.16E-02	6.16E-02
TC-97M	89 D	1.37E-01	4.86E-02	5.43E-02	1.98E+00	5.85E-02	3.92E-02	6.19E-02	9.84E-02	1.05E-01
TC-98	4.2E6 Y	1.23E+02	1.18E+02	1.32E+02	1.51E+02	1.16E+02	1.04E+02	1.23E+02	1.13E+02	1.23E+02
TC-99	2.13E5 Y	4.49E-05	4.48E-05	4.63E-05	8.56E-05	4.22E-05	3.67E-05	4.53E-05	4.04E-05	4.56E-05
TC-99M	6.02 M	1.18E+01	1.08E+01	1.16E+01	1.89E+01	1.07E+01	9.30E+00	1.14E+01	1.05E+01	1.10E+01
TC-101	14.2 M	3.15E+01	2.92E+01	3.20E+01	4.19E+01	2.85E+01	2.56E+01	3.02E+01	2.82E+01	3.02E+01
RU-97	2.9 D	2.14E+01	1.95E+01	2.09E+01	3.26E+01	1.90E+01	1.70E+01	2.01E+01	1.89E+01	2.01E+01
RU-103	39.35 D	4.30E+01	4.08E+01	4.54E+01	5.43E+01	3.98E+01	3.58E+01	4.23E+01	3.90E+01	4.23E+01
RU-105	4.44 H	6.93E+01	6.61E+01	7.39E+01	8.65E+01	6.50E+01	5.86E+01	6.90E+01	6.37E+01	6.89E+01
RU-106	368.2 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH-103M	56.119 M	2.78E-02	1.31E-02	8.65E-03	3.85E-01	1.01E-02	7.39E-03	2.04E-02	1.98E-02	3.34E-02
RH-105	35.36 H	7.19E+00	6.64E+00	7.24E+00	9.58E+00	6.47E+00	5.81E+00	6.85E+00	6.42E+00	6.85E+00
RH-105M	45 S	2.60E+00	2.34E+00	2.48E+00	6.03E+00	2.30E+00	1.98E+00	2.51E+00	2.29E+00	2.48E+00
RH-106	29.92 S	1.81E+01	1.73E+01	1.93E+01	2.25E+01	1.69E+01	1.53E+01	1.80E+01	1.66E+01	1.80E+01
PD-103	16.961 D	2.49E-01	1.09E-01	7.83E-02	3.42E+00	9.06E-02	6.46E-02	1.79E-01	1.77E-01	2.88E-01
PD-107	6.5E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD-109	13.453 H	6.11E-02	5.80E-02	6.46E-02	7.71E-02	5.67E-02	5.10E-02	6.02E-02	5.56E-02	6.01E-02
AG-106M	8.46 D	2.35E+02	2.28E+02	2.55E+02	2.95E+02	2.24E+02	2.04E+02	2.38E+02	2.20E+02	2.38E+02
AG-108	2.37 M	1.55E+00	1.47E+00	1.65E+00	1.99E+00	1.44E+00	1.30E+00	1.54E+00	1.42E+00	1.54E+00
AG-108M	127 Y	1.42E+02	1.36E+02	1.52E+02	1.80E+02	1.33E+02	1.20E+02	1.42E+02	1.31E+02	1.41E+02
AG-109M	39.6 S	4.15E-01	3.78E-01	3.37E-01	2.09E+00	3.18E-01	2.76E-01	4.27E-01	3.51E-01	5.03E-01
AG-110	24.57 S	2.69E+00	2.57E+00	2.89E+00	3.32E+00	2.53E+00	2.28E+00	2.69E+00	2.47E+00	2.68E+00
AG-110M	249.85 D	2.30E+02	2.23E+02	2.51E+02	2.83E+02	2.20E+02	2.00E+02	2.34E+02	2.16E+02	2.34E+02
AG-111	7.46 D	2.43E+00	2.25E+00	2.46E+00	3.22E+00	2.20E+00	1.97E+00	2.32E+00	2.17E+00	2.32E+00
CD-109	464 D	2.49E-01	1.78E-01	8.48E-02	2.91E+00	9.70E-02	8.25E-02	2.66E-01	1.83E-01	4.03E-01
CD-111M	48.7 M	2.61E+01	2.39E+01	2.56E+01	3.84E+01	2.33E+01	2.07E+01	2.48E+01	2.31E+01	2.47E+01
CD-113	9.3E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CD-113M	13.7 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CD-115	53.46 H	1.81E+01	1.72E+01	1.91E+01	2.30E+01	1.68E+01	1.51E+01	1.78E+01	1.65E+01	1.78E+01
CD-115M	44.6 D	1.80E+00	1.76E+00	1.98E+00	2.21E+00	1.74E+00	1.59E+00	1.85E+00	1.70E+00	1.85E+00
CD-117	2.49 H	8.69E+01	8.54E+01	9.56E+01	1.10E+02	8.43E+01	7.73E+01	8.97E+01	8.28E+01	8.96E+01
CD-117M	3.36 H	1.58E+02	1.59E+02	1.78E+02	1.99E+02	1.58E+02	1.45E+02	1.68E+02	1.55E+02	1.68E+02
IN-111	2.83 D	3.64E+01	3.33E+01	3.56E+01	5.52E+01	3.24E+01	2.88E+01	3.46E+01	3.23E+01	3.45E+01
IN-113M	1.658 H	2.33E+01	2.17E+01	2.39E+01	3.09E+01	2.12E+01	1.90E+01	2.25E+01	2.09E+01	2.26E+01
IN-114	71.9 S	2.78E+00	2.66E+00	2.97E+00	3.49E+00	2.61E+00	2.35E+00	2.77E+00	2.55E+00	2.77E+00
IN-114M	49.51 D	8.07E+00	7.60E+00	8.27E+00	1.19E+01	7.37E+00	6.62E+00	7.94E+00	7.30E+00	8.01E+00
IN-115	4.6E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IN-115M	4.36 H	1.47E+01	1.36E+01	1.48E+01	2.04E+01	1.32E+01	1.18E+01	1.40E+01	1.31E+01	1.41E+01
IN-116M	54.15 M	1.91E+02	1.90E+02	2.14E+02	2.39E+02	1.88E+02	1.73E+02	2.00E+02	1.85E+02	2.00E+02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
TC-96M	51.5 M	3.36E+00	3.64E+00	3.96E+00	3.64E+00	3.28E+00	2.93E+00	4.05E+00	3.28E+00	3.34E+00
TC-97	2.6E6 Y	2.97E-02	1.38E-01	1.79E-01	4.67E-02	8.38E-02	7.71E-02	2.27E-01	6.48E-02	7.17E-02
TC-97M	89 D	5.91E-02	1.53E-01	2.17E-01	6.49E-02	9.96E-02	8.78E-02	2.55E-01	8.62E-02	9.34E-02
TC-98	4.2E6 Y	1.17E+02	1.25E+02	1.38E+02	1.27E+02	1.14E+02	1.01E+02	1.40E+02	1.14E+02	1.16E+02
TC-99	2.13E5 Y	4.46E-05	4.94E-05	8.37E-05	3.62E-05	3.75E-05	3.30E-05	8.62E-05	4.27E-05	4.30E-05
TC-99M	6.02 H	1.08E+01	1.19E+01	1.82E+01	1.09E+01	9.38E+00	8.98E+00	1.87E+01	1.08E+01	1.07E+01
TC-101	14.2 M	2.91E+01	3.14E+01	3.91E+01	3.23E+01	2.69E+01	2.51E+01	3.98E+01	2.87E+01	2.87E+01
RU-97	2.9 D	1.94E+01	2.12E+01	2.84E+01	2.13E+01	1.74E+01	1.67E+01	2.90E+01	1.93E+01	1.92E+01
RU-103	39.35 D	4.05E+01	4.35E+01	5.02E+01	4.45E+01	3.89E+01	3.49E+01	5.10E+01	3.96E+01	4.00E+01
RU-105	4.44 H	6.57E+01	7.04E+01	7.95E+01	7.18E+01	6.33E+01	5.67E+01	8.09E+01	6.41E+01	6.50E+01
RU-106	368.2 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH-103M	56.119 M	1.25E-02	3.27E-02	4.75E-02	1.13E-02	2.13E-02	1.71E-02	5.46E-02	1.72E-02	1.95E-02
RH-105	35.36 H	6.61E+00	7.14E+00	8.97E+00	7.37E+00	6.07E+00	5.71E+00	9.13E+00	6.53E+00	6.53E+00
RH-105M	45 S	2.34E+00	2.68E+00	4.16E+00	2.29E+00	2.07E+00	1.95E+00	4.31E+00	2.36E+00	2.35E+00
RH-106	29.92 S	1.72E+01	1.84E+01	2.07E+01	1.88E+01	1.66E+01	1.48E+01	2.11E+01	1.67E+01	1.70E+01
PD-103	16.961 D	1.07E-01	2.89E-01	4.12E-01	1.06E-01	1.89E-01	1.54E-01	4.75E-01	1.53E-01	1.73E-01
PD-107	6.5E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD-109	13.453 H	5.77E-02	6.19E-02	7.13E-02	6.33E-02	5.54E-02	4.96E-02	7.24E-02	5.63E-02	5.69E-02
AG-106M	8.46 D	2.26E+02	2.42E+02	2.66E+02	2.46E+02	2.17E+02	1.96E+02	2.70E+02	2.20E+02	2.23E+02
AG-108	2.37 M	1.46E+00	1.57E+00	1.78E+00	1.60E+00	1.42E+00	1.26E+00	1.81E+00	1.43E+00	1.45E+00
AG-108M	127 Y	1.35E+02	1.45E+02	1.64E+02	1.48E+02	1.30E+02	1.16E+02	1.67E+02	1.32E+02	1.33E+02
AG-109M	39.6 S	3.54E-01	4.72E-01	7.72E-01	2.82E-01	3.44E-01	2.89E-01	8.15E-01	3.57E-01	3.71E-01
AG-110	24.57 S	2.56E+00	2.74E+00	3.04E+00	2.79E+00	2.48E+00	2.20E+00	3.09E+00	2.49E+00	2.53E+00
AG-110M	249.85 D	2.22E+02	2.37E+02	2.57E+02	2.40E+02	2.14E+02	1.92E+02	2.61E+02	2.15E+02	2.19E+02
AG-111	7.46 D	2.24E+00	2.42E+00	3.02E+00	2.49E+00	2.07E+00	1.93E+00	3.07E+00	2.21E+00	2.21E+00
CD-109	464 D	1.36E-01	3.02E-01	4.54E-01	1.04E-01	2.01E-01	1.53E-01	5.06E-01	1.64E-01	1.88E-01
CD-111M	48.7 M	2.38E+01	2.59E+01	3.52E+01	2.59E+01	2.12E+01	2.04E+01	3.59E+01	2.36E+01	2.35E+01
CD-113	9.3E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CD-113M	13.7 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CD-115	53.46 H	1.71E+01	1.83E+01	2.12E+01	1.87E+01	1.64E+01	1.47E+01	2.15E+01	1.67E+01	1.68E+01
CD-115M	44.6 D	1.75E+00	1.86E+00	1.99E+00	1.88E+00	1.69E+00	1.51E+00	2.03E+00	1.69E+00	1.72E+00
CD-117	2.49 H	8.52E+01	9.05E+01	9.89E+01	9.17E+01	8.03E+01	7.37E+01	1.01E+02	8.26E+01	8.35E+01
CD-117M	3.36 H	1.59E+02	1.68E+02	1.77E+02	1.70E+02	1.48E+02	1.38E+02	1.80E+02	1.53E+02	1.56E+02
IN-111	2.83 D	3.31E+01	3.62E+01	4.99E+01	3.59E+01	2.94E+01	2.83E+01	5.10E+01	3.30E+01	3.28E+01
IN-113M	1.658 H	2.16E+01	2.33E+01	2.81E+01	2.40E+01	2.03E+01	1.86E+01	2.86E+01	2.12E+01	2.13E+01
IN-114	71.9 S	2.64E+00	2.83E+00	3.19E+00	2.89E+00	2.55E+00	2.28E+00	3.24E+00	2.58E+00	2.61E+00
IN-114M	49.51 D	7.51E+00	8.17E+00	1.00E+01	8.12E+00	7.06E+00	6.45E+00	1.02E+01	7.38E+00	7.45E+00
IN-115	4.6E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IN-115M	4.36 H	1.35E+01	1.46E+01	1.82E+01	1.50E+01	1.25E+01	1.16E+01	1.85E+01	1.33E+01	1.33E+01
IN-116M	54.15 M	1.90E+02	2.01E+02	2.13E+02	2.03E+02	1.80E+02	1.64E+02	2.17E+02	1.83E+02	1.86E+02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
TC-96M	51.5 M	5.18E+00	3.75E+00	4.62E+00	2.92E+00	4.39E+00	7.45E+00	0.0	7.45E+00
TC-97	2.6E6 Y	7.80E-01	2.00E-02	2.35E-01	1.34E-03	6.38E-01	3.76E+00	0.0	3.76E+00
TC-97M	.89 D	7.07E-01	5.92E-02	2.65E-01	2.48E-02	5.55E-01	2.86E+00	0.0	2.86E+00
TC-98	4.2E6 Y	1.66E+02	1.30E+02	1.57E+02	1.02E+02	1.42E+02	1.92E+02	3.32E+00	1.95E+02
TC-99	2.13E5 Y	7.25E-05	5.64E-05	7.25E-05	3.73E-05	6.26E-05	7.73E-05	0.0	7.73E-05
TC-99M	6.02 H	1.67E+01	1.28E+01	1.64E+01	9.51E+00	1.48E+01	1.82E+01	0.0	1.82E+01
TC-101	14.2 M	4.25E+01	3.22E+01	3.99E+01	2.56E+01	3.68E+01	4.78E+01	4.32E+02	4.80E+02
RU-97	2.9 D	2.96E+01	2.19E+01	2.77E+01	1.71E+01	2.59E+01	3.57E+01	0.0	3.57E+01
RU-103	39.35 D	5.84E+01	4.42E+01	5.41E+01	3.54E+01	5.00E+01	6.68E+01	6.31E+00	7.31E+01
RU-105	4.44 H	9.40E+01	7.30E+01	8.85E+01	5.73E+01	8.05E+01	1.08E+02	3.43E+02	4.51E+02
RU-106	368.2 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH-103M	56.119 M	1.56E-01	1.35E-02	6.32E-02	2.32E-03	1.15E-01	5.32E-01	0.0	5.32E-01
RH-105	35.36 H	9.66E+00	7.29E+00	9.07E+00	5.83E+00	8.39E+00	1.09E+01	3.21E+01	4.29E+01
RH-105M	.45 S	4.35E+00	2.79E+00	3.82E+00	2.00E+00	3.70E+00	6.58E+00	0.0	6.58E+00
RH-106	29.92 S	2.46E+01	1.89E+01	2.29E+01	1.50E+01	2.10E+01	2.82E+01	1.53E+03	1.56E+03
PD-103	16.961 D	1.38E+00	1.09E-01	5.52E-01	2.00E-02	1.02E+00	4.73E+00	0.0	4.73E+00
PD-107	6.5E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD-109	13.453 H	8.31E-02	6.29E-02	7.69E-02	5.04E-02	7.11E-02	9.50E-02	2.89E+02	2.89E+02
AG-106M	8.46 D	3.22E+02	2.51E+02	3.02E+02	1.99E+02	2.75E+02	3.72E+02	2.82E+00	3.75E+02
AG-108	2.37 M	2.13E+00	1.61E+00	1.97E+00	1.27E+00	1.81E+00	2.50E+00	6.14E+02	6.16E+02
AG-108M	127 Y	1.94E+02	1.49E+02	1.82E+02	1.18E+02	1.66E+02	2.26E+02	6.22E+00	2.32E+02
AG-109M	39.6 S	1.17E+00	4.44E-01	7.84E-01	2.49E-01	8.97E-01	2.52E+00	0.0	2.52E+00
AG-110	24.57 S	3.65E+00	2.84E+00	3.43E+00	2.23E+00	3.12E+00	4.22E+00	1.28E+03	1.28E+03
AG-110M	249.85 D	3.13E+02	2.48E+02	2.97E+02	1.94E+02	2.68E+02	3.61E+02	1.05E+01	3.72E+02
AG-111	7.46 D	3.27E+00	2.47E+00	3.07E+00	1.98E+00	2.84E+00	3.68E+00	2.74E+02	2.78E+02
CD-109	464 D	1.33E+00	1.63E-01	6.11E-01	2.49E-02	9.45E-01	3.82E+00	0.0	3.82E+00
CD-111M	48.7 M	3.60E+01	2.69E+01	3.41E+01	2.09E+01	3.14E+01	4.09E+01	0.0	4.09E+01
CD-113	9.3E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CD-113M	13.7 Y	0.0	0.0	0.0	0.0	0.0	0.0	5.01E+01	5.01E+01
CD-115	53.46 H	2.47E+01	1.87E+01	2.28E+01	1.49E+01	2.11E+01	2.83E+01	2.23E+02	2.51E+02
CD-115M	44.6 D	2.46E+00	1.96E+00	2.34E+00	1.53E+00	2.10E+00	2.84E+00	6.06E+02	6.09E+02
CD-117	2.49 H	1.20E+02	9.44E+01	1.13E+02	7.54E+01	1.03E+02	1.37E+02	3.69E+02	5.06E+02
CD-117M	3.36 H	2.20E+02	1.74E+02	2.05E+02	1.42E+02	1.89E+02	2.51E+02	8.65E+01	3.37E+02
IN-111	2.83 D	5.07E+01	3.76E+01	4.80E+01	2.91E+01	4.42E+01	5.82E+01	0.0	5.82E+01
IN-113M	1.658 H	3.17E+01	2.36E+01	2.93E+01	1.89E+01	2.73E+01	3.65E+01	2.92E+01	6.57E+01
IN-114	71.9 S	3.80E+00	2.91E+00	3.54E+00	2.31E+00	3.24E+00	4.38E+00	8.06E+02	8.10E+02
IN-114M	49.51 D	1.15E+01	8.45E+00	1.06E+01	6.52E+00	9.80E+00	1.39E+01	0.0	1.39E+01
IN-115	4.6E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	1.70E+01	1.70E+01
IN-115M	4.36 H	2.02E+01	1.48E+01	1.86E+01	1.18E+01	1.74E+01	2.35E+01	6.93E+00	3.04E+01
IN-116M	54.15 M	2.64E+02	2.10E+02	2.49E+02	1.68E+02	2.27E+02	3.03E+02	2.12E+02	5.15E+02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
IN-117	43.8 M	6.17E+01	5.83E+01	6.45E+01	8.11E+01	5.71E+01	5.11E+01	6.07E+01	5.60E+01	6.03E+01
IN-117M	116.5 M	8.17E+00	7.53E+00	8.12E+00	1.20E+01	7.32E+00	6.53E+00	7.83E+00	7.27E+00	7.82E+00
SN-113	115.1 D	7.46E-01	7.11E-01	5.71E-01	3.35E+00	5.37E-01	4.93E-01	7.98E-01	6.26E-01	9.99E-01
SN-117M	13.60 D	1.35E+01	1.25E+01	1.31E+01	2.26E+01	1.21E+01	1.06E+01	1.31E+01	1.20E+01	1.29E+01
SN-119M	293.0 D	1.78E-01	1.89E-01	7.55E-02	1.63E+00	8.15E-02	8.19E-02	2.27E-01	1.36E-01	3.60E-01
SN-123	129.2 D	5.58E-01	5.48E-01	6.18E-01	6.84E-01	5.42E-01	4.96E-01	5.77E-01	5.31E-01	5.76E-01
SN-125	9.64 D	2.47E+01	2.43E+01	2.74E+01	3.06E+01	2.41E+01	2.20E+01	2.56E+01	2.36E+01	2.56E+01
SN-126	1.0E5 Y	4.11E+00	4.21E+00	4.17E+00	9.23E+00	3.79E+00	3.35E+00	4.20E+00	3.68E+00	4.48E+00
S8-117	2.80 H	1.56E+01	1.45E+01	1.53E+01	2.56E+01	1.40E+01	1.24E+01	1.52E+01	1.39E+01	1.51E+01
S8-122	2.70 D	3.91E+01	3.73E+01	4.17E+01	4.88E+01	3.65E+01	3.29E+01	3.88E+01	3.58E+01	3.88E+01
S8-124	60.20 D	1.49E+02	1.48E+02	1.65E+02	1.87E+02	1.46E+02	1.34E+02	1.55E+02	1.43E+02	1.55E+02
S8-125	2.77 Y	3.77E+01	3.58E+01	3.96E+01	4.93E+01	3.48E+01	3.14E+01	3.71E+01	3.42E+01	3.74E+01
S8-126	12.4 D	2.42E+02	2.32E+02	2.60E+02	3.00E+02	2.28E+02	2.06E+02	2.42E+02	2.23E+02	2.42E+02
S8-126M	19.0 M	1.39E+02	1.33E+02	1.48E+02	1.73E+02	1.30E+02	1.17E+02	1.38E+02	1.28E+02	1.38E+02
S8-127	3.85 D	5.84E+01	5.58E+01	6.23E+01	7.31E+01	5.47E+01	4.93E+01	5.81E+01	5.36E+01	5.81E+01
S8-129	4.40 H	1.20E+02	1.17E+02	1.31E+02	1.48E+02	1.15E+02	1.05E+02	1.23E+02	1.13E+02	1.22E+02
TE-121	16.8 D	4.97E+01	4.74E+01	5.26E+01	6.44E+01	4.62E+01	4.16E+01	4.93E+01	4.53E+01	4.96E+01
TE-121M	154 D	1.89E+01	1.75E+01	1.86E+01	2.82E+01	1.69E+01	1.52E+01	1.81E+01	1.68E+01	1.83E+01
TE-123	1E13 Y	2.29E-01	2.83E-01	1.12E-01	1.76E+00	1.17E-01	1.27E-01	2.86E-01	1.81E-01	5.02E-01
TE-123M	119.7 D	1.29E+01	1.19E+01	1.26E+01	2.13E+01	1.15E+01	1.02E+01	1.25E+01	1.14E+01	1.24E+01
TE-125M	58 D	7.34E-01	9.64E-01	4.15E-01	4.86E+00	4.18E-01	4.59E-01	8.82E-01	5.93E-01	1.60E+00
TE-127	9.35 H	4.40E-01	4.11E-01	4.54E-01	5.70E-01	4.02E-01	3.61E-01	4.26E-01	3.96E-01	4.25E-01
TE-127M	109 D	2.38E-01	3.05E-01	1.41E-01	1.54E+00	1.40E-01	1.50E-01	2.84E-01	1.94E-01	5.02E-01
TE-129	69.6 M	4.76E+00	5.54E+00	4.97E+00	6.52E+00	4.38E+00	3.96E+00	4.70E+00	4.33E+00	4.78E+00
TE-129M	33.6 D	2.92E+00	2.86E+00	3.06E+00	4.50E+00	2.70E+00	2.45E+00	2.97E+00	2.68E+00	3.12E+00
TE-131	25.0 M	3.67E+01	3.49E+01	3.86E+01	4.92E+01	3.43E+01	3.08E+01	3.65E+01	3.36E+01	3.63E+01
TE-131M	30 H	1.20E+02	1.17E+02	1.31E+02	1.51E+02	1.15E+02	1.05E+02	1.23E+02	1.13E+02	1.22E+02
TE-132	78.2 H	2.01E+01	1.86E+01	1.95E+01	3.13E+01	1.77E+01	1.59E+01	1.90E+01	1.77E+01	1.96E+01
TE-133	12.45 M	7.83E+01	7.55E+01	8.40E+01	9.96E+01	7.43E+01	6.75E+01	7.89E+01	7.30E+01	7.88E+01
TE-133M	55.4 M	1.87E+02	1.82E+02	2.04E+02	2.34E+02	1.80E+02	1.63E+02	1.91E+02	1.76E+02	1.91E+02
TE-134	41.8 M	7.73E+01	7.34E+01	8.12E+01	1.01E+02	7.18E+01	6.46E+01	7.64E+01	7.05E+01	7.65E+01
I-122	3.62 M	8.54E+01	8.14E+01	9.07E+01	1.08E+02	7.96E+01	7.17E+01	8.45E+01	7.80E+01	8.46E+01
I-123	13.13 H	1.44E+01	1.34E+01	1.40E+01	2.43E+01	1.29E+01	1.14E+01	1.40E+01	1.28E+01	1.41E+01
I-124	4.18 D	8.76E+01	8.54E+01	9.52E+01	1.12E+02	8.38E+01	7.63E+01	8.93E+01	8.22E+01	8.96E+01
I-125	60.14 D	8.40E-01	1.11E+00	4.58E-01	5.76E+00	4.64E-01	5.17E-01	1.02E+00	6.76E-01	1.87E+00
I-126	12.93 D	4.04E+01	3.86E+01	4.28E+01	5.20E+01	3.77E+01	3.40E+01	4.01E+01	3.70E+01	4.04E+01
I-128	24.99 M	6.72E+00	6.35E+00	7.03E+00	8.67E+00	6.19E+00	5.57E+00	6.57E+00	6.08E+00	6.60E+00
I-129	1.57E7 Y	8.12E-01	1.12E+00	5.07E-01	4.74E+00	4.97E-01	5.61E-01	9.15E-01	6.69E-01	1.77E+00
I-130	12.36 H	1.87E+02	1.79E+02	2.01E+02	2.32E+02	1.76E+02	1.59E+02	1.87E+02	1.73E+02	1.87E+02
I-131	8.040 D	3.47E+01	3.24E+01	3.56E+01	4.53E+01	3.16E+01	2.84E+01	3.35E+01	3.12E+01	3.36E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/ISQUARE M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
IN-117	43.8 M	5.80E+01	6.25E+01	7.56E+01	6.29E+01	5.48E+01	4.97E+01	7.70E+01	5.68E+01	5.73E+01
IN-117M	116.5 M	7.48E+00	8.15E+00	1.08E+01	8.15E+00	6.78E+00	6.41E+00	1.10E+01	7.42E+00	7.40E+00
SN-113	115.1 D	6.17E-01	8.10E-01	1.16E+00	5.90E-01	6.21E-01	5.37E-01	1.21E+00	6.21E-01	6.48E-01
SN-117M	13.60 D	1.23E+01	1.36E+01	2.02E+01	1.27E+01	1.08E+01	1.04E+01	2.08E+01	1.23E+01	1.22E+01
SN-119M	293.0 D	1.29E-01	2.23E-01	3.53E-01	7.85E-02	1.54E-01	1.09E-01	3.79E-01	1.29E-01	1.48E-01
SN-123	129.2 D	5.46E-01	5.80E-01	6.16E-01	5.86E-01	5.26E-01	4.72E-01	6.26E-01	5.28E-01	5.37E-01
SN-125	9.64 D	2.43E+01	2.58E+01	2.75E+01	2.61E+01	2.32E+01	2.10E+01	2.80E+01	2.35E+01	2.39E+01
SN-126	1.0E5 Y	4.13E+00	4.63E+00	7.91E+00	3.17E+00	3.48E+00	2.98E+00	8.15E+00	3.90E+00	3.96E+00
SB-117	2.80 H	1.43E+01	1.58E+01	2.25E+01	1.48E+01	1.27E+01	1.21E+01	2.31E+01	1.42E+01	1.42E+01
SB-122	2.70 D	3.71E+01	3.97E+01	4.49E+01	4.06E+01	3.58E+01	3.19E+01	4.56E+01	3.61E+01	3.66E+01
SB-124	60.20 D	1.47E+02	1.56E+02	1.68E+02	1.59E+02	1.39E+02	1.28E+02	1.70E+02	1.42E+02	1.44E+02
SB-125	2.77 Y	3.55E+01	3.82E+01	4.45E+01	3.88E+01	3.39E+01	3.05E+01	4.52E+01	3.47E+01	3.51E+01
SB-126	12.4 D	2.30E+02	2.47E+02	2.76E+02	2.52E+02	2.23E+02	1.99E+02	2.80E+02	2.24E+02	2.28E+02
SB-126M	19.0 M	1.32E+02	1.41E+02	1.59E+02	1.44E+02	1.27E+02	1.14E+02	1.62E+02	1.29E+02	1.30E+02
SB-127	3.85 D	5.54E+01	5.94E+01	6.72E+01	6.06E+01	5.34E+01	4.77E+01	6.83E+01	5.40E+01	5.48E+01
SB-129	4.40 H	1.16E+02	1.24E+02	1.34E+02	1.26E+02	1.12E+02	1.00E+02	1.37E+02	1.13E+02	1.15E+02
TE-121	14.8 D	4.70E+01	5.05E+01	5.77E+01	5.13E+01	4.54E+01	4.04E+01	5.86E+01	4.58E+01	4.64E+01
TE-121M	154 D	1.73E+01	1.89E+01	2.52E+01	1.87E+01	1.55E+01	1.48E+01	2.58E+01	1.71E+01	1.71E+01
TE-123	1E13 Y	1.96E-01	2.94E-01	4.79E-01	1.05E-01	2.07E-01	1.41E-01	5.05E-01	1.78E-01	2.03E-01
TE-123M	119.7 D	1.18E+01	1.30E+01	1.93E+01	1.21E+01	1.03E+01	9.88E+00	1.98E+01	1.18E+01	1.17E+01
TE-125M	58 D	6.93E-01	9.46E-01	1.57E+00	3.59E-01	6.76E-01	4.57E-01	1.64E+00	5.99E-01	6.77E-01
TE-127	9.35 H	4.09E-01	4.41E-01	5.32E-01	4.53E-01	3.85E-01	3.53E-01	5.41E-01	4.02E-01	4.04E-01
TE-127M	109 D	2.24E-01	3.05E-01	5.04E-01	1.21E-01	2.19E-01	1.50E-01	5.26E-01	1.96E-01	2.20E-01
TE-129	69.6 M	4.48E+00	4.84E+00	5.66E+00	4.89E+00	4.28E+00	3.85E+00	5.76E+00	4.38E+00	4.42E+00
TE-129M	33.6 D	2.78E+00	3.02E+00	3.46E+00	2.95E+00	2.71E+00	2.37E+00	3.52E+00	2.69E+00	2.75E+00
TE-131	25.0 M	3.47E+01	3.74E+01	4.55E+01	3.72E+01	3.25E+01	2.97E+01	4.64E+01	3.40E+01	3.43E+01
TE-131M	30 H	1.16E+02	1.24E+02	1.37E+02	1.25E+02	1.11E+02	1.00E+02	1.39E+02	1.13E+02	1.15E+02
TE-132	78.2 H	1.84E+01	2.01E+01	2.76E+01	1.96E+01	1.63E+01	1.55E+01	2.82E+01	1.81E+01	1.81E+01
TE-133	12.45 M	7.52E+01	8.03E+01	9.09E+01	8.19E+01	7.09E+01	6.50E+01	9.24E+01	7.33E+01	7.40E+01
TE-133M	55.4 M	1.81E+02	1.93E+02	2.12E+02	1.95E+02	1.73E+02	1.56E+02	2.15E+02	1.76E+02	1.79E+02
TE-134	41.8 M	7.29E+01	7.84E+01	9.24E+01	7.90E+01	6.92E+01	6.25E+01	9.41E+01	7.12E+01	7.20E+01
I-122	3.62 M	8.09E+01	8.68E+01	9.93E+01	8.86E+01	7.77E+01	6.96E+01	1.01E+02	7.89E+01	7.98E+01
I-123	13.13 H	1.32E+01	1.46E+01	2.12E+01	1.36E+01	1.17E+01	1.11E+01	2.18E+01	1.31E+01	1.31E+01
I-124	4.18 D	8.49E+01	9.06E+01	9.99E+01	9.20E+01	8.09E+01	7.33E+01	1.02E+02	8.24E+01	8.36E+01
I-125	60.14 D	7.90E-01	1.09E+00	1.81E+00	3.98E-01	7.77E-01	5.19E-01	1.89E+00	6.80E-01	7.73E-01
I-126	12.93 D	3.83E+01	4.11E+01	4.68E+01	4.18E+01	3.68E+01	3.29E+01	4.76E+01	3.73E+01	3.78E+01
I-128	24.99 M	6.30E+00	6.78E+00	7.95E+00	6.94E+00	6.00E+00	5.43E+00	8.07E+00	6.17E+00	6.22E+00
I-129	1.57E7 Y	8.43E-01	1.07E+00	1.81E+00	4.02E-01	7.68E-01	5.06E-01	1.87E+00	6.91E-01	7.79E-01
I-130	12.36 H	1.78E+02	1.91E+02	2.13E+02	1.95E+02	1.72E+02	1.54E+02	2.17E+02	1.74E+02	1.76E+02
I-131	8.040 D	3.22E+01	3.47E+01	4.20E+01	3.57E+01	3.02E+01	2.78E+01	4.28E+01	3.17E+01	3.18E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
IN-117	43.8 M	8.44E+01	6.44E+01	7.93E+01	5.07E+01	7.26E+01	9.57E+01	1.31E+02	2.26E+02
IN-117M	116.5 M	1.14E+01	8.41E+00	1.07E+01	6.57E+00	9.85E+00	1.31E+01	3.52E+02	3.65E+02
SN-113	115.1 D	2.02E+00	7.39E-01	1.33E+00	4.23E-01	1.52E+00	4.09E+00	0.0	4.09E+00
SN-117M	13.60 D	1.97E+01	1.45E+01	1.88E+01	1.08E+01	1.71E+01	2.27E+01	0.0	2.27E+01
SN-119M	293.0 D	8.56E-01	1.81E-01	4.63E-01	3.69E-02	5.98E-01	2.03E+00	0.0	2.03E+00
SN-123	129.2 D	7.64E-01	6.13E-01	7.29E-01	4.79E-01	6.54E-01	8.82E-01	5.20E+02	5.21E+02
SN-125	9.64 D	3.39E+01	2.70E+01	3.22E+01	2.13E+01	2.91E+01	3.90E+01	8.58E+02	8.97E+02
SN-126	1.0E5 Y	7.36E+00	5.31E+00	7.00E+00	3.34E+00	6.18E+00	8.79E+00	0.0	8.79E+00
SB-117	2.80 H	2.27E+01	1.66E+01	2.15E+01	1.25E+01	1.96E+01	2.65E+01	1.55E+00	2.81E+01
SB-122	2.70 D	5.31E+01	4.07E+01	4.95E+01	3.23E+01	4.54E+01	6.10E+01	5.57E+02	6.18E+02
SB-124	60.20 D	2.06E+02	1.61E+02	1.92E+02	1.31E+02	1.76E+02	2.35E+02	3.09E+02	5.45E+02
SB-125	2.77 Y	5.19E+01	3.92E+01	4.81E+01	3.09E+01	4.43E+01	6.02E+01	1.51E+01	7.53E+01
SB-126	12.4 D	3.29E+02	2.56E+02	3.10E+02	2.01E+02	2.81E+02	3.79E+02	2.23E+02	6.01E+02
SB-126M	19.0 M	1.89E+02	1.46E+02	1.77E+02	1.15E+02	1.62E+02	2.17E+02	6.02E+02	8.19E+02
SB-127	3.85 D	7.94E+01	6.14E+01	7.46E+01	4.83E+01	6.79E+01	9.12E+01	2.23E+02	3.14E+02
SB-129	4.40 H	1.64E+02	1.30E+02	1.55E+02	1.02E+02	1.40E+02	1.89E+02	2.79E+02	4.67E+02
TE-121	16.8 D	6.87E+01	5.17E+01	6.34E+01	4.08E+01	5.84E+01	8.02E+01	2.86E+00	8.31E+01
TE-121M	154 D	2.64E+01	1.97E+01	2.50E+01	1.52E+01	2.29E+01	3.03E+01	0.0	3.03E+01
TE-123	1E13 Y	1.02E+00	2.95E-01	6.14E-01	6.96E-02	7.11E-01	2.10E+00	0.0	2.10E+00
TE-123M	119.7 D	1.87E+01	1.39E+01	1.79E+01	1.03E+01	1.63E+01	2.12E+01	0.0	2.12E+01
TE-125M	58 D	2.98E+00	1.07E+00	1.94E+00	3.00E-01	2.10E+00	5.60E+00	0.0	5.60E+00
TE-127	9.35 H	5.94E-01	4.48E-01	5.53E-01	3.59E-01	5.12E-01	6.73E-01	9.93E+01	9.99E+01
TE-127M	109 D	9.46E-01	3.38E-01	6.17E-01	9.98E-02	6.70E-01	1.79E+00	2.84E+00	4.62E+00
TE-129	69.6 M	6.69E+00	4.95E+00	6.13E+00	3.89E+00	5.68E+00	7.94E+00	5.03E+02	5.11E+02
TE-129M	33.6 D	4.42E+00	3.16E+00	3.97E+00	2.35E+00	3.67E+00	5.60E+00	2.15E+02	2.20E+02
TE-131	25.0 M	5.06E+01	3.91E+01	4.81E+01	3.04E+01	4.36E+01	5.73E+01	7.11E+02	7.68E+02
TE-131M	30 H	1.65E+02	1.30E+02	1.56E+02	1.02E+02	1.41E+02	1.90E+02	5.60E+01	2.46E+02
TE-132	78.2 H	2.87E+01	2.11E+01	2.69E+01	1.60E+01	2.48E+01	3.31E+01	0.0	3.31E+01
TE-133	12.45 M	1.07E+02	8.32E+01	1.01E+02	6.63E+01	9.18E+01	1.22E+02	8.52E+02	9.74E+02
TE-133M	55.4 M	2.56E+02	2.02E+02	2.43E+02	1.59E+02	2.19E+02	2.95E+02	6.99E+02	9.93E+02
TE-134	41.8 M	1.06E+02	8.15E+01	9.98E+01	6.36E+01	9.08E+01	1.21E+02	5.08E+00	1.26E+02
I-122	3.62 M	1.17E+02	8.84E+01	1.08E+02	7.07E+01	9.95E+01	1.34E+02	1.12E+03	1.26E+03
I-123	13.13 H	2.13E+01	1.55E+01	2.01E+01	1.14E+01	1.84E+01	2.48E+01	0.0	2.48E+01
I-124	4.18 D	1.21E+02	9.32E+01	1.12E+02	7.46E+01	1.03E+02	1.40E+02	2.09E+02	3.49E+02
I-125	60.14 D	3.51E+00	1.23E+00	2.26E+00	3.26E-01	2.47E+00	6.66E+00	0.0	6.66E+00
I-126	12.93 D	5.55E+01	4.24E+01	5.18E+01	3.33E+01	4.74E+01	6.45E+01	9.71E+01	1.62E+02
I-128	24.99 M	9.17E+00	6.90E+00	8.48E+00	5.51E+00	7.85E+00	1.05E+01	7.97E+02	8.07E+02
I-129	1.57E7 Y	3.09E+00	1.33E+00	2.17E+00	4.05E-01	2.20E+00	5.28E+00	0.0	5.28E+00
I-130	12.36 H	2.55E+02	1.97E+02	2.39E+02	1.55E+02	2.18E+02	2.93E+02	1.87E+02	4.80E+02
I-131	8.040 D	4.69E+01	3.54E+01	4.38E+01	2.83E+01	4.04E+01	5.32E+01	5.27E+01	1.06E+02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
I-132	2.30 H	1.96E+02	1.90E+02	2.13E+02	2.42E+02	1.87E+02	1.69E+02	1.99E+02	1.83E+02	1.98E+02
I-133	20.8 H	5.30E+01	5.06E+01	5.66E+01	6.63E+01	4.96E+01	4.48E+01	5.27E+01	4.86E+01	5.27E+01
I-134	52.6 M	2.21E+02	2.15E+02	2.42E+02	2.72E+02	2.12E+02	1.93E+02	2.26E+02	2.08E+02	2.25E+02
I-135	6.61 H	1.22E+02	1.22E+02	1.37E+02	1.52E+02	1.20E+02	1.11E+02	1.28E+02	1.18E+02	1.28E+02
I-136	83 S	1.86E+02	1.88E+02	2.10E+02	2.35E+02	1.87E+02	1.74E+02	1.99E+02	1.84E+02	2.00E+02
XE-122	20.1 H	5.45E+00	5.29E+00	5.28E+00	1.02E+01	4.76E+00	4.32E+00	5.36E+00	4.83E+00	5.91E+00
XE-123	2.14 H	5.23E+01	5.05E+01	5.56E+01	7.11E+01	4.93E+01	4.46E+01	5.27E+01	4.85E+01	5.30E+01
XE-125	16.8 H	2.25E+01	2.12E+01	2.23E+01	3.53E+01	2.01E+01	1.81E+01	2.18E+01	2.01E+01	2.24E+01
XE-127	36.406 D	2.42E+01	2.24E+01	2.36E+01	3.75E+01	2.14E+01	1.92E+01	2.31E+01	2.14E+01	2.36E+01
XE-129M	8.89 D	2.23E+00	2.66E+00	1.68E+00	9.40E+00	1.59E+00	1.61E+00	2.35E+00	1.88E+00	3.80E+00
XE-131M	11.84 D	8.24E-01	9.84E-01	6.01E-01	3.70E+00	5.76E-01	5.83E-01	8.76E-01	6.93E-01	1.45E+00
XE-133	5.245 D	3.06E+00	3.34E+00	2.98E+00	8.13E+00	2.72E+00	2.48E+00	3.15E+00	2.72E+00	3.84E+00
XE-133M	2.19 D	2.79E+00	2.78E+00	2.52E+00	6.51E+00	2.31E+00	2.14E+00	2.72E+00	2.43E+00	3.32E+00
XE-135	9.11 H	2.30E+01	2.11E+01	2.28E+01	3.18E+01	2.05E+01	1.84E+01	2.17E+01	2.04E+01	2.18E+01
XE-135M	15.36 M	3.80E+01	3.61E+01	4.02E+01	4.84E+01	3.52E+01	3.17E+01	3.75E+01	3.46E+01	3.76E+01
XE-137	3.83 M	1.62E+01	1.55E+01	1.72E+01	2.05E+01	1.51E+01	1.37E+01	1.61E+01	1.49E+01	1.61E+01
XE-138	14.13 M	8.79E+01	8.80E+01	9.80E+01	1.13E+02	8.73E+01	8.05E+01	9.28E+01	8.58E+01	9.31E+01
CS-126	1.64 M	9.93E+01	9.45E+01	1.05E+02	1.26E+02	9.23E+01	8.32E+01	9.80E+01	9.06E+01	9.82E+01
CS-129	32.06 H	2.38E+01	2.27E+01	2.41E+01	3.59E+01	2.14E+01	1.94E+01	2.32E+01	2.13E+01	2.44E+01
CS-131	9.688 D	7.09E-01	9.63E-01	4.14E-01	4.41E+00	4.13E-01	4.68E-01	7.98E-01	5.78E-01	1.58E+00
CS-132	6.475 D	6.17E+01	5.94E+01	6.59E+01	7.96E+01	5.78E+01	5.22E+01	6.18E+01	5.67E+01	6.24E+01
CS-134	2.062 Y	1.36E+02	1.30E+02	1.46E+02	1.67E+02	1.28E+02	1.16E+02	1.36E+02	1.26E+02	1.36E+02
CS-134M	2.90 H	1.87E+00	1.90E+00	1.73E+00	4.55E+00	1.61E+00	1.45E+00	1.88E+00	1.64E+00	2.21E+00
CS-135	2.3E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS-136	13.16 D	1.83E+02	1.77E+02	1.99E+02	2.29E+02	1.75E+02	1.59E+02	1.86E+02	1.71E+02	1.86E+02
CS-137	30.17 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS-138	32.2 M	1.81E+02	1.81E+02	2.03E+02	2.27E+02	1.79E+02	1.65E+02	1.90E+02	1.76E+02	1.91E+02
CS-139	9.40 M	2.28E+01	2.31E+01	2.59E+01	2.88E+01	2.29E+01	2.12E+01	2.44E+01	2.25E+01	2.44E+01
BA-131	11.8 D	4.08E+01	3.89E+01	4.19E+01	5.88E+01	3.72E+01	3.35E+01	4.00E+01	3.68E+01	4.11E+01
BA-133	10.5 Y	3.36E+01	3.21E+01	3.37E+01	5.20E+01	3.01E+01	2.72E+01	3.25E+01	3.00E+01	3.41E+01
BA-133M	38.9 H	5.23E+00	5.11E+00	4.99E+00	9.61E+00	4.52E+00	4.15E+00	5.06E+00	4.61E+00	5.70E+00
BA-135M	28.7 H	4.61E+00	4.55E+00	4.36E+00	8.78E+00	3.96E+00	3.65E+00	4.47E+00	4.06E+00	5.13E+00
BA-137M	2.552 M	5.26E+01	5.04E+01	5.64E+01	6.52E+01	4.94E+01	4.46E+01	5.26E+01	4.84E+01	5.26E+01
BA-139	83.1 M	3.15E+00	2.94E+00	3.14E+00	4.80E+00	2.86E+00	2.54E+00	3.06E+00	2.83E+00	3.04E+00
BA-140	12.789 D	1.68E+01	1.59E+01	1.75E+01	2.24E+01	1.54E+01	1.39E+01	1.65E+01	1.52E+01	1.66E+01
BA-141	18.27 M	7.60E+01	7.28E+01	8.05E+01	9.87E+01	7.15E+01	6.48E+01	7.59E+01	7.03E+01	7.59E+01
BA-142	10.70 M	7.49E+01	7.28E+01	8.13E+01	9.50E+01	7.16E+01	6.52E+01	7.63E+01	7.03E+01	7.64E+01
LA-140	40.22 H	1.79E+02	1.79E+02	2.00E+02	2.26E+02	1.77E+02	1.63E+02	1.88E+02	1.74E+02	1.88E+02
LA-141	3.94 H	3.18E+00	3.20E+00	3.60E+00	3.98E+00	3.17E+00	2.93E+00	3.37E+00	3.11E+00	3.37E+00
LA-142	95.4 M	2.03E+02	2.06E+02	2.30E+02	2.59E+02	2.05E+02	1.91E+02	2.18E+02	2.02E+02	2.20E+02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
I-132	2.30 H	1.89E+02	2.01E+02	2.21E+02	2.05E+02	1.82E+02	1.63E+02	2.24E+02	1.83E+02	1.86E+02
I-133	20.8 H	5.04E+01	5.39E+01	6.10E+01	5.51E+01	4.85E+01	4.34E+01	6.20E+01	4.91E+01	4.97E+01
I-134	52.6 M	2.14E+02	2.28E+02	2.47E+02	2.31E+02	2.06E+02	1.85E+02	2.51E+02	2.07E+02	2.11E+02
I-135	6.61 H	1.21E+02	1.29E+02	1.36E+02	1.30E+02	1.15E+02	1.05E+02	1.38E+02	1.17E+02	1.19E+02
I-136	83 S	1.88E+02	1.98E+02	2.06E+02	2.01E+02	1.74E+02	1.64E+02	2.09E+02	1.81E+02	1.85E+02
XE-122	20.1 H	5.07E+00	5.62E+00	7.46E+00	5.22E+00	4.67E+00	4.22E+00	7.63E+00	4.92E+00	4.99E+00
XE-123	2.14 H	5.01E+01	5.39E+01	6.36E+01	5.37E+01	4.70E+01	4.30E+01	6.48E+01	4.89E+01	4.94E+01
XE-125	16.8 H	2.08E+01	2.27E+01	3.04E+01	2.21E+01	1.88E+01	1.76E+01	3.10E+01	2.05E+01	2.05E+01
XE-127	36.406 D	2.21E+01	2.42E+01	3.31E+01	2.37E+01	1.98E+01	1.88E+01	3.38E+01	2.19E+01	2.18E+01
XE-129M	8.89 D	2.18E+00	2.64E+00	4.22E+00	1.52E+00	1.97E+00	1.52E+00	4.35E+00	1.93E+00	2.08E+00
XE-131M	11.84 D	8.00E-01	9.85E-01	1.59E+00	5.41E-01	7.31E-01	5.55E-01	1.65E+00	7.10E-01	7.66E-01
XE-133	5.245 D	3.15E+00	3.56E+00	6.12E+00	2.22E+00	2.66E+00	2.16E+00	6.30E+00	2.88E+00	2.97E+00
XE-133M	2.19 D	2.58E+00	2.92E+00	4.16E+00	2.51E+00	2.32E+00	2.09E+00	4.27E+00	2.48E+00	2.53E+00
XE-135	9.11 H	2.10E+01	2.27E+01	2.97E+01	2.32E+01	1.89E+01	1.81E+01	3.03E+01	2.08E+01	2.07E+01
XE-135M	15.36 M	3.59E+01	3.85E+01	4.43E+01	3.93E+01	3.45E+01	3.08E+01	4.50E+01	3.50E+01	3.54E+01
XE-137	3.83 M	1.54E+01	1.65E+01	1.89E+01	1.69E+01	1.46E+01	1.33E+01	1.92E+01	1.50E+01	1.52E+01
XE-138	14.13 M	8.81E+01	9.33E+01	1.01E+02	9.46E+01	8.09E+01	7.65E+01	1.03E+02	8.50E+01	8.62E+01
CS-126	1.64 M	9.39E+01	1.01E+02	1.16E+02	1.03E+02	8.98E+01	8.08E+01	1.18E+02	9.17E+01	9.26E+01
CS-129	32.06 H	2.22E+01	2.42E+01	2.98E+01	2.40E+01	2.09E+01	1.89E+01	3.03E+01	2.17E+01	2.19E+01
CS-131	9.688 D	7.13E-01	9.29E-01	1.56E+00	3.43E-01	6.67E-01	4.39E-01	1.62E+00	5.91E-01	6.70E-01
CS-132	6.475 D	5.87E+01	6.30E+01	7.05E+01	6.36E+01	5.70E+01	5.04E+01	7.17E+01	5.70E+01	5.80E+01
CS-134	2.062 Y	1.30E+02	1.39E+02	1.53E+02	1.41E+02	1.26E+02	1.12E+02	1.56E+02	1.26E+02	1.28E+02
CS-134M	2.90 H	1.78E+00	2.02E+00	3.22E+00	1.55E+00	1.55E+00	1.37E+00	3.32E+00	1.71E+00	1.73E+00
CS-135	2.3E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS-136	13.16 D	1.76E+02	1.88E+02	2.08E+02	1.90E+02	1.69E+02	1.52E+02	2.12E+02	1.71E+02	1.74E+02
CS-137	30.17 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS-138	32.2 M	1.81E+02	1.91E+02	2.02E+02	1.93E+02	1.69E+02	1.57E+02	2.05E+02	1.74E+02	1.77E+02
CS-139	9.40 M	2.31E+01	2.43E+01	2.54E+01	2.46E+01	2.15E+01	2.01E+01	2.58E+01	2.22E+01	2.26E+01
BA-131	11.8 D	3.83E+01	4.15E+01	5.16E+01	4.10E+01	3.59E+01	3.25E+01	5.26E+01	3.74E+01	3.78E+01
BA-133	10.5 Y	3.15E+01	3.43E+01	4.46E+01	3.32E+01	2.89E+01	2.64E+01	4.55E+01	3.07E+01	3.09E+01
BA-133M	38.9 H	4.88E+00	5.37E+00	7.27E+00	5.01E+00	4.40E+00	4.03E+00	7.43E+00	4.71E+00	4.76E+00
BA-135M	28.7 H	4.31E+00	4.76E+00	6.52E+00	4.37E+00	3.88E+00	3.53E+00	6.66E+00	4.15E+00	4.20E+00
BA-137M	2.552 M	5.00E+01	5.36E+01	5.97E+01	5.46E+01	4.86E+01	4.31E+01	6.06E+01	4.87E+01	4.95E+01
BA-139	83.1 M	2.92E+00	3.19E+00	4.50E+00	3.04E+00	2.57E+00	2.46E+00	4.60E+00	2.89E+00	2.88E+00
BA-140	12.789 D	1.58E+01	1.70E+01	2.01E+01	1.72E+01	1.50E+01	1.35E+01	2.05E+01	1.54E+01	1.56E+01
BA-141	18.27 M	7.25E+01	7.76E+01	9.05E+01	7.87E+01	6.78E+01	6.25E+01	9.21E+01	7.08E+01	7.13E+01
BA-142	10.70 M	7.24E+01	7.73E+01	8.59E+01	7.78E+01	6.90E+01	6.24E+01	8.74E+01	7.03E+01	7.13E+01
LA-140	40.22 H	1.79E+02	1.89E+02	2.02E+02	1.91E+02	1.68E+02	1.55E+02	2.05E+02	1.72E+02	1.75E+02
LA-141	3.94 H	3.19E+00	3.37E+00	3.53E+00	3.40E+00	3.01E+00	2.77E+00	3.59E+00	3.08E+00	3.11E+00
LA-142	95.4 M	2.07E+02	2.17E+02	2.27E+02	2.22E+02	1.89E+02	1.80E+02	2.30E+02	1.99E+02	2.03E+02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/ISQUARE M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
I-132	2.30 H	2.67E+02	2.10E+02	2.53E+02	1.65E+02	2.29E+02	3.08E+02	4.50E+02	7.58E+02
I-133	20.8 H	7.21E+01	5.53E+01	6.72E+01	4.40E+01	6.16E+01	8.27E+01	3.56E+02	4.38E+02
I-134	52.6 M	3.02E+02	2.39E+02	2.86E+02	1.87E+02	2.58E+02	3.48E+02	6.03E+02	9.51E+02
I-135	6.61 H	1.69E+02	1.34E+02	1.59E+02	1.08E+02	1.45E+02	1.93E+02	3.01E+02	4.95E+02
I-136	83 S	2.59E+02	2.05E+02	2.41E+02	1.68E+02	2.22E+02	2.93E+02	2.19E+03	2.48E+03
XE-122	20.1 H	8.89E+00	5.87E+00	7.76E+00	4.22E+00	7.32E+00	1.15E+01	0.0	1.15E+01
XE-123	2.14 H	7.33E+01	5.59E+01	6.85E+01	4.40E+01	6.27E+01	8.44E+01	1.54E+02	2.38E+02
XE-125	16.8 H	3.27E+01	2.39E+01	3.04E+01	1.80E+01	2.80E+01	3.84E+01	3.35E-01	3.87E+01
XE-127	36.406 D	3.46E+01	2.53E+01	3.24E+01	1.93E+01	2.98E+01	3.99E+01	0.0	3.99E+01
XE-129M	8.89 D	6.45E+00	3.11E+00	4.79E+00	1.35E+00	4.76E+00	1.04E+01	0.0	1.04E+01
XE-131M	11.84 D	2.49E+00	1.15E+00	1.82E+00	4.77E-01	1.83E+00	4.11E+00	0.0	4.11E+00
XE-133	5.245 D	6.29E+00	4.22E+00	5.68E+00	2.40E+00	5.08E+00	7.97E+00	0.0	7.97E+00
XE-133M	2.19 D	5.17E+00	3.16E+00	4.35E+00	2.05E+00	4.15E+00	7.13E+00	0.0	7.13E+00
XE-135	9.11 H	3.10E+01	2.35E+01	2.94E+01	1.85E+01	2.71E+01	3.46E+01	2.10E+02	2.44E+02
XE-135M	15.36 M	5.20E+01	3.93E+01	4.81E+01	3.13E+01	4.43E+01	5.98E+01	1.04E+02	1.64E+02
XE-137	3.83 M	2.20E+01	1.68E+01	2.05E+01	1.35E+01	1.89E+01	2.51E+01	1.92E+03	1.95E+03
XE-138	14.13 M	1.22E+02	9.56E+01	1.14E+02	7.90E+01	1.05E+02	1.38E+02	5.96E+02	7.34E+02
CS-126	1.64 M	1.35E+02	1.03E+02	1.25E+02	8.21E+01	1.16E+02	1.55E+02	1.45E+03	1.60E+03
CS-129	32.06 H	3.49E+01	2.49E+01	3.15E+01	1.91E+01	2.94E+01	4.20E+01	1.36E+00	4.34E+01
CS-131	9.688 D	2.82E+00	1.13E+00	1.92E+00	3.17E-01	1.99E+00	4.97E+00	0.0	4.97E+00
CS-132	6.475 D	8.56E+01	6.55E+01	7.97E+01	5.08E+01	7.26E+01	1.00E+02	5.07E+00	1.05E+02
CS-134	2.062 Y	1.85E+02	1.44E+02	1.74E+02	1.13E+02	1.58E+02	2.13E+02	6.30E+01	2.76E+02
CS-134M	2.90 H	3.52E+00	2.28E+00	3.11E+00	1.41E+00	2.87E+00	4.66E+00	0.0	4.66E+00
CS-135	2.3E6 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS-136	13.16 D	2.50E+02	1.98E+02	2.38E+02	1.54E+02	2.14E+02	2.88E+02	5.37E+00	2.94E+02
CS-137	30.17 Y	0.0	0.0	0.0	0.0	0.0	0.0	3.99E+01	3.99E+01
CS-138	32.2 M	2.50E+02	1.98E+02	2.34E+02	1.61E+02	2.15E+02	2.85E+02	1.32E+03	1.60E+03
CS-139	9.40 M	3.18E+01	2.52E+01	2.97E+01	2.06E+01	2.73E+01	3.62E+01	1.79E+03	1.83E+03
BA-131	11.8 D	5.84E+01	4.30E+01	5.38E+01	3.31E+01	4.96E+01	6.81E+01	2.56E+00	7.07E+01
BA-133	10.5 Y	4.94E+01	3.58E+01	4.53E+01	2.70E+01	4.19E+01	5.82E+01	0.0	5.82E+01
BA-133M	38.9 H	8.42E+00	5.75E+00	7.48E+00	4.07E+00	6.98E+00	1.06E+01	0.0	1.06E+01
BA-135M	28.7 H	7.61E+00	5.13E+00	6.72E+00	3.57E+00	6.27E+00	9.60E+00	0.0	9.60E+00
BA-137M	2.552 M	7.16E+01	5.55E+01	6.72E+01	4.35E+01	6.11E+01	8.26E+01	6.94E+01	1.52E+02
BA-139	83.1 M	4.43E+00	3.39E+00	4.29E+00	2.57E+00	3.88E+00	4.90E+00	9.51E+02	9.56E+02
BA-140	12.789 D	2.32E+01	1.74E+01	2.15E+01	1.37E+01	1.98E+01	2.70E+01	1.82E+02	2.09E+02
BA-141	18.27 M	1.04E+02	8.05E+01	9.80E+01	6.39E+01	8.94E+01	1.18E+02	8.82E+02	1.00E+03
BA-142	10.70 M	1.03E+02	8.13E+01	9.78E+01	6.35E+01	8.82E+01	1.18E+02	4.04E+02	5.22E+02
LA-140	40.22 H	2.48E+02	1.96E+02	2.33E+02	1.59E+02	2.13E+02	2.84E+02	5.08E+02	7.92E+02
LA-141	3.94 H	4.42E+00	3.53E+00	4.17E+00	2.84E+00	3.79E+00	5.06E+00	1.01E+03	1.01E+03
LA-142	95.4 M	2.84E+02	2.23E+02	2.61E+02	1.85E+02	2.44E+02	3.20E+02	8.81E+02	1.20E+03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
CE-139	137.66 D	1.35E+01	1.29E+01	1.30E+01	2.38E+01	1.19E+01	1.07E+01	1.31E+01	1.19E+01	1.38E+01
CE-141	32.50 D	6.87E+00	6.46E+00	6.72E+00	1.15E+01	6.19E+00	5.44E+00	6.70E+00	6.10E+00	6.69E+00
CE-143	33.0 H	2.34E+01	2.25E+01	2.39E+01	3.38E+01	2.13E+01	1.93E+01	2.29E+01	2.11E+01	2.38E+01
CE-144	284.3 D	1.59E+00	1.56E+00	1.55E+00	2.98E+00	1.43E+00	1.27E+00	1.58E+00	1.41E+00	1.65E+00
PR-142	19.13 H	4.28E+00	4.33E+00	4.88E+00	5.39E+00	4.30E+00	3.99E+00	4.58E+00	4.22E+00	4.58E+00
PR-143	13.56 D	7.81E-07	7.51E-07	8.43E-07	9.57E-07	7.39E-07	6.68E-07	7.86E-07	7.23E-07	7.84E-07
PR-144	17.28 M	2.50E+00	2.50E+00	2.80E+00	3.15E+00	2.49E+00	2.29E+00	2.65E+00	2.44E+00	2.66E+00
PR-144M	7.2 M	4.25E-01	6.32E-01	3.25E-01	1.91E+00	3.04E-01	3.43E-01	4.85E-01	3.64E-01	8.66E-01
ND-147	10.98 D	1.16E+01	1.15E+01	1.20E+01	1.83E+01	1.07E+01	9.66E+00	1.16E+01	1.05E+01	1.22E+01
ND-149	1.73 H	3.41E+01	3.22E+01	3.47E+01	4.79E+01	3.10E+01	2.79E+01	3.31E+01	3.07E+01	3.34E+01
PM-143	265 D	2.61E+01	2.57E+01	2.78E+01	3.54E+01	2.44E+01	2.23E+01	2.64E+01	2.41E+01	2.73E+01
PM-144	363 D	1.36E+02	1.30E+02	1.45E+02	1.72E+02	1.27E+02	1.15E+02	1.36E+02	1.25E+02	1.36E+02
PM-145	17.7 Y	1.32E+00	1.88E+00	1.09E+00	5.24E+00	1.01E+00	1.09E+00	1.48E+00	1.14E+00	2.46E+00
PM-146	2020 D	6.57E+01	6.31E+01	6.99E+01	8.40E+01	6.14E+01	5.54E+01	6.54E+01	6.02E+01	6.60E+01
PM-147	2.6234 Y	3.19E-04	2.99E-04	3.18E-04	5.32E-04	2.93E-04	2.53E-04	3.15E-04	2.85E-04	3.03E-04
PM-148	5.37 D	4.56E+01	4.49E+01	5.05E+01	5.67E+01	4.43E+01	4.06E+01	4.72E+01	4.35E+01	4.71E+01
PM-148M	41.3 D	1.75E+02	1.67E+02	1.87E+02	2.18E+02	1.64E+02	1.48E+02	1.74E+02	1.61E+02	1.74E+02
PM-149	53.08 H	1.06E+00	9.89E-01	1.08E+00	1.42E+00	9.63E-01	8.66E-01	1.02E+00	9.53E-01	1.02E+00
PM-151	28.40 H	3.00E+01	2.84E+01	3.08E+01	4.15E+01	2.74E+01	2.47E+01	2.93E+01	2.71E+01	2.96E+01
SM-147	1.069E11 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM-151	90 Y	1.16E-04	6.10E-05	3.46E-05	1.87E-03	4.09E-05	3.09E-05	1.01E-04	8.18E-05	1.54E-04
SM-153	46.7 H	4.48E+00	4.94E+00	4.35E+00	1.06E+01	3.98E+00	3.67E+00	4.63E+00	3.99E+00	5.48E+00
EU-152	13.6 Y	9.35E+01	9.18E+01	1.02E+02	1.22E+02	8.96E+01	8.19E+01	9.58E+01	8.80E+01	9.66E+01
EU-152M	9.32 H	2.65E+01	2.59E+01	2.87E+01	3.43E+01	2.52E+01	2.30E+01	2.70E+01	2.47E+01	2.73E+01
EU-154	8.8 Y	1.02E+02	1.00E+02	1.12E+02	1.30E+02	9.87E+01	9.00E+01	1.05E+02	9.67E+01	1.05E+02
EU-155	4.96 Y	4.91E+00	5.06E+00	4.96E+00	1.01E+01	4.53E+00	4.02E+00	5.00E+00	4.40E+00	5.32E+00
EU-156	15.19 D	1.05E+02	1.05E+02	1.18E+02	1.33E+02	1.04E+02	9.60E+01	1.11E+02	1.02E+02	1.11E+02
GD-152	1.1E14 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GD-153	241.6 D	7.77E+00	8.77E+00	7.47E+00	1.94E+01	6.84E+00	6.37E+00	8.09E+00	6.90E+00	9.84E+00
GD-159	18.56 H	3.42E+00	3.35E+00	3.46E+00	5.35E+00	3.08E+00	2.80E+00	3.33E+00	3.06E+00	3.55E+00
GD-162	9.7 M	3.82E+01	3.59E+01	3.96E+01	4.93E+01	3.50E+01	3.14E+01	3.71E+01	3.44E+01	3.72E+01
TB-157	150 Y	2.23E-01	3.05E-01	2.02E-01	8.39E-01	1.82E-01	1.90E-01	2.43E-01	1.96E-01	3.73E-01
TB-160	72.3 D	9.01E+01	8.77E+01	9.80E+01	1.14E+02	8.63E+01	7.86E+01	9.19E+01	8.46E+01	9.19E+01
TB-162	7.76 M	9.59E+01	9.18E+01	1.02E+02	1.22E+02	9.02E+01	8.15E+01	9.59E+01	8.85E+01	9.59E+01
DY-157	8.06 H	3.10E+01	2.96E+01	3.12E+01	4.55E+01	2.79E+01	2.52E+01	2.99E+01	2.77E+01	3.10E+01
DY-165	2.334 H	2.15E+00	2.13E+00	2.23E+00	3.36E+00	1.98E+00	1.79E+00	2.14E+00	1.95E+00	2.25E+00
DY-166	81.6 H	2.71E+00	3.08E+00	2.73E+00	6.74E+00	2.44E+00	2.28E+00	2.78E+00	2.42E+00	3.39E+00
HO-166	26.80 H	2.13E+00	2.22E+00	2.33E+00	3.57E+00	2.06E+00	1.90E+00	2.23E+00	2.02E+00	2.36E+00
HO-166M	1.20E3 Y	1.40E+02	1.34E+02	1.49E+02	1.80E+02	1.32E+02	1.19E+02	1.40E+02	1.29E+02	1.40E+02
ER-169	9.40 D	1.66E-04	1.37E-04	1.46E-04	1.99E-03	1.36E-04	1.15E-04	1.44E-04	1.38E-04	1.39E-04

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
CE-139	137.66 D	1.25E+01	1.38E+01	2.05E+01	1.25E+01	1.09E+01	1.03E+01	2.10E+01	1.23E+01	1.23E+01
CE-141	32.50 D	6.37E+00	7.02E+00	1.07E+01	6.31E+00	5.51E+00	5.22E+00	1.10E+01	6.31E+00	6.28E+00
CE-143	33.0 H	2.21E+01	2.39E+01	2.98E+01	2.35E+01	2.05E+01	1.86E+01	3.03E+01	2.14E+01	2.17E+01
CE-144	284.3 D	1.51E+00	1.68E+00	2.65E+00	1.39E+00	1.30E+00	1.19E+00	2.72E+00	1.47E+00	1.48E+00
PR-142	19.13 H	4.34E+00	4.57E+00	4.75E+00	4.61E+00	4.05E+00	3.77E+00	4.83E+00	4.18E+00	4.22E+00
PR-143	13.56 D	7.46E-07	7.97E-07	8.75E-07	8.11E-07	7.25E-07	6.43E-07	8.90E-07	7.24E-07	7.38E-07
PR-144	17.28 H	2.51E+00	2.65E+00	2.79E+00	2.69E+00	2.33E+00	2.18E+00	2.84E+00	2.41E+00	2.46E+00
PR-144M	7.2 M	4.95E-01	5.64E-01	9.91E-01	2.27E-01	4.10E-01	2.71E-01	1.01E+00	3.88E-01	4.30E-01
ND-147	10.98 D	1.12E+01	1.22E+01	1.61E+01	1.12E+01	1.04E+01	9.14E+00	1.64E+01	1.08E+01	1.10E+01
ND-149	1.73 H	3.19E+01	3.45E+01	4.42E+01	3.41E+01	2.93E+01	2.70E+01	4.51E+01	3.12E+01	3.14E+01
PM-143	265 D	2.52E+01	2.70E+01	3.06E+01	2.65E+01	2.43E+01	2.13E+01	3.11E+01	2.42E+01	2.47E+01
PM-144	363 D	1.29E+02	1.39E+02	1.56E+02	1.40E+02	1.25E+02	1.11E+02	1.59E+02	1.26E+02	1.28E+02
PM-145	17.7 Y	1.53E+00	1.72E+00	3.05E+00	7.47E-01	1.26E+00	8.58E-01	3.11E+00	1.23E+00	1.34E+00
PM-146	2020 D	6.25E+01	6.70E+01	7.62E+01	6.78E+01	6.01E+01	5.36E+01	7.74E+01	6.07E+01	6.16E+01
PM-147	2.6234 Y	2.98E-04	3.30E-04	5.22E-04	2.85E-04	2.56E-04	2.41E-04	5.37E-04	2.96E-04	2.94E-04
PM-148	5.37 D	4.48E+01	4.75E+01	5.10E+01	4.81E+01	4.26E+01	3.87E+01	5.19E+01	4.33E+01	4.39E+01
PM-148M	41.3 D	1.66E+02	1.78E+02	2.00E+02	1.81E+02	1.60E+02	1.43E+02	2.03E+02	1.62E+02	1.64E+02
PM-149	53.08 H	9.83E-01	1.06E+00	1.32E+00	1.09E+00	9.06E-01	8.47E-01	1.35E+00	9.69E-01	9.70E-01
PM-151	28.40 H	2.81E+01	3.04E+01	3.80E+01	3.02E+01	2.61E+01	2.39E+01	3.87E+01	2.75E+01	2.77E+01
SM-147	1.069E11 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM-151	90 Y	5.22E-05	1.36E-04	1.96E-04	4.65E-05	8.86E-05	7.11E-05	2.27E-04	7.09E-05	8.06E-05
SM-153	46.7 H	4.62E+00	5.13E+00	8.69E+00	3.41E+00	3.87E+00	3.21E+00	8.91E+00	4.22E+00	4.34E+00
EU-152	13.6 Y	9.11E+01	9.71E+01	1.09E+02	9.68E+01	8.64E+01	7.80E+01	1.11E+02	8.81E+01	8.93E+01
EU-152M	9.32 H	2.56E+01	2.74E+01	3.06E+01	2.72E+01	2.46E+01	2.19E+01	3.11E+01	2.47E+01	2.52E+01
EU-154	8.8 Y	9.97E+01	1.06E+02	1.17E+02	1.06E+02	9.52E+01	8.58E+01	1.19E+02	9.66E+01	9.80E+01
EU-155	4.96 Y	4.93E+00	5.47E+00	9.27E+00	3.90E+00	4.15E+00	3.59E+00	9.53E+00	4.66E+00	4.72E+00
EU-156	15.19 D	1.05E+02	1.11E+02	1.18E+02	1.12E+02	9.87E+01	9.10E+01	1.20E+02	1.01E+02	1.03E+02
GD-152	1.1E14 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GD-153	241.6 D	8.11E+00	9.01E+00	1.54E+01	5.75E+00	6.76E+00	5.52E+00	1.58E+01	7.32E+00	7.56E+00
GD-159	18.56 H	3.27E+00	3.55E+00	4.68E+00	3.32E+00	2.98E+00	2.67E+00	4.77E+00	3.14E+00	3.18E+00
GD-162	9.7 M	3.57E+01	3.84E+01	4.57E+01	3.94E+01	3.37E+01	3.07E+01	4.64E+01	3.50E+01	3.52E+01
TB-157	150 Y	2.63E-01	2.93E-01	5.25E-01	1.29E-01	2.12E-01	1.47E-01	5.37E-01	2.13E-01	2.30E-01
TB-160	72.3 D	8.72E+01	9.30E+01	1.03E+02	9.35E+01	8.34E+01	7.50E+01	1.05E+02	8.45E+01	8.59E+01
TB-162	7.76 M	9.13E+01	9.78E+01	1.12E+02	9.87E+01	8.69E+01	7.85E+01	1.14E+02	8.89E+01	9.02E+01
DY-157	8.06 H	2.91E+01	3.15E+01	4.09E+01	3.09E+01	2.65E+01	2.44E+01	4.17E+01	2.83E+01	2.85E+01
DY-165	2.334 H	2.09E+00	2.27E+00	2.99E+00	2.05E+00	1.93E+00	1.69E+00	3.06E+00	2.00E+00	2.03E+00
DY-166	81.6 H	2.92E+00	3.23E+00	5.52E+00	1.97E+00	2.43E+00	1.92E+00	5.65E+00	2.59E+00	2.70E+00
HO-166	26.80 H	2.19E+00	2.36E+00	3.10E+00	2.01E+00	1.97E+00	1.73E+00	3.17E+00	2.06E+00	2.10E+00
HO-166M	1.20E3 Y	1.33E+02	1.43E+02	1.65E+02	1.44E+02	1.27E+02	1.14E+02	1.68E+02	1.30E+02	1.32E+02
ER-169	9.40 D	1.36E-04	1.68E-04	2.55E-04	1.31E-04	1.25E-04	1.21E-04	2.80E-04	1.39E-04	1.39E-04

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/SQUARE M

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
CE-139	137.66 D	2.06E+01	1.50E+01	1.94E+01	1.07E+01	1.76E+01	2.39E+01	0.0	2.39E+01
CE-141	32.50 D	1.01E+01	7.63E+00	9.80E+00	5.53E+00	8.78E+00	1.11E+01	1.64E+01	2.75E+01
CE-143	33.0 H	3.35E+01	2.51E+01	3.12E+01	1.90E+01	2.85E+01	3.88E+01	3.53E+02	3.92E+02
CE-144	284.3 D	2.53E+00	1.88E+00	2.43E+00	1.28E+00	2.16E+00	2.86E+00	0.0	2.86E+00
PR-142	19.13 H	5.97E+00	4.75E+00	5.59E+00	3.89E+00	5.13E+00	6.81E+00	8.70E+02	8.77E+02
PR-143	13.56 D	1.06E-06	8.33E-07	1.00E-06	6.48E-07	9.06E-07	1.22E-06	2.27E+02	2.27E+02
PR-144	17.28 H	3.46E+00	2.72E+00	3.22E+00	2.24E+00	2.98E+00	3.94E+00	1.31E+03	1.31E+03
PR-144M	7.2 H	1.36E+00	7.93E-01	1.09E+00	2.94E-01	1.01E+00	2.01E+00	0.0	2.01E+00
ND-147	10.98 D	1.76E+01	1.31E+01	1.64E+01	9.53E+00	1.48E+01	2.04E+01	1.27E+02	1.48E+02
ND-149	1.73 H	4.75E+01	3.60E+01	4.48E+01	2.78E+01	4.09E+01	5.36E+01	4.07E+02	4.61E+02
PM-143	265 D	3.74E+01	2.87E+01	3.49E+01	2.15E+01	3.15E+01	4.41E+01	1.08E+00	4.52E+01
PM-144	363 D	1.86E+02	1.44E+02	1.74E+02	1.12E+02	1.59E+02	2.15E+02	8.81E+00	2.24E+02
PM-145	17.7 Y	3.85E+00	2.39E+00	3.20E+00	9.72E-01	2.91E+00	5.36E+00	0.0	5.36E+00
PM-146	2020 D	9.04E+01	6.95E+01	8.46E+01	5.42E+01	7.71E+01	1.04E+02	5.64E+01	1.61E+02
PM-147	2.6234 Y	4.65E-04	3.59E-04	4.63E-04	2.59E-04	4.10E-04	4.96E-04	0.0	4.96E-04
PM-148	5.37 D	6.27E+01	4.95E+01	5.90E+01	3.95E+01	5.37E+01	7.20E+01	7.38E+02	8.10E+02
PM-148M	41.3 D	2.38E+02	1.84E+02	2.23E+02	1.45E+02	2.03E+02	2.73E+02	3.83E+01	3.12E+02
PM-149	53.08 H	1.44E+00	1.09E+00	1.36E+00	8.65E-01	1.25E+00	1.62E+00	2.94E+02	2.96E+02
PM-151	28.40 H	4.17E+01	3.17E+01	3.93E+01	2.45E+01	3.59E+01	4.74E+01	1.87E+02	2.34E+02
SM-147	1.069E11 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM-151	90 Y	6.56E-04	5.69E-05	2.64E-04	7.38E-06	5.20E-04	2.87E-03	0.0	2.87E-03
SM-153	46.7 H	8.60E+00	6.21E+00	8.05E+00	3.60E+00	7.08E+00	1.02E+01	1.01E+02	1.11E+02
EU-152	13.6 Y	1.30E+02	1.03E+02	1.23E+02	7.97E+01	1.11E+02	1.50E+02	6.05E+01	2.11E+02
EU-152M	9.32 H	3.70E+01	2.91E+01	3.51E+01	2.22E+01	3.15E+01	4.29E+01	4.97E+02	5.40E+02
EU-154	8.8 Y	1.41E+02	1.12E+02	1.34E+02	8.74E+01	1.21E+02	1.62E+02	1.35E+02	2.97E+02
EU-155	4.96 Y	8.43E+00	6.37E+00	8.22E+00	4.03E+00	7.15E+00	9.39E+00	0.0	9.39E+00
EU-156	15.19 D	1.46E+02	1.16E+02	1.37E+02	9.34E+01	1.26E+02	1.67E+02	3.36E+02	5.03E+02
GD-152	1.1E14 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GD-153	241.6 D	1.55E+01	1.11E+01	1.44E+01	6.22E+00	1.27E+01	1.86E+01	0.0	1.86E+01
GD-159	18.56 H	5.12E+00	3.79E+00	4.74E+00	2.78E+00	4.33E+00	5.94E+00	2.22E+02	2.28E+02
GD-162	9.7 H	5.18E+01	3.90E+01	4.80E+01	3.13E+01	4.45E+01	5.90E+01	2.38E+02	2.97E+02
TB-157	150 Y	5.98E-01	3.99E-01	5.20E-01	1.75E-01	4.70E-01	8.96E-01	0.0	8.96E-01
TB-160	72.3 D	1.24E+02	9.82E+01	1.18E+02	7.62E+01	1.06E+02	1.42E+02	1.10E+02	2.53E+02
TB-162	7.76 H	1.31E+02	1.03E+02	1.24E+02	7.96E+01	1.12E+02	1.50E+02	4.56E+02	6.06E+02
OY-157	8.06 H	4.43E+01	3.30E+01	4.13E+01	2.52E+01	3.79E+01	5.06E+01	0.0	5.06E+01
OY-165	2.334 H	3.25E+00	2.46E+00	3.06E+00	1.76E+00	2.74E+00	3.75E+00	3.97E+02	4.01E+02
OY-166	81.6 H	5.44E+00	3.95E+00	5.09E+00	2.21E+00	4.45E+00	6.58E+00	1.72E+00	8.30E+00
HO-166	26.80 H	3.38E+00	2.62E+00	3.21E+00	1.85E+00	2.86E+00	3.97E+00	6.95E+02	6.99E+02
HO-166M	1.20E3 Y	1.92E+02	1.50E+02	1.82E+02	1.16E+02	1.65E+02	2.20E+02	2.22E+01	2.42E+02
ER-169	9.40 D	3.77E-04	1.66E-04	2.26E-04	1.17E-04	4.96E-04	3.94E-03	0.0	3.94E-03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/ISQUARE M

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
ER-171	7.52 H	3.37E+01	3.16E+01	3.40E+01	4.86E+01	3.05E+01	2.73E+01	3.24E+01	3.01E+01	3.28E+01
TM-170	128.6 D	3.97E-01	4.31E-01	4.10E-01	9.40E-01	3.68E-01	3.33E-01	4.03E-01	3.57E-01	4.58E-01
TM-171	1.92 Y	4.52E-02	5.31E-02	4.66E-02	1.24E-01	4.13E-02	3.88E-02	4.64E-02	4.06E-02	5.85E-02
YB-169	31.97 D	2.56E+01	2.58E+01	2.55E+01	4.90E+01	2.31E+01	2.09E+01	2.51E+01	2.28E+01	2.73E+01
YB-175	4.19 D	3.56E+00	3.35E+00	3.63E+00	4.96E+00	3.24E+00	2.91E+00	3.44E+00	3.19E+00	3.47E+00
LU-177	6.71 D	3.17E+00	2.97E+00	3.12E+00	5.02E+00	2.84E+00	2.53E+00	3.03E+00	2.81E+00	3.06E+00
LU-177M	160.10 D	8.97E+01	8.42E+01	9.00E+01	1.32E+02	8.10E+01	7.25E+01	8.61E+01	8.00E+01	8.70E+01
HF-181	42.39 D	4.85E+01	4.60E+01	5.05E+01	6.55E+01	4.47E+01	4.01E+01	4.75E+01	4.39E+01	4.76E+01
TA-182	114.74 D	1.03E+02	1.01E+02	1.13E+02	1.33E+02	9.96E+01	9.12E+01	1.06E+02	9.76E+01	1.06E+02
W-181	120.95 D	2.76E+00	3.17E+00	2.89E+00	7.18E+00	2.56E+00	2.37E+00	2.82E+00	2.48E+00	3.43E+00
W-185	75.1 D	2.44E-03	2.28E-03	2.43E-03	4.02E-03	2.24E-03	1.94E-03	2.40E-03	2.18E-03	2.31E-03
W-187	23.83 H	4.18E+01	4.02E+01	4.45E+01	5.45E+01	3.91E+01	3.52E+01	4.16E+01	3.83E+01	4.18E+01
W-188	69.4 D	1.63E-01	1.50E-01	1.62E-01	2.29E-01	1.46E-01	1.31E-01	1.54E-01	1.44E-01	1.55E-01
RE-182	64.0 H	1.42E+02	1.40E+02	1.53E+02	1.95E+02	1.36E+02	1.24E+02	1.45E+02	1.33E+02	1.46E+02
RE-182M	12.7 H	9.43E+01	9.40E+01	1.04E+02	1.26E+02	9.17E+01	8.40E+01	9.78E+01	8.98E+01	9.88E+01
RE-183	70 D	1.25E+01	1.28E+01	1.27E+01	2.50E+01	1.14E+01	1.03E+01	1.24E+01	1.12E+01	1.34E+01
RE-184	38.0 D	7.61E+01	7.43E+01	8.25E+01	9.92E+01	7.25E+01	6.57E+01	7.73E+01	7.09E+01	7.78E+01
RE-184M	169 D	3.33E+01	3.23E+01	3.50E+01	4.83E+01	3.11E+01	2.81E+01	3.32E+01	3.05E+01	3.37E+01
RE-186	90.64 H	1.78E+00	1.74E+00	1.79E+00	3.26E+00	1.63E+00	1.44E+00	1.76E+00	1.59E+00	1.79E+00
RE-187	4.7E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RE-188	16.98 H	5.12E+00	4.87E+00	5.31E+00	7.28E+00	4.76E+00	4.25E+00	5.06E+00	4.66E+00	5.03E+00
OS-185	93.6 D	6.14E+01	5.94E+01	6.59E+01	8.00E+01	5.78E+01	5.22E+01	6.15E+01	5.65E+01	6.20E+01
OS-186	2.0E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OS-190M	9.9 M	1.42E+02	1.34E+02	1.49E+02	1.84E+02	1.31E+02	1.18E+02	1.39E+02	1.29E+02	1.39E+02
OS-191	15.4 D	5.95E+00	6.02E+00	6.09E+00	1.21E+01	5.52E+00	4.89E+00	5.93E+00	5.33E+00	6.22E+00
OS-191M	13.03 H	3.46E-01	3.82E-01	3.63E-01	1.10E+00	3.23E-01	2.94E-01	3.49E-01	3.11E-01	4.04E-01
OS-193	30.0 H	5.92E+00	5.68E+00	6.13E+00	8.78E+00	5.45E+00	4.88E+00	5.79E+00	5.34E+00	5.88E+00
IR-190	11.78 D	1.24E+02	1.18E+02	1.30E+02	1.63E+02	1.15E+02	1.03E+02	1.22E+02	1.13E+02	1.23E+02
IR-190M	1.2 H	4.12E-03	4.77E-07	3.29E-04	3.23E-01	5.37E-04	7.12E-06	1.07E-05	1.69E-03	5.80E-06
IR-190M	3.2 H	3.54E+00	3.95E+00	3.75E+00	8.62E+00	3.33E+00	3.04E+00	3.60E+00	3.19E+00	4.17E+00
IR-192	74.02 D	7.45E+01	6.96E+01	7.65E+01	9.78E+01	6.79E+01	6.10E+01	7.19E+01	6.69E+01	7.20E+01
IR-193M	11.9 D	2.91E-02	2.78E-02	2.70E-02	3.72E-01	2.43E-02	2.15E-02	2.56E-02	2.43E-02	2.92E-02
IR-194	19.15 H	8.02E+00	7.59E+00	8.38E+00	1.04E+01	7.43E+00	6.71E+00	7.88E+00	7.32E+00	7.88E+00
IR-194M	171 D	2.09E+02	1.98E+02	2.20E+02	2.66E+02	1.93E+02	1.74E+02	2.05E+02	1.90E+02	2.05E+02
PT-191	2.71 D	2.47E+01	2.43E+01	2.58E+01	3.97E+01	2.29E+01	2.06E+01	2.44E+01	2.23E+01	2.53E+01
PT-193	50 Y	4.02E-03	7.24E-10	3.20E-04	3.14E-01	5.23E-04	6.74E-06	9.93E-06	1.65E-03	4.81E-06
PT-193M	4.33 D	8.09E-01	8.78E-01	8.54E-01	2.19E+00	7.62E-01	6.86E-01	8.17E-01	7.28E-01	9.16E-01
PT-195M	4.02 D	5.50E+00	5.83E+00	5.74E+00	1.28E+01	5.16E+00	4.61E+00	5.56E+00	4.95E+00	6.07E+00
PT-197	18.3 H	1.96E+00	1.96E+00	2.01E+00	3.96E+00	1.81E+00	1.61E+00	1.93E+00	1.75E+00	2.01E+00
PT-197M	94.4 H	6.84E+00	6.76E+00	7.05E+00	1.21E+01	6.28E+00	5.65E+00	6.69E+00	6.13E+00	7.02E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/ISQUARE M

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
ER-171	7.52 H	3.14E+01	3.41E+01	4.51E+01	3.34E+01	2.85E+01	2.65E+01	4.60E+01	3.08E+01	3.09E+01
TM-170	128.6 D	4.22E-01	4.68E-01	8.21E-01	2.88E-01	3.48E-01	2.82E-01	8.44E-01	3.83E-01	3.94E-01
TM-171	1.92 Y	5.10E-02	5.68E-02	1.02E-01	2.94E-02	4.14E-02	3.11E-02	1.05E-01	4.42E-02	4.63E-02
YB-169	31.97 D	2.53E+01	2.78E+01	4.36E+01	2.20E+01	2.16E+01	1.91E+01	4.47E+01	2.39E+01	2.42E+01
YB-175	4.19 D	3.33E+00	3.60E+00	4.61E+00	3.57E+00	3.06E+00	2.82E+00	4.70E+00	3.26E+00	3.27E+00
LU-177	6.71 D	2.95E+00	3.23E+00	4.72E+00	2.98E+00	2.57E+00	2.43E+00	4.83E+00	2.90E+00	2.89E+00
LU-177M	160.10 D	8.36E+01	9.08E+01	1.23E+02	8.79E+01	7.51E+01	7.00E+01	1.26E+02	8.20E+01	8.21E+01
HF-181	42.39 D	4.57E+01	4.93E+01	6.10E+01	4.91E+01	4.29E+01	3.88E+01	6.21E+01	4.47E+01	4.50E+01
TA-182	114.74 D	1.01E+02	1.08E+02	1.20E+02	1.06E+02	9.56E+01	8.63E+01	1.22E+02	9.75E+01	9.89E+01
W-181	120.95 D	3.08E+00	3.42E+00	6.13E+00	1.85E+00	2.50E+00	1.91E+00	6.29E+00	2.70E+00	2.81E+00
W-185	75.1 D	2.27E-03	2.51E-03	3.94E-03	2.20E-03	1.96E-03	1.85E-03	4.05E-03	2.26E-03	2.24E-03
W-187	23.83 H	3.99E+01	4.28E+01	5.02E+01	4.26E+01	3.81E+01	3.39E+01	5.11E+01	3.87E+01	3.93E+01
W-188	69.4 D	1.49E-01	1.62E-01	2.14E-01	1.63E-01	1.34E-01	1.28E-01	2.18E-01	1.48E-01	1.47E-01
RE-182	64.0 H	1.39E+02	1.49E+02	1.77E+02	1.44E+02	1.29E+02	1.17E+02	1.81E+02	1.34E+02	1.36E+02
RE-182M	12.7 H	9.35E+01	9.97E+01	1.13E+02	9.66E+01	8.80E+01	7.91E+01	1.15E+02	8.99E+01	9.13E+01
RE-183	70 D	1.26E+01	1.39E+01	2.24E+01	1.04E+01	1.06E+01	9.23E+00	2.29E+01	1.18E+01	1.20E+01
RE-184	38.0 D	7.37E+01	7.89E+01	9.00E+01	7.75E+01	7.07E+01	6.25E+01	9.17E+01	7.11E+01	7.26E+01
RE-184M	169 D	3.21E+01	3.46E+01	4.40E+01	3.26E+01	2.96E+01	2.66E+01	4.49E+01	3.10E+01	3.14E+01
RE-186	90.64 H	1.72E+00	1.90E+00	3.05E+00	1.54E+00	1.47E+00	1.33E+00	3.13E+00	1.67E+00	1.67E+00
RE-187	4.7E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RE-188	16.98 H	4.84E+00	5.24E+00	6.81E+00	5.04E+00	4.44E+00	4.07E+00	6.96E+00	4.74E+00	4.77E+00
OS-185	93.6 D	5.90E+01	6.33E+01	7.31E+01	6.25E+01	5.66E+01	5.00E+01	7.44E+01	5.70E+01	5.81E+01
OS-186	2.0E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OS-190M	9.9 M	1.33E+02	1.44E+02	1.70E+02	1.46E+02	1.27E+02	1.15E+02	1.73E+02	1.31E+02	1.32E+02
OS-191	15.4 D	5.97E+00	6.59E+00	1.10E+01	4.83E+00	5.00E+00	4.36E+00	1.13E+01	5.64E+00	5.70E+00
OS-191M	13.03 H	3.75E-01	4.17E-01	7.41E-01	2.40E-01	3.07E-01	2.43E-01	7.63E-01	3.36E-01	3.47E-01
OS-193	30.0 H	5.65E+00	6.12E+00	8.11E+00	5.77E+00	5.16E+00	4.66E+00	8.27E+00	5.48E+00	5.52E+00
IR-190	11.78 D	1.17E+02	1.26E+02	1.51E+02	1.27E+02	1.11E+02	1.00E+02	1.54E+02	1.14E+02	1.16E+02
IR-190M	1.2 H	4.04E-05	3.26E-03	1.96E-03	1.07E-03	1.61E-03	2.41E-03	5.29E-03	9.30E-04	8.40E-04
IR-190M	3.2 H	3.88E+00	4.28E+00	7.64E+00	2.46E+00	3.15E+00	2.48E+00	7.84E+00	3.46E+00	3.57E+00
IR-192	74.02 D	6.92E+01	7.46E+01	9.11E+01	7.64E+01	6.46E+01	5.96E+01	9.27E+01	6.80E+01	6.83E+01
IR-193M	11.9 D	2.74E-02	3.33E-02	5.55E-02	1.88E-02	2.39E-02	2.01E-02	6.02E-02	2.55E-02	2.61E-02
IR-194	19.15 H	7.55E+00	8.10E+00	9.59E+00	8.29E+00	7.08E+00	6.52E+00	9.76E+00	7.40E+00	7.44E+00
IR-194M	171 D	1.97E+02	2.11E+02	2.46E+02	2.16E+02	1.87E+02	1.69E+02	2.50E+02	1.92E+02	1.94E+02
PT-191	2.71 D	2.41E+01	2.62E+01	3.64E+01	2.31E+01	2.18E+01	1.92E+01	3.72E+01	2.31E+01	2.34E+01
PT-193	50 Y	3.90E-05	3.17E-03	1.91E-03	1.04E-03	1.57E-03	2.34E-03	5.15E-03	9.05E-04	8.18E-04
PT-193M	4.33 D	8.66E-01	9.59E-01	1.69E+00	5.80E-01	7.10E-01	5.74E-01	1.74E+00	7.85E-01	8.06E-01
PT-195M	4.02 D	5.75E+00	6.37E+00	1.11E+01	4.13E+00	4.76E+00	3.95E+00	1.14E+01	5.30E+00	5.41E+00
PT-197	18.3 H	1.95E+00	2.14E+00	3.49E+00	1.63E+00	1.64E+00	1.45E+00	3.59E+00	1.85E+00	1.86E+00
PT-197M	94.4 H	6.70E+00	7.31E+00	1.07E+01	6.22E+00	5.90E+00	5.22E+00	1.09E+01	6.39E+00	6.46E+00

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
ER-171	7.52 H	4.72E+01	3.56E+01	4.46E+01	2.73E+01	4.08E+01	5.31E+01	2.88E+02	3.41E+02
TM-170	128.6 D	7.48E-01	5.61E-01	7.24E-01	3.28E-01	6.27E-01	9.02E-01	2.28E+02	2.29E+02
TM-171	1.92 Y	9.73E-02	7.08E-02	9.18E-02	3.70E-02	7.94E-02	1.19E-01	0.0	1.19E-01
YB-169	31.97 D	4.22E+01	3.14E+01	4.03E+01	2.07E+01	3.56E+01	4.83E+01	0.0	4.83E+01
YB-175	4.19 D	4.95E+00	3.73E+00	4.64E+00	2.90E+00	4.26E+00	5.58E+00	8.19E+00	1.38E+01
LU-177	6.71 D	4.55E+00	3.46E+00	4.40E+00	2.56E+00	3.97E+00	5.05E+00	1.28E+01	1.79E+01
LU-177M	160.10 D	1.26E+02	9.55E+01	1.20E+02	7.28E+01	1.09E+02	1.41E+02	1.46E+00	1.43E+02
HF-181	42.39 D	6.72E+01	5.08E+01	6.28E+01	3.98E+01	5.77E+01	7.62E+01	1.04E+01	8.66E+01
TA-182	114.74 D	1.43E+02	1.14E+02	1.37E+02	8.85E+01	1.23E+02	1.65E+02	1.34E+01	1.78E+02
W-181	120.95 D	5.66E+00	4.22E+00	5.43E+00	2.30E+00	4.68E+00	6.89E+00	0.0	6.89E+00
W-185	75.1 D	3.53E-03	2.73E-03	3.51E-03	1.98E-03	3.11E-03	3.76E-03	3.50E+00	3.50E+00
W-187	23.83 H	5.79E+01	4.46E+01	5.45E+01	3.46E+01	4.94E+01	6.64E+01	1.64E+02	2.30E+02
W-188	69.4 D	2.22E-01	1.68E-01	2.10E-01	1.31E-01	1.93E-01	2.49E-01	0.0	2.49E-01
RE-182	64.0 H	2.01E+02	1.58E+02	1.92E+02	1.21E+02	1.73E+02	2.30E+02	0.0	2.30E+02
RE-182M	12.7 H	1.34E+02	1.06E+02	1.28E+02	8.16E+01	1.14E+02	1.54E+02	1.57E+01	1.70E+02
RE-183	70 D	2.10E+01	1.59E+01	2.03E+01	1.03E+01	1.78E+01	2.47E+01	0.0	2.47E+01
RE-184	38.0 D	1.06E+02	8.40E+01	1.01E+02	6.37E+01	9.07E+01	1.23E+02	3.35E+00	1.26E+02
RE-184M	169 D	4.78E+01	3.72E+01	4.57E+01	2.76E+01	4.10E+01	5.53E+01	0.0	5.53E+01
RE-186	90.64 H	2.78E+00	2.13E+00	2.73E+00	1.46E+00	2.40E+00	3.14E+00	2.56E+02	2.59E+02
RE-187	4.7E10 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RE-188	16.98 H	7.17E+00	5.56E+00	6.89E+00	4.22E+00	6.21E+00	8.08E+00	7.98E+02	8.06E+02
OS-185	93.6 D	8.55E+01	6.64E+01	8.07E+01	5.09E+01	7.29E+01	9.89E+01	5.87E+00	1.05E+02
OS-186	2.0E15 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OS-190M	9.9 H	1.93E+02	1.47E+02	1.81E+02	1.17E+02	1.66E+02	2.21E+02	1.88E+01	2.40E+02
OS-191	15.4 D	9.88E+00	7.58E+00	9.69E+00	4.93E+00	8.51E+00	1.19E+01	0.0	1.19E+01
OS-191M	13.03 H	6.87E-01	5.05E-01	6.47E-01	2.90E-01	6.03E-01	1.37E+00	0.0	1.37E+00
OS-193	30.0 H	8.50E+00	6.46E+00	8.04E+00	4.87E+00	7.31E+00	9.79E+00	2.71E+02	2.80E+02
IR-190	11.78 D	1.71E+02	1.31E+02	1.60E+02	1.02E+02	1.46E+02	1.95E+02	8.30E+00	2.03E+02
IR-190M	1.2 H	2.99E-02	1.15E-06	2.06E-03	4.00E-07	5.73E-02	6.88E-01	0.0	6.88E-01
IR-190M	3.2 H	6.84E+00	5.22E+00	6.66E+00	3.00E+00	5.74E+00	8.26E+00	0.0	8.26E+00
IR-192	74.02 D	1.01E+02	7.63E+01	9.43E+01	6.08E+01	8.70E+01	1.14E+02	5.88E+01	1.73E+02
IR-193M	11.9 D	7.67E-02	3.66E-02	4.86E-02	2.14E-02	9.52E-02	7.24E-01	0.0	7.24E-01
IR-194	19.15 H	1.09E+01	8.37E+00	1.02E+01	6.64E+00	9.38E+00	1.23E+01	8.49E+02	8.61E+02
IR-194M	171 D	2.84E+02	2.17E+02	2.65E+02	1.72E+02	2.43E+02	3.24E+02	2.68E+01	3.51E+02
PT-191	2.71 D	3.73E+01	2.84E+01	3.54E+01	2.04E+01	3.18E+01	4.32E+01	4.50E+00	4.77E+01
PT-193	50 Y	2.91E-02	6.71E-07	2.01E-03	2.93E-07	5.58E-02	6.71E-01	0.0	6.71E-01
PT-193M	4.33 D	1.53E+00	1.15E+00	1.47E+00	6.84E-01	1.32E+00	2.47E+00	0.0	2.47E+00
PT-195M	4.02 D	9.89E+00	7.53E+00	9.64E+00	4.61E+00	8.46E+00	1.30E+01	0.0	1.30E+01
PT-197	18.3 H	3.17E+00	2.43E+00	3.10E+00	1.63E+00	2.75E+00	4.10E+00	6.76E+01	7.17E+01
PT-197M	94.4 H	1.06E+01	8.02E+00	1.01E+01	5.65E+00	9.10E+00	1.33E+01	3.29E+00	1.65E+01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/ISQUARE M

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
AU-194	39.5 H	8.68E+01	8.56E+01	9.48E+01	1.15E+02	8.40E+01	7.69E+01	8.93E+01	8.25E+01	8.99E+01
AU-195	183 D	6.38E+00	6.83E+00	6.71E+00	1.47E+01	6.01E+00	5.39E+00	6.47E+00	5.75E+00	7.12E+00
AU-195M	30.6 S	1.82E+01	1.69E+01	1.81E+01	2.66E+01	1.63E+01	1.47E+01	1.73E+01	1.62E+01	1.74E+01
AU-196	6.183 D	4.26E+01	4.02E+01	4.36E+01	5.99E+01	3.88E+01	3.48E+01	4.11E+01	3.82E+01	4.16E+01
AU-198	2.696 D	3.67E+01	3.44E+01	3.80E+01	4.73E+01	3.36E+01	3.02E+01	3.56E+01	3.30E+01	3.56E+01
AU-199	3.139 D	8.11E+00	7.57E+00	8.02E+00	1.31E+01	7.34E+00	6.47E+00	7.81E+00	7.21E+00	7.75E+00
HG-197	64.14 H	5.22E+00	5.59E+00	5.52E+00	1.20E+01	4.94E+00	4.42E+00	5.29E+00	4.71E+00	5.79E+00
HG-197M	23.8 H	7.94E+00	7.68E+00	8.03E+00	1.45E+01	7.30E+00	6.43E+00	7.80E+00	7.10E+00	7.86E+00
HG-203	46.60 D	2.11E+01	1.95E+01	2.10E+01	2.95E+01	1.89E+01	1.70E+01	2.00E+01	1.87E+01	2.01E+01
TL-200	26.1 H	1.09E+02	1.06E+02	1.18E+02	1.41E+02	1.04E+02	9.44E+01	1.10E+02	1.02E+02	1.11E+02
TL-201	73.06 H	7.37E+00	7.59E+00	7.66E+00	1.54E+01	6.90E+00	6.14E+00	7.37E+00	6.63E+00	7.84E+00
TL-202	12.23 D	4.13E+01	3.94E+01	4.31E+01	5.72E+01	3.81E+01	3.42E+01	4.04E+01	3.73E+01	4.08E+01
TL-204	3.779 Y	8.43E-02	9.03E-02	8.93E-02	1.94E-01	7.99E-02	7.15E-02	8.55E-02	7.61E-02	9.35E-02
TL-207	4.77 M	1.86E-01	1.80E-01	2.03E-01	2.27E-01	1.78E-01	1.62E-01	1.90E-01	1.74E-01	1.89E-01
TL-208	3.053 M	2.51E+02	2.55E+02	2.83E+02	3.24E+02	2.54E+02	2.36E+02	2.70E+02	2.50E+02	2.74E+02
TL-209	2.20 M	1.64E+02	1.63E+02	1.82E+02	2.12E+02	1.61E+02	1.48E+02	1.71E+02	1.58E+02	1.71E+02
TL-210	1.30 M	2.23E+02	2.20E+02	2.46E+02	2.81E+02	2.17E+02	1.99E+02	2.31E+02	2.13E+02	2.31E+02
PB-203	52.02 H	2.71E+01	2.56E+01	2.73E+01	4.14E+01	2.45E+01	2.20E+01	2.60E+01	2.41E+01	2.65E+01
PB-204M	66.9 M	1.81E+02	1.74E+02	1.95E+02	2.23E+02	1.71E+02	1.55E+02	1.82E+02	1.68E+02	1.82E+02
PB-205	1.51E7 Y	5.74E-03	2.69E-09	4.73E-04	4.21E-01	7.67E-04	1.20E-05	1.02E-05	2.42E-03	9.43E-06
PB-209	3.253 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB-210	22.26 Y	1.13E-01	1.38E-01	1.00E-01	8.54E-01	9.02E-02	9.03E-02	1.12E-01	9.65E-02	1.63E-01
PB-211	36.1 M	4.49E+00	4.29E+00	4.79E+00	5.63E+00	4.21E+00	3.80E+00	4.47E+00	4.13E+00	4.47E+00
PB-212	10.643 H	1.34E+01	1.25E+01	1.33E+01	2.05E+01	1.20E+01	1.08E+01	1.28E+01	1.19E+01	1.29E+01
PB-214	26.8 M	2.26E+01	2.11E+01	2.30E+01	3.12E+01	2.05E+01	1.84E+01	2.18E+01	2.03E+01	2.18E+01
BI-206	6.243 D	2.74E+02	2.67E+02	2.99E+02	3.48E+02	2.63E+02	2.39E+02	2.80E+02	2.58E+02	2.80E+02
BI-207	33.4 Y	1.28E+02	1.25E+02	1.40E+02	1.63E+02	1.23E+02	1.12E+02	1.31E+02	1.20E+02	1.31E+02
BI-208	3.68E5 Y	1.87E+02	1.94E+02	2.14E+02	2.46E+02	1.94E+02	1.82E+02	2.06E+02	1.91E+02	2.10E+02
BI-210	5.013 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BI-211	2.13 M	4.33E+00	4.04E+00	4.42E+00	5.82E+00	3.93E+00	3.53E+00	4.16E+00	3.88E+00	4.18E+00
BI-212	60.55 M	1.51E+01	1.48E+01	1.66E+01	1.90E+01	1.46E+01	1.33E+01	1.55E+01	1.43E+01	1.55E+01
BI-213	45.65 M	1.24E+01	1.18E+01	1.30E+01	1.61E+01	1.15E+01	1.03E+01	1.22E+01	1.13E+01	1.22E+01
BI-214	19.9 M	1.19E+02	1.18E+02	1.32E+02	1.49E+02	1.17E+02	1.07E+02	1.24E+02	1.15E+02	1.24E+02
PO-209	102 Y	3.02E-01	2.90E-01	3.20E-01	4.01E-01	2.84E-01	2.56E-01	3.01E-01	2.78E-01	3.02E-01
PO-210	138.378 D	7.41E-04	7.15E-04	8.04E-04	9.06E-04	7.05E-04	6.38E-04	7.50E-04	6.89E-04	7.48E-04
PO-211	0.516 S	6.74E-01	6.49E-01	7.29E-01	8.30E-01	6.39E-01	5.78E-01	6.80E-01	6.25E-01	6.78E-01
PO-212	2.98E-7 S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PO-213	4.2E-6 S	2.66E-03	2.57E-03	2.88E-03	3.26E-03	2.53E-03	2.29E-03	2.69E-03	2.47E-03	2.68E-03
PO-214	1.637E-4 S	7.27E-03	7.01E-03	7.88E-03	8.88E-03	6.91E-03	6.25E-03	7.35E-03	6.76E-03	7.33E-03
PO-215	1.778E-3 S	1.34E-02	1.26E-02	1.40E-02	1.72E-02	1.23E-02	1.11E-02	1.31E-02	1.21E-02	1.31E-02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/ISQUARE M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
AU-194	39.5 H	8.55E+01	9.10E+01	1.04E+02	9.06E+01	7.92E+01	7.31E+01	1.06E+02	8.26E+01	8.36E+01
AU-195	183 D	6.75E+00	7.46E+00	1.31E+01	4.70E+00	5.55E+00	4.56E+00	1.34E+01	6.18E+00	6.32E+00
AU-195M	30.6 S	1.68E+01	1.83E+01	2.46E+01	1.81E+01	1.50E+01	1.42E+01	2.51E+01	1.66E+01	1.65E+01
AU-196	6.183 D	4.00E+01	4.32E+01	5.57E+01	4.26E+01	3.67E+01	3.37E+01	5.67E+01	3.91E+01	3.92E+01
AU-198	2.696 D	3.42E+01	3.68E+01	4.40E+01	3.79E+01	3.23E+01	2.95E+01	4.47E+01	3.36E+01	3.38E+01
AU-199	3.139 D	7.55E+00	8.28E+00	1.24E+01	7.55E+00	6.52E+00	6.19E+00	1.27E+01	7.45E+00	7.42E+00
HG-197	64.14 H	5.54E+00	6.11E+00	1.07E+01	3.85E+00	4.55E+00	3.73E+00	1.10E+01	5.07E+00	5.18E+00
HG-197M	23.8 H	7.64E+00	8.41E+00	1.32E+01	6.98E+00	6.55E+00	5.97E+00	1.36E+01	7.41E+00	7.43E+00
HG-203	46.60 D	1.94E+01	2.10E+01	2.76E+01	2.12E+01	1.75E+01	1.66E+01	2.81E+01	1.91E+01	1.91E+01
TL-200	26.1 H	1.05E+02	1.13E+02	1.29E+02	1.12E+02	9.95E+01	9.02E+01	1.31E+02	1.02E+02	1.03E+02
TL-201	73.06 H	7.54E+00	8.30E+00	1.40E+01	5.84E+00	6.27E+00	5.37E+00	1.44E+01	7.05E+00	7.15E+00
TL-202	12.23 D	3.92E+01	4.23E+01	5.29E+01	4.14E+01	3.66E+01	3.29E+01	5.39E+01	3.81E+01	3.84E+01
TL-204	3.779 Y	8.94E-02	9.87E-02	1.73E-01	6.20E-02	7.35E-02	6.03E-02	1.78E-01	8.19E-02	8.37E-02
TL-207	4.77 M	1.79E-01	1.91E-01	2.06E-01	1.94E-01	1.74E-01	1.55E-01	2.10E-01	1.74E-01	1.77E-01
TL-208	3.053 M	2.56E+02	2.69E+02	2.82E+02	2.75E+02	2.32E+02	2.24E+02	2.87E+02	2.46E+02	2.53E+02
TL-209	2.20 M	1.63E+02	1.73E+02	1.91E+02	1.73E+02	1.52E+02	1.40E+02	1.94E+02	1.58E+02	1.59E+02
TL-210	1.30 M	2.19E+02	2.33E+02	2.52E+02	2.36E+02	2.06E+02	1.90E+02	2.56E+02	2.12E+02	2.16E+02
PB-203	52.02 H	2.55E+01	2.77E+01	3.85E+01	2.61E+01	2.27E+01	2.10E+01	3.93E+01	2.49E+01	2.49E+01
PB-204M	66.9 M	1.73E+02	1.85E+02	2.04E+02	1.88E+02	1.67E+02	1.49E+02	2.07E+02	1.68E+02	1.71E+02
PB-205	1.51E7 Y	6.64E-05	4.62E-03	2.94E-03	1.52E-03	2.29E-03	3.37E-03	7.51E-03	1.36E-03	1.24E-03
PB-209	3.253 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB-210	22.26 Y	1.23E-01	1.43E-01	2.52E-01	6.45E-02	1.03E-01	7.44E-02	2.63E-01	1.03E-01	1.10E-01
PB-211	36.1 M	4.26E+00	4.57E+00	5.17E+00	4.65E+00	4.10E+00	3.67E+00	5.26E+00	4.15E+00	4.21E+00
PB-212	10.643 H	1.25E+01	1.36E+01	1.92E+01	1.29E+01	1.10E+01	1.03E+01	1.96E+01	1.22E+01	1.22E+01
PB-214	26.8 M	2.10E+01	2.27E+01	2.90E+01	2.28E+01	1.93E+01	1.79E+01	2.95E+01	2.07E+01	2.07E+01
BI-206	6.243 D	2.66E+02	2.84E+02	3.15E+02	2.86E+02	2.54E+02	2.29E+02	3.21E+02	2.58E+02	2.62E+02
BI-207	33.4 Y	1.24E+02	1.33E+02	1.48E+02	1.33E+02	1.19E+02	1.07E+02	1.51E+02	1.20E+02	1.22E+02
BI-208	3.68E5 Y	1.95E+02	2.04E+02	2.10E+02	2.08E+02	1.73E+02	1.71E+02	2.14E+02	1.87E+02	1.92E+02
BI-210	5.013 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BI-211	2.13 M	4.02E+00	4.34E+00	5.43E+00	4.42E+00	3.72E+00	3.45E+00	5.53E+00	3.96E+00	3.96E+00
BI-212	60.55 M	1.48E+01	1.57E+01	1.70E+01	1.59E+01	1.41E+01	1.27E+01	1.73E+01	1.43E+01	1.45E+01
BI-213	45.65 M	1.17E+01	1.26E+01	1.50E+01	1.28E+01	1.11E+01	1.00E+01	1.52E+01	1.14E+01	1.15E+01
BI-214	19.9 M	1.18E+02	1.25E+02	1.33E+02	1.26E+02	1.11E+02	1.02E+02	1.35E+02	1.14E+02	1.16E+02
PO-209	102 Y	2.88E-01	3.09E-01	3.68E-01	3.06E-01	2.71E-01	2.45E-01	3.75E-01	2.80E-01	2.84E-01
PO-210	138.378 D	7.10E-04	7.59E-04	8.26E-04	7.71E-04	6.91E-04	6.13E-04	8.40E-04	6.89E-04	7.03E-04
PO-211	0.516 S	6.45E-01	6.90E-01	7.59E-01	7.01E-01	6.25E-01	5.57E-01	7.71E-01	6.27E-01	6.38E-01
PO-212	2.98E-7 S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PO-213	4.2E-6 S	2.55E-03	2.72E-03	2.97E-03	2.77E-03	2.48E-03	2.20E-03	3.02E-03	2.47E-03	2.52E-03
PO-214	1.637E-4 S	6.96E-03	7.44E-03	8.10E-03	7.56E-03	6.77E-03	6.01E-03	8.24E-03	6.76E-03	6.89E-03
PO-215	1.778E-3 S	1.26E-02	1.35E-02	1.60E-02	1.39E-02	1.19E-02	1.08E-02	1.62E-02	1.23E-02	1.24E-02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
AU-194	39.5 H	1.21E+02	9.48E+01	1.14E+02	7.55E+01	1.04E+02	1.39E+02	1.07E+01	1.49E+02
AU-195	183 D	1.16E+01	8.89E+00	1.14E+01	5.38E+00	9.86E+00	1.44E+01	0.0	1.44E+01
AU-195M	30.6 S	2.52E+01	1.91E+01	2.39E+01	1.48E+01	2.20E+01	2.90E+01	0.0	2.90E+01
AU-196	6.183 D	5.94E+01	4.49E+01	5.58E+01	3.48E+01	5.12E+01	6.76E+01	0.0	6.76E+01
AU-198	2.696 D	4.96E+01	3.74E+01	4.61E+01	3.00E+01	4.27E+01	5.63E+01	2.31E+02	7.87E+02
AU-199	3.139 D	1.16E+01	8.93E+00	1.14E+01	6.58E+00	1.02E+01	1.30E+01	8.31E-01	1.39E+01
HG-197	64.14 H	9.43E+00	7.28E+00	9.27E+00	4.43E+00	8.06E+00	1.19E+01	0.0	1.19E+01
HG-197M	23.8 H	1.21E+01	9.31E+00	1.19E+01	6.52E+00	1.06E+01	1.47E+01	0.0	1.47E+01
HG-203	46.60 D	2.87E+01	2.17E+01	2.72E+01	1.71E+01	2.50E+01	3.22E+01	0.0	3.22E+01
TL-200	26.1 H	1.51E+02	1.18E+02	1.42E+02	9.24E+01	1.29E+02	1.73E+02	9.59E+00	1.82E+02
TL-201	73.06 H	1.25E+01	9.65E+00	1.23E+01	6.18E+00	1.07E+01	1.51E+01	0.0	1.51E+01
TL-202	12.23 D	5.79E+01	4.38E+01	5.42E+01	3.40E+01	4.97E+01	6.65E+01	4.91E+00	7.15E+01
TL-204	3.779 Y	1.52E-01	1.18E-01	1.50E-01	7.16E-02	1.30E-01	1.91E-01	1.59E+02	1.59E+02
TL-207	4.77 M	2.53E-01	2.02E-01	2.41E-01	1.56E-01	2.16E-01	2.93E-01	4.66E+02	4.66E+02
TL-208	3.053 M	3.52E+02	2.75E+02	3.21E+02	2.29E+02	3.03E+02	3.94E+02	5.71E+02	9.65E+02
TL-209	2.20 M	2.28E+02	1.79E+02	2.14E+02	1.45E+02	1.96E+02	2.60E+02	6.92E+02	9.52E+02
TL-210	1.30 M	3.07E+02	2.42E+02	2.88E+02	1.94E+02	2.63E+02	3.51E+02	6.77E+02	1.03E+03
PB-203	52.02 H	3.87E+01	2.95E+01	3.70E+01	2.21E+01	3.36E+01	4.43E+01	0.0	4.43E+01
PB-204M	66.9 M	2.45E+02	1.94E+02	2.33E+02	1.51E+02	2.10E+02	2.83E+02	8.99E+01	3.73E+02
PB-205	1.51E7 Y	4.14E-02	1.47E-06	3.11E-03	3.87E-07	7.55E-02	8.82E-01	0.0	8.82E-01
PB-209	3.253 H	0.0	0.0	0.0	0.0	0.0	0.0	6.88E+01	6.88E+01
PB-210	22.26 Y	3.20E-01	1.82E-01	2.42E-01	8.34E-02	3.00E-01	1.37E+00	0.0	1.37E+00
PB-211	36.1 M	6.10E+00	4.74E+00	5.75E+00	3.72E+00	5.23E+00	7.01E+00	4.14E+02	4.21E+02
PB-212	10.643 H	1.89E+01	1.44E+01	1.82E+01	1.09E+01	1.65E+01	2.14E+01	3.92E+00	2.54E+01
PB-214	26.8 M	3.10E+01	2.35E+01	2.92E+01	1.84E+01	2.69E+01	3.53E+01	1.01E+02	1.36E+02
BI-206	6.243 D	3.78E+02	2.97E+02	3.57E+02	2.33E+02	3.24E+02	4.35E+02	5.92E+01	4.94E+02
BI-207	33.4 Y	1.77E+02	1.39E+02	1.67E+02	1.09E+02	1.51E+02	2.04E+02	1.14E+02	3.19E+02
BI-208	3.68E5 Y	2.65E+02	2.08E+02	2.40E+02	1.76E+02	2.29E+02	2.95E+02	4.38E+00	3.00E+02
BI-210	5.013 D	0.0	0.0	0.0	0.0	0.0	0.0	3.30E+02	3.30E+02
BI-211	2.13 M	5.90E+00	4.45E+00	5.52E+00	3.53E+00	5.10E+00	6.67E+00	1.14E-01	6.78E+00
BI-212	60.55 M	2.08E+01	1.64E+01	1.96E+01	1.30E+01	1.78E+01	2.42E+01	4.73E+02	4.97E+02
BI-213	45.65 M	1.70E+01	1.28E+01	1.58E+01	1.02E+01	1.46E+01	1.94E+01	3.78E+02	3.98E+02
BI-214	19.9 M	1.64E+02	1.29E+02	1.54E+02	1.05E+02	1.41E+02	1.88E+02	6.42E+02	8.29E+02
PO-209	102 Y	4.17E-01	3.27E-01	3.99E-01	2.51E-01	3.59E-01	4.80E-01	0.0	4.80E-01
PO-210	138.378 D	1.01E-03	7.96E-04	9.56E-04	6.18E-04	8.60E-04	1.16E-03	0.0	1.16E-03
PO-211	0.516 S	9.17E-01	7.19E-01	8.66E-01	5.62E-01	7.84E-01	1.06E+00	0.0	1.06E+00
PO-212	2.98E-7 S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PO-213	4.2E-6 S	3.62E-03	2.85E-03	3.43E-03	2.22E-03	3.09E-03	4.18E-03	0.0	4.18E-03
PO-214	1.637E-4 S	9.87E-03	7.80E-03	9.37E-03	6.05E-03	8.43E-03	1.14E-02	0.0	1.14E-02
PO-215	1.778E-3 S	1.82E-02	1.37E-02	1.69E-02	1.10E-02	1.56E-02	2.07E-02	0.0	2.07E-02

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
PO-216	0.146 S	1.26E-03	1.22E-03	1.37E-03	1.54E-03	1.20E-03	1.09E-03	1.28E-03	1.17E-03	1.27E-03
PO-218	3.05 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AT-211	7.214 H	3.11E+00	3.19E+00	3.26E+00	6.57E+00	2.94E+00	2.59E+00	3.14E+00	2.81E+00	3.27E+00
AT-217	0.0323 S	2.11E-02	2.01E-02	2.25E-02	2.62E-02	1.97E-02	1.77E-02	2.09E-02	1.93E-02	2.09E-02
RN-218	0.035 S	6.68E-02	6.38E-02	7.14E-02	8.29E-02	6.26E-02	5.64E-02	6.65E-02	6.12E-02	6.64E-02
RN-219	3.96 S	5.26E+00	4.88E+00	5.32E+00	7.10E+00	4.75E+00	4.26E+00	5.03E+00	4.70E+00	5.04E+00
RN-220	55.61 S	4.63E-02	4.41E-02	4.92E-02	5.79E-02	4.31E-02	3.88E-02	4.58E-02	4.22E-02	4.58E-02
RN-222	3.8235 D	3.45E-02	3.28E-02	3.65E-02	4.35E-02	3.20E-02	2.88E-02	3.40E-02	3.14E-02	3.40E-02
FR-221	4.8 M	2.85E+00	2.62E+00	2.80E+00	4.22E+00	2.55E+00	2.27E+00	2.70E+00	2.53E+00	2.70E+00
FR-223	21.8 M	4.09E+00	4.18E+00	4.14E+00	8.83E+00	3.71E+00	3.37E+00	4.04E+00	3.66E+00	4.45E+00
RA-222	38.0 S	8.48E-01	7.85E-01	8.57E-01	1.13E+00	7.65E-01	6.87E-01	8.10E-01	7.58E-01	8.10E-01
RA-223	11.434 D	1.20E+01	1.14E+01	1.21E+01	1.94E+01	1.10E+01	9.73E+00	1.17E+01	1.07E+01	1.17E+01
RA-224	3.62 D	9.29E-01	8.52E-01	9.15E-01	1.32E+00	8.29E-01	7.42E-01	8.78E-01	8.24E-01	8.77E-01
RA-225	14.8 D	6.43E-01	9.30E-01	5.23E-01	2.99E+00	4.83E-01	5.31E-01	7.15E-01	5.54E-01	1.20E+00
RA-226	1600 Y	6.21E-01	5.71E-01	6.08E-01	9.56E-01	5.56E-01	4.93E-01	5.90E-01	5.50E-01	5.85E-01
RA-228	5.75 Y	4.80E-09	8.65E-16	3.83E-10	3.76E-07	6.25E-10	8.06E-12	1.19E-11	1.97E-09	5.75E-12
AC-225	10.0 D	1.19E+00	1.13E+00	1.19E+00	2.60E+00	1.09E+00	9.52E-01	1.17E+00	1.06E+00	1.16E+00
AC-227	21.773 Y	1.13E-02	9.79E-03	1.05E-02	5.62E-02	9.74E-03	8.28E-03	1.03E-02	9.78E-03	9.97E-03
AC-228	6.13 H	7.75E+01	7.53E+01	8.43E+01	9.80E+01	7.43E+01	6.75E+01	7.90E+01	7.28E+01	7.88E+01
TH-226	30.9 M	7.00E-01	6.53E-01	6.94E-01	1.35E+00	6.35E-01	5.55E-01	6.80E-01	6.22E-01	6.67E-01
TH-227	18.718 D	9.58E+00	8.91E+00	9.50E+00	1.52E+01	8.57E+00	7.68E+00	9.11E+00	8.51E+00	9.21E+00
TH-228	1.9132 Y	1.75E-01	1.64E-01	1.72E-01	5.70E-01	1.57E-01	1.38E-01	1.67E-01	1.54E-01	1.68E-01
TH-229	7.34E3 Y	7.54E+00	7.27E+00	7.56E+00	1.57E+01	6.91E+00	6.05E+00	7.42E+00	6.72E+00	7.46E+00
TH-230	7.7E4 Y	3.53E-02	3.13E-02	3.19E-02	3.05E-01	2.90E-02	2.53E-02	3.02E-02	2.97E-02	3.25E-02
TH-231	25.52 H	1.01E+00	9.59E-01	9.53E-01	4.58E+00	8.74E-01	7.60E-01	9.72E-01	8.76E-01	1.03E+00
TH-232	1.405E10 Y	1.80E-02	1.39E-02	1.39E-02	2.72E-01	1.28E-02	1.09E-02	1.31E-02	1.41E-02	1.48E-02
TH-233	22.3 M	2.98E+00	2.84E+00	3.11E+00	4.45E+00	2.75E+00	2.47E+00	2.94E+00	2.70E+00	2.96E+00
TH-234	24.10 D	6.61E-01	6.69E-01	6.76E-01	1.63E+00	6.14E-01	5.40E-01	6.61E-01	5.92E-01	6.90E-01
PA-230	17.4 D	5.63E+01	5.44E+01	6.07E+01	7.45E+01	5.35E+01	4.83E+01	5.70E+01	5.23E+01	5.68E+01
PA-231	3.276E4 Y	2.76E+00	2.54E+00	2.72E+00	5.40E+00	2.45E+00	2.19E+00	2.62E+00	2.44E+00	2.66E+00
PA-233	27.0 D	1.94E+01	1.81E+01	1.96E+01	2.92E+01	1.76E+01	1.57E+01	1.87E+01	1.73E+01	1.86E+01
PA-234	6.70 H	1.66E+02	1.61E+02	1.80E+02	2.14E+02	1.58E+02	1.44E+02	1.69E+02	1.55E+02	1.68E+02
PA-234M	1.17 M	9.63E-01	9.36E-01	1.05E+00	1.21E+00	9.24E-01	8.38E-01	9.85E-01	9.04E-01	9.81E-01
U-230	20.8 D	1.01E-01	8.94E-02	9.39E-02	5.53E-01	8.57E-02	7.49E-02	8.96E-02	8.68E-02	9.21E-02
U-231	4.2 D	5.95E+00	5.72E+00	5.94E+00	1.43E+01	5.45E+00	4.73E+00	5.90E+00	5.30E+00	5.88E+00
U-232	72 Y	2.70E-02	1.85E-02	1.93E-02	4.25E-01	1.80E-02	1.49E-02	1.79E-02	2.08E-02	1.97E-02
U-233	1.592E5 Y	2.20E-02	1.80E-02	1.94E-02	1.59E-01	1.81E-02	1.52E-02	1.89E-02	1.86E-02	1.83E-02
U-234	2.445E5 Y	1.66E-02	9.22E-03	9.69E-03	3.59E-01	9.30E-03	7.27E-03	8.76E-03	1.19E-02	1.00E-02
U-235	7.038E8 Y	1.39E+01	1.28E+01	1.36E+01	2.20E+01	1.25E+01	1.10E+01	1.33E+01	1.23E+01	1.30E+01
U-236	2.3415E7 Y	1.34E-02	6.40E-03	7.09E-03	3.36E-01	6.84E-03	5.09E-03	5.95E-03	9.17E-03	6.83E-03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
PO-216	0.146 S	1.21E-03	1.29E-03	1.41E-03	1.31E-03	1.18E-03	1.04E-03	1.43E-03	1.17E-03	1.20E-03
PO-218	3.05 H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AT-211	7.214 H	3.17E+00	3.51E+00	5.95E+00	2.45E+00	2.66E+00	2.27E+00	6.12E+00	2.99E+00	3.03E+00
AT-217	0.0323 S	2.00E-02	2.14E-02	2.41E-02	2.18E-02	1.93E-02	1.72E-02	2.45E-02	1.94E-02	1.97E-02
RN-218	0.035 S	6.34E-02	6.79E-02	7.63E-02	6.93E-02	6.14E-02	5.46E-02	7.76E-02	6.17E-02	6.27E-02
RN-219	3.96 S	4.86E+00	5.25E+00	6.63E+00	5.35E+00	4.46E+00	4.17E+00	6.76E+00	4.79E+00	4.79E+00
RN-220	55.61 S	4.38E-02	4.70E-02	5.35E-02	4.80E-02	4.22E-02	3.77E-02	5.44E-02	4.27E-02	4.32E-02
RN-222	3.8235 D	3.26E-02	3.50E-02	4.03E-02	3.58E-02	3.13E-02	2.81E-02	4.09E-02	3.18E-02	3.22E-02
FR-221	4.8 H	2.61E+00	2.84E+00	3.95E+00	2.80E+00	2.30E+00	2.21E+00	4.04E+00	2.59E+00	2.58E+00
FR-223	21.8 H	4.09E+00	4.51E+00	6.94E+00	3.49E+00	3.55E+00	3.06E+00	7.13E+00	3.83E+00	3.91E+00
RA-222	38.0 S	7.81E-01	8.44E-01	1.06E+00	8.68E-01	7.19E-01	6.74E-01	1.08E+00	7.71E-01	7.71E-01
RA-223	11.434 D	1.13E+01	1.24E+01	1.79E+01	1.13E+01	1.00E+01	9.25E+00	1.84E+01	1.11E+01	1.11E+01
RA-224	3.62 D	8.48E-01	9.21E-01	1.24E+00	9.28E-01	7.56E-01	7.26E-01	1.26E+00	8.42E-01	8.37E-01
RA-225	14.8 D	7.52E-01	8.47E-01	1.50E+00	3.52E-01	6.14E-01	4.14E-01	1.53E+00	5.94E-01	6.52E-01
RA-226	1600 Y	5.69E-01	6.22E-01	8.95E-01	5.97E-01	4.96E-01	4.79E-01	9.17E-01	5.65E-01	5.61E-01
RA-228	5.75 Y	4.66E-11	3.79E-09	2.28E-09	1.25E-09	1.88E-09	2.80E-09	6.16E-09	1.08E-09	9.78E-10
AC-225	10.0 D	1.13E+00	1.25E+00	1.97E+00	1.05E+00	9.74E-01	8.98E-01	2.03E+00	1.11E+00	1.10E+00
AC-227	21.773 Y	9.81E-03	1.17E-02	1.82E-02	9.45E-03	8.85E-03	8.40E-03	1.93E-02	1.00E-02	9.95E-03
AC-228	6.13 H	7.49E+01	7.99E+01	8.79E+01	8.08E+01	7.17E+01	6.47E+01	8.94E+01	7.27E+01	7.38E+01
TH-226	30.9 H	6.51E-01	7.20E-01	1.10E+00	6.37E-01	5.67E-01	5.32E-01	1.13E+00	6.44E-01	6.42E-01
TH-227	18.718 D	8.85E+00	9.64E+00	1.31E+01	9.41E+00	7.91E+00	7.46E+00	1.34E+01	8.71E+00	8.70E+00
TH-228	1.9132 Y	1.64E-01	1.85E-01	2.88E-01	1.50E-01	1.42E-01	1.31E-01	3.00E-01	1.60E-01	1.60E-01
TH-229	7.34E3 Y	7.22E+00	8.02E+00	1.29E+01	6.47E+00	6.18E+00	5.63E+00	1.33E+01	7.03E+00	7.04E+00
TH-230	7.7E4 Y	3.12E-02	3.86E-02	6.09E-02	2.58E-02	2.82E-02	2.52E-02	6.59E-02	3.05E-02	3.09E-02
TH-231	25.52 H	9.36E-01	1.11E+00	1.84E+00	7.60E-01	8.26E-01	7.24E-01	1.93E+00	9.12E-01	9.25E-01
TH-232	1.405E10 Y	1.38E-02	1.96E-02	2.99E-02	1.13E-02	1.36E-02	1.23E-02	3.40E-02	1.40E-02	1.43E-02
TH-233	22.3 H	2.82E+00	3.05E+00	3.79E+00	2.98E+00	2.65E+00	2.38E+00	3.87E+00	2.75E+00	2.78E+00
TH-234	24.10 D	6.63E-01	7.41E-01	1.26E+00	5.14E-01	5.58E-01	4.80E-01	1.31E+00	6.28E-01	6.36E-01
PA-230	17.4 D	5.41E+01	5.80E+01	6.67E+01	5.74E+01	5.17E+01	4.62E+01	6.80E+01	5.25E+01	5.34E+01
PA-231	3.276E4 Y	2.51E+00	2.76E+00	3.64E+00	2.72E+00	2.29E+00	2.16E+00	3.73E+00	2.49E+00	2.49E+00
PA-233	27.0 D	1.80E+01	1.96E+01	2.61E+01	1.92E+01	1.63E+01	1.52E+01	2.66E+01	1.77E+01	1.77E+01
PA-234	6.70 H	1.60E+02	1.71E+02	1.92E+02	1.72E+02	1.53E+02	1.38E+02	1.96E+02	1.55E+02	1.58E+02
PA-234M	1.17 H	9.31E-01	9.94E-01	1.09E+00	9.98E-01	8.99E-01	8.01E-01	1.11E+00	9.02E-01	9.20E-01
U-230	20.8 D	8.93E-02	1.06E-01	1.60E-01	8.42E-02	8.05E-02	7.47E-02	1.70E-01	8.88E-02	8.91E-02
U-231	4.2 D	5.68E+00	6.39E+00	1.05E+01	4.92E+00	4.88E+00	4.40E+00	1.09E+01	5.55E+00	5.57E+00
U-232	72 Y	1.86E-02	2.86E-02	4.13E-02	1.73E-02	1.97E-02	1.86E-02	4.82E-02	2.01E-02	2.04E-02
U-233	1.592E5 Y	1.81E-02	2.26E-02	3.44E-02	1.77E-02	1.68E-02	1.62E-02	3.73E-02	1.88E-02	1.87E-02
U-234	2.445E5 Y	9.34E-03	1.74E-02	2.38E-02	9.15E-03	1.14E-02	1.11E-02	2.95E-02	1.09E-02	1.11E-02
U-235	7.038E8 Y	1.27E+01	1.39E+01	2.02E+01	1.33E+01	1.11E+01	1.07E+01	2.07E+01	1.27E+01	1.26E+01
U-236	2.3415E7 Y	6.66E-03	1.40E-02	1.88E-02	6.53E-03	8.82E-03	8.72E-03	2.41E-02	8.24E-03	8.41E-03

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
PO-216	0.146 S	1.71E-03	1.36E-03	1.63E-03	1.05E-03	1.47E-03	1.98E-03	0.0	1.98E-03
PO-218	3.05 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AT-211	7.214 H	5.26E+00	4.06E+00	5.18E+00	2.62E+00	4.54E+00	6.49E+00	0.0	6.49E+00
AT-217	0.0323 S	2.86E-02	2.20E-02	2.67E-02	1.74E-02	2.44E-02	3.28E-02	0.0	3.28E-02
RN-218	0.035 S	9.07E-02	6.99E-02	8.49E-02	5.52E-02	7.75E-02	1.04E-01	0.0	1.04E-01
RN-219	3.96 S	7.12E+00	5.38E+00	6.70E+00	4.28E+00	6.18E+00	8.03E+00	4.26E-01	8.46E+00
RN-220	55.61 S	6.29E-02	4.80E-02	5.85E-02	3.82E-02	5.38E-02	7.21E-02	0.0	7.21E-02
RN-222	3.8235 D	4.70E-02	3.56E-02	4.35E-02	2.85E-02	4.02E-02	5.37E-02	0.0	5.37E-02
FR-221	4.8 M	3.92E+00	2.99E+00	3.77E+00	2.30E+00	3.44E+00	4.42E+00	0.0	4.42E+00
FR-223	21.8 M	7.00E+00	5.09E+00	6.53E+00	3.31E+00	5.93E+00	9.69E+00	2.67E+02	2.77E+02
RA-222	38.0 S	1.14E+00	8.63E-01	1.07E+00	6.89E-01	9.92E-01	1.29E+00	0.0	1.29E+00
RA-223	11.434 D	1.74E+01	1.33E+01	1.68E+01	9.82E+00	1.52E+01	2.03E+01	0.0	2.03E+01
RA-224	3.62 D	1.26E+00	9.57E-01	1.20E+00	7.49E-01	1.10E+00	1.41E+00	0.0	1.41E+00
RA-225	14.8 D	1.94E+00	1.19E+00	1.58E+00	4.76E-01	1.51E+00	3.42E+00	0.0	3.42E+00
RA-226	1600 Y	8.63E-01	6.59E-01	8.37E-01	5.01E-01	7.60E-01	9.77E-01	0.0	9.77E-01
RA-228	5.75 Y	3.48E-08	8.02E-13	2.40E-09	3.50E-13	6.67E-08	8.02E-07	0.0	8.02E-07
AC-225	10.0 D	1.85E+00	1.37E+00	1.76E+00	9.66E-01	1.66E+00	3.03E+00	0.0	3.03E+00
AC-227	21.773 Y	2.18E-02	1.19E-02	1.63E-02	8.44E-03	2.12E-02	8.62E-02	0.0	8.62E-02
AC-228	6.13 H	1.06E+02	8.38E+01	1.01E+02	6.56E+01	9.10E+01	1.24E+02	3.07E+02	4.31E+02
TH-226	30.9 M	1.04E+00	7.75E-01	9.95E-01	5.64E-01	9.25E-01	1.50E+00	0.0	1.50E+00
TH-227	18.718 D	1.35E+01	1.01E+01	1.27E+01	7.72E+00	1.18E+01	1.71E+01	0.0	1.71E+01
TH-228	1.9132 Y	2.97E-01	1.99E-01	2.59E-01	1.40E-01	2.77E-01	8.00E-01	0.0	8.00E-01
TH-229	7.34E3 Y	1.19E+01	8.89E+00	1.14E+01	6.14E+00	1.05E+01	1.70E+01	0.0	1.70E+01
TH-230	7.7E4 Y	8.64E-02	3.97E-02	5.48E-02	2.54E-02	9.07E-02	5.16E-01	0.0	5.16E-01
TH-231	25.52 H	2.12E+00	1.19E+00	1.66E+00	7.55E-01	1.91E+00	6.42E+00	0.0	6.42E+00
TH-232	1.405E10 Y	5.86E-02	1.80E-02	2.73E-02	1.08E-02	6.66E-02	4.85E-01	0.0	4.85E-01
TH-233	22.3 M	4.24E+00	3.17E+00	3.93E+00	2.44E+00	3.65E+00	5.37E+00	3.44E+02	3.49E+02
TH-234	24.10 D	1.16E+00	8.52E-01	1.10E+00	5.43E-01	1.01E+00	1.77E+00	0.0	1.77E+00
PA-230	17.4 D	7.79E+01	6.12E+01	7.42E+01	4.70E+01	6.69E+01	9.25E+01	4.40E+00	9.69E+01
PA-231	3.276E4 Y	4.06E+00	2.83E+00	3.62E+00	2.19E+00	3.58E+00	6.94E+00	0.0	6.94E+00
PA-233	27.0 D	2.71E+01	2.03E+01	2.55E+01	1.58E+01	2.36E+01	3.28E+01	0.0	3.28E+01
PA-234	6.70 H	2.28E+02	1.80E+02	2.17E+02	1.40E+02	1.96E+02	2.68E+02	1.52E+02	4.20E+02
PA-234M	1.17 M	1.32E+00	1.05E+00	1.26E+00	8.11E-01	1.13E+00	1.55E+00	8.72E+02	8.74E+02
U-230	20.8 D	2.04E-01	1.08E-01	1.46E-01	7.56E-02	2.00E-01	8.72E-01	0.0	8.72E-01
U-231	4.2 D	9.87E+00	7.08E+00	9.26E+00	4.79E+00	8.71E+00	1.62E+01	0.0	1.62E+01
U-232	72 Y	9.36E-02	2.34E-02	3.89E-02	1.47E-02	1.03E-01	7.42E-01	0.0	7.42E-01
U-233	1.592E5 Y	4.87E-02	2.18E-02	3.10E-02	1.55E-02	5.00E-02	2.61E-01	0.0	2.61E-01
U-234	2.445E5 Y	7.07E-02	1.18E-02	2.31E-02	7.04E-03	8.07E-02	6.36E-01	0.0	6.36E-01
U-235	7.038E8 Y	1.94E+01	1.48E+01	1.88E+01	1.12E+01	1.71E+01	2.27E+01	0.0	2.27E+01
U-236	2.3415E7 Y	6.30E-02	8.45E-03	1.81E-02	4.98E-03	7.33E-02	5.99E-01	0.0	5.99E-01

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
U-237	6.75 D	1.19E+01	1.14E+01	1.19E+01	2.31E+01	1.08E+01	9.57E+00	1.16E+01	1.06E+01	1.18E+01
U-238	4.468E9 Y	1.16E-02	5.45E-03	6.02E-03	2.97E-01	5.82E-03	4.31E-03	5.03E-03	7.90E-03	5.85E-03
U-239	23.40 M	3.88E+00	4.04E+00	4.10E+00	7.99E+00	3.66E+00	3.28E+00	3.92E+00	3.52E+00	4.21E+00
U-240	14.1 H	8.10E-02	5.34E-02	4.06E-02	1.68E+00	3.97E-02	3.41E-02	4.25E-02	5.71E-02	6.67E-02
NP-235	396.1 D	1.88E-01	1.49E-01	1.60E-01	1.59E+00	1.49E-01	1.24E-01	1.55E-01	1.56E-01	1.53E-01
NP-236	1.15E6 Y	1.15E+01	1.08E+01	1.14E+01	2.43E+01	1.05E+01	9.11E+00	1.13E+01	1.03E+01	1.10E+01
NP-236M	22.5 H	4.44E+00	4.25E+00	4.52E+00	8.41E+00	4.11E+00	3.59E+00	4.42E+00	3.99E+00	4.35E+00
NP-237	2.14E6 Y	2.01E+00	1.96E+00	1.95E+00	6.13E+00	1.79E+00	1.57E+00	1.97E+00	1.77E+00	2.11E+00
NP-238	2.117 D	4.59E+01	4.48E+01	5.04E+01	5.74E+01	4.43E+01	4.03E+01	4.71E+01	4.33E+01	4.70E+01
NP-239	2.355 D	1.51E+01	1.40E+01	1.50E+01	2.57E+01	1.36E+01	1.20E+01	1.46E+01	1.34E+01	1.44E+01
NP-240	65 M	9.95E+01	9.55E+01	1.07E+02	1.30E+02	9.40E+01	8.49E+01	9.99E+01	9.21E+01	9.96E+01
NP-240M	7.4 M	2.84E+01	2.72E+01	3.05E+01	3.66E+01	2.68E+01	2.42E+01	2.84E+01	2.62E+01	2.84E+01
PU-236	2.851 Y	1.55E-02	4.27E-03	5.43E-03	4.62E-01	5.66E-03	3.43E-03	3.85E-03	9.70E-03	4.95E-03
PU-237	45.3 D	4.18E+00	3.99E+00	4.16E+00	9.36E+00	3.83E+00	3.31E+00	4.14E+00	3.72E+00	4.07E+00
PU-238	87.75 Y	1.23E-02	2.12E-03	3.17E-03	4.07E-01	3.56E-03	1.72E-03	1.86E-03	7.22E-03	2.67E-03
PU-239	24131 Y	8.91E-03	4.64E-03	5.42E-03	1.62E-01	5.26E-03	3.98E-03	4.90E-03	6.53E-03	4.84E-03
PU-240	6537 Y	1.19E-02	2.30E-03	3.23E-03	3.88E-01	3.59E-03	1.83E-03	2.01E-03	7.07E-03	2.86E-03
PU-241	14.4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU-242	3.758E5 Y	1.00E-02	2.04E-03	2.84E-03	3.22E-01	3.12E-03	1.64E-03	1.80E-03	5.99E-03	2.50E-03
PU-243	4.956 H	2.00E+00	2.00E+00	2.06E+00	4.21E+00	1.87E+00	1.64E+00	2.00E+00	1.79E+00	2.05E+00
PU-244	8.26E7 Y	7.84E-03	9.18E-04	1.50E-03	2.78E-01	1.86E-03	6.90E-04	7.43E-04	4.43E-03	1.35E-03
PU-245	10.57 H	3.69E+01	3.50E+01	3.88E+01	4.84E+01	3.44E+01	3.09E+01	3.65E+01	3.37E+01	3.64E+01
PU-246	10.85 D	8.78E+00	8.35E+00	8.52E+00	1.41E+01	7.75E+00	7.01E+00	8.39E+00	7.76E+00	8.78E+00
AM-241	432.2 Y	1.63E+00	1.83E+00	1.67E+00	5.55E+00	1.49E+00	1.37E+00	1.63E+00	1.45E+00	1.98E+00
AM-242	16.02 H	1.21E+00	1.12E+00	1.19E+00	3.30E+00	1.10E+00	9.40E-01	1.18E+00	1.07E+00	1.15E+00
AM-242M	152 Y	5.74E-02	2.30E-02	2.72E-02	1.18E+00	2.74E-02	1.91E-02	2.27E-02	3.98E-02	2.67E-02
AM-243	7.38E3 Y	4.22E+00	4.47E+00	4.41E+00	1.04E+01	3.96E+00	3.53E+00	4.25E+00	3.79E+00	4.64E+00
AM-244	10.1 H	6.96E+01	6.69E+01	7.49E+01	9.10E+01	6.59E+01	5.95E+01	7.01E+01	6.45E+01	6.98E+01
AM-245	122.4 M	2.83E+00	2.62E+00	2.80E+00	4.74E+00	2.55E+00	2.25E+00	2.72E+00	2.51E+00	2.68E+00
AM-246	25.0 M	8.09E+01	7.89E+01	8.88E+01	1.01E+02	7.80E+01	7.10E+01	8.30E+01	7.63E+01	8.27E+01
CM-242	163.2 D	1.42E-02	1.95E-03	3.47E-03	4.30E-01	4.02E-03	1.75E-03	1.77E-03	8.48E-03	2.78E-03
CM-243	28.5 Y	1.15E+01	1.06E+01	1.14E+01	1.98E+01	1.03E+01	9.12E+00	1.10E+01	1.02E+01	1.09E+01
CM-244	18.11 Y	1.23E-02	1.34E-03	2.71E-03	3.83E-01	3.24E-03	1.25E-03	1.21E-03	7.24E-03	2.07E-03
CM-245	8.5E3 Y	6.26E+00	5.85E+00	6.19E+00	1.29E+01	5.70E+00	4.93E+00	6.13E+00	5.57E+00	5.96E+00
CM-246	4.75E3 Y	1.06E-02	9.22E-04	1.97E-03	3.41E-01	2.50E-03	8.12E-04	7.64E-04	6.13E-03	1.65E-03
CM-247	1.56E7 Y	2.88E+01	2.69E+01	2.97E+01	3.77E+01	2.63E+01	2.36E+01	2.78E+01	2.59E+01	2.78E+01
CM-248	3.39E5 Y	8.90E-03	1.22E-03	2.14E-03	2.71E-01	2.49E-03	1.08E-03	1.08E-03	5.31E-03	1.76E-03
CM-249	64.15 M	1.67E+00	1.59E+00	1.77E+00	2.11E+00	1.56E+00	1.40E+00	1.65E+00	1.53E+00	1.65E+00
CM-250	6.9E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BK-249	320 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN REM/YR PER MICROCURIE/SQUARE M

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
U-237	6.75 D	1.14E+01	1.26E+01	1.95E+01	1.06E+01	9.80E+00	8.99E+00	2.00E+01	1.11E+01	1.11E+01
U-238	4.468E9 Y	5.67E-03	1.21E-02	1.63E-02	5.56E-03	7.62E-03	7.53E-03	2.09E-02	7.07E-03	7.22E-03
U-239	23.40 M	4.00E+00	4.39E+00	7.11E+00	3.13E+00	3.42E+00	2.87E+00	7.29E+00	3.72E+00	3.79E+00
U-240	14.1 H	4.87E-02	9.17E-02	1.33E-01	3.61E-02	5.88E-02	5.13E-02	1.60E-01	5.27E-02	5.61E-02
NP-235	396.1 D	1.50E-01	1.97E-01	3.04E-01	1.41E-01	1.44E-01	1.36E-01	3.33E-01	1.57E-01	1.57E-01
NP-236	1.15E6 Y	1.08E+01	1.20E+01	1.90E+01	1.01E+01	9.31E+00	8.69E+00	1.96E+01	1.07E+01	1.06E+01
NP-236M	22.5 H	4.23E+00	4.68E+00	7.17E+00	3.52E+00	3.73E+00	3.38E+00	7.39E+00	4.14E+00	4.16E+00
NP-237	2.14E6 Y	1.92E+00	2.19E+00	3.59E+00	1.61E+00	1.66E+00	1.47E+00	3.73E+00	1.85E+00	1.87E+00
NP-238	2.117 D	4.45E+01	4.74E+01	5.07E+01	4.79E+01	4.31E+01	3.85E+01	5.16E+01	4.31E+01	4.40E+01
NP-239	2.355 D	1.40E+01	1.54E+01	2.25E+01	1.41E+01	1.23E+01	1.16E+01	2.31E+01	1.38E+01	1.38E+01
NP-240	65 M	9.50E+01	1.02E+02	1.15E+02	1.03E+02	9.10E+01	8.17E+01	1.18E+02	9.24E+01	9.38E+01
NP-240M	7.4 M	2.71E+01	2.90E+01	3.24E+01	2.95E+01	2.61E+01	2.34E+01	3.30E+01	2.64E+01	2.67E+01
PU-236	2.851 Y	4.84E-03	1.59E-02	1.93E-02	6.31E-03	9.37E-03	9.80E-03	2.68E-02	7.91E-03	8.13E-03
PU-237	45.3 D	3.97E+00	4.45E+00	7.32E+00	3.50E+00	3.41E+00	3.10E+00	7.56E+00	3.89E+00	3.90E+00
PU-238	87.75 Y	2.63E-03	1.22E-02	1.39E-02	4.51E-03	6.96E-03	7.61E-03	2.05E-02	5.52E-03	5.67E-03
PU-239	24131 Y	4.85E-03	8.94E-03	1.20E-02	5.58E-03	6.00E-03	6.13E-03	1.47E-02	6.02E-03	6.02E-03
PU-240	6537 Y	2.77E-03	1.19E-02	1.37E-02	4.43E-03	6.84E-03	7.40E-03	2.00E-02	5.47E-03	5.63E-03
PU-241	14.4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU-242	3.758E5 Y	2.44E-03	1.01E-02	1.17E-02	3.78E-03	5.79E-03	6.23E-03	1.69E-02	4.67E-03	4.81E-03
PU-243	4.956 H	1.99E+00	2.21E+00	3.65E+00	1.62E+00	1.69E+00	1.47E+00	3.76E+00	1.90E+00	1.91E+00
PU-244	8.26E7 Y	1.20E-03	7.71E-03	8.27E-03	2.68E-03	4.28E-03	4.81E-03	1.28E-02	3.21E-03	3.31E-03
PU-245	10.57 H	3.48E+01	3.75E+01	4.43E+01	3.78E+01	3.30E+01	2.99E+01	4.51E+01	3.41E+01	3.44E+01
PU-246	10.85 D	8.17E+00	8.91E+00	1.26E+01	8.39E+00	7.15E+00	6.74E+00	1.29E+01	7.98E+00	7.98E+00
AM-241	432.2 Y	1.78E+00	2.01E+00	3.58E+00	1.08E+00	1.46E+00	1.13E+00	3.69E+00	1.57E+00	1.64E+00
AM-242	16.02 H	1.12E+00	1.28E+00	2.07E+00	1.02E+00	9.78E-01	9.04E-01	2.15E+00	1.12E+00	1.11E+00
AM-242M	152 Y	2.53E-02	5.97E-02	7.90E-02	2.94E-02	3.79E-02	3.77E-02	9.99E-02	3.49E-02	3.59E-02
AM-243	7.38E3 Y	4.41E+00	4.90E+00	8.55E+00	3.12E+00	3.65E+00	3.02E+00	8.80E+00	4.06E+00	4.15E+00
AM-244	10.1 H	6.65E+01	7.12E+01	7.94E+01	7.18E+01	6.43E+01	5.73E+01	8.09E+01	6.46E+01	6.58E+01
AM-245	122.4 M	2.61E+00	2.87E+00	4.16E+00	2.68E+00	2.30E+00	2.18E+00	4.27E+00	2.59E+00	2.58E+00
AM-246	25.0 M	7.85E+01	8.36E+01	8.98E+01	8.45E+01	7.58E+01	6.78E+01	9.13E+01	7.60E+01	7.74E+01
CM-242	163.2 D	2.82E-03	1.43E-02	1.65E-02	5.24E-03	8.19E-03	8.81E-03	2.39E-02	6.47E-03	6.71E-03
CM-243	28.5 Y	1.06E+01	1.17E+01	1.69E+01	1.08E+01	9.35E+00	8.83E+00	1.74E+01	1.05E+01	1.05E+01
CM-244	18.11 Y	2.12E-03	1.24E-02	1.40E-02	4.42E-03	6.99E-03	7.61E-03	2.05E-02	5.42E-03	5.62E-03
CM-245	8.5E3 Y	5.83E+00	6.52E+00	1.03E+01	5.49E+00	5.05E+00	4.71E+00	1.07E+01	5.79E+00	5.76E+00
CM-246	4.75E3 Y	1.53E-03	1.06E-02	1.17E-02	3.67E-03	5.94E-03	6.52E-03	1.75E-02	4.47E-03	4.66E-03
CM-247	1.56E7 Y	2.68E+01	2.89E+01	3.49E+01	2.97E+01	2.51E+01	2.31E+01	3.55E+01	2.63E+01	2.65E+01
CM-248	3.39E5 Y	1.75E-03	9.01E-03	1.04E-02	3.26E-03	5.14E-03	5.52E-03	1.50E-02	4.04E-03	4.20E-03
CM-249	64.15 M	1.58E+00	1.69E+00	1.93E+00	1.73E+00	1.52E+00	1.36E+00	1.97E+00	1.54E+00	1.56E+00
CM-250	6.9E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BK-249	320 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
U-237	6.75 D	1.85E+01	1.38E+01	1.77E+01	9.65E+00	1.61E+01	2.42E+01	0.0	2.42E+01
U-238	4.468E9 Y	5.54E-02	7.23E-03	1.57E-02	4.20E-03	6.46E-02	5.30E-01	0.0	5.30E-01
U-239	23.40 M	6.64E+00	5.09E+00	6.43E+00	3.27E+00	5.65E+00	8.04E+00	3.41E+02	3.49E+02
U-240	14.1 H	3.91E-01	7.02E-02	1.39E-01	3.06E-02	3.98E-01	2.83E+00	3.69E+00	6.51E+00
NP-235	396.1 D	4.71E-01	1.84E-01	2.75E-01	1.26E-01	4.74E-01	2.57E+00	0.0	2.57E+00
NP-236	1.15E6 Y	1.78E+01	1.30E+01	1.69E+01	9.28E+00	1.58E+01	2.68E+01	0.0	2.68E+01
NP-236M	22.5 H	6.81E+00	5.12E+00	6.56E+00	3.61E+00	5.96E+00	8.98E+00	1.22E+01	2.12E+01
NP-237	2.14E6 Y	3.71E+00	2.42E+00	3.25E+00	1.57E+00	3.24E+00	7.54E+00	0.0	7.54E+00
NP-238	2.117 D	6.28E+01	5.01E+01	5.98E+01	3.89E+01	5.38E+01	7.47E+01	1.67E+02	2.41E+02
NP-239	2.355 D	2.19E+01	1.63E+01	2.09E+01	1.21E+01	1.92E+01	2.72E+01	5.78E+00	3.30E+01
NP-240	65 M	1.36E+02	1.06E+02	1.29E+02	8.29E+01	1.17E+02	1.62E+02	1.48E+02	3.11E+02
NP-240M	7.4 M	3.88E+01	2.99E+01	3.62E+01	2.37E+01	3.33E+01	4.64E+01	5.92E+02	6.39E+02
PU-236	2.851 Y	8.82E-02	5.78E-03	2.01E-02	3.15E-03	9.92E-02	8.11E-01	0.0	8.11E-01
PU-237	45.3 D	6.74E+00	4.92E+00	6.42E+00	3.36E+00	5.95E+00	1.01E+01	0.0	1.01E+01
PU-238	87.75 Y	7.55E-02	2.92E-03	1.51E-02	1.47E-03	8.58E-02	7.17E-01	0.0	7.17E-01
PU-239	24131 Y	3.46E-02	5.67E-03	1.16E-02	3.99E-03	3.78E-02	2.80E-01	0.0	2.80E-01
PU-240	6537 Y	7.24E-02	3.15E-03	1.49E-02	1.58E-03	8.20E-02	6.83E-01	0.0	6.83E-01
PU-241	14.4 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU-242	3.758E5 Y	6.02E-02	2.79E-03	1.25E-02	1.44E-03	6.82E-02	5.67E-01	0.0	5.67E-01
PU-243	4.956 H	3.32E+00	2.51E+00	3.22E+00	1.66E+00	2.87E+00	4.24E+00	3.08E+01	3.51E+01
PU-244	8.26E7 Y	5.09E-02	1.26E-03	9.39E-03	5.24E-04	5.80E-02	4.91E-01	0.0	4.91E-01
PU-245	10.57 H	5.04E+01	3.90E+01	4.76E+01	3.04E+01	4.34E+01	5.83E+01	1.57E+02	2.15E+02
PU-246	10.85 D	1.29E+01	9.61E+00	1.22E+01	7.04E+00	1.11E+01	1.46E+01	0.0	1.46E+01
AM-241	432.2 Y	3.54E+00	2.43E+00	3.17E+00	1.33E+00	2.99E+00	6.39E+00	0.0	6.39E+00
AM-242	16.02 H	2.04E+00	1.38E+00	1.83E+00	9.55E-01	1.82E+00	3.96E+00	5.28E+01	5.68E+01
AM-242M	152 Y	2.74E-01	2.95E-02	8.22E-02	1.80E-02	2.77E-01	1.97E+00	0.0	1.97E+00
AM-243	7.38E3 Y	7.73E+00	5.80E+00	7.43E+00	3.55E+00	6.61E+00	1.06E+01	0.0	1.06E+01
AM-244	10.1 H	9.56E+01	7.46E+01	9.02E+01	5.78E+01	8.20E+01	1.16E+02	4.27E+01	1.59E+02
AM-245	122.4 M	4.06E+00	3.04E+00	3.88E+00	2.28E+00	3.57E+00	5.03E+00	1.55E+02	1.60E+02
AM-246	25.0 M	1.11E+02	8.81E+01	1.05E+02	6.87E+01	9.48E+01	1.30E+02	3.81E+02	5.11E+02
CM-242	163.2 D	8.79E-02	2.77E-03	1.86E-02	1.40E-03	9.34E-02	7.36E-01	0.0	7.36E-01
CM-243	28.5 Y	1.66E+01	1.23E+01	1.58E+01	9.23E+00	1.46E+01	2.15E+01	0.0	2.15E+01
CM-244	18.11 Y	7.78E-02	1.95E-03	1.59E-02	9.40E-04	8.29E-02	6.56E-01	0.0	6.56E-01
CM-245	8.5E3 Y	9.65E+00	7.07E+00	9.20E+00	5.02E+00	8.54E+00	1.39E+01	0.0	1.39E+01
CM-246	4.75E3 Y	6.89E-02	1.34E-03	1.37E-02	5.26E-04	7.34E-02	5.84E-01	0.0	5.84E-01
CM-247	1.56E7 Y	3.90E+01	2.93E+01	3.63E+01	2.35E+01	3.36E+01	4.44E+01	1.02E+00	4.55E+01
CM-248	3.39E5 Y	5.54E-02	1.73E-03	1.17E-02	8.47E-04	5.88E-02	4.63E-01	0.0	4.63E-01
CM-249	64.15 M	2.27E+00	1.74E+00	2.12E+00	1.38E+00	1.94E+00	2.62E+00	1.74E+02	1.77E+02
CM-250	6.9E3 Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BK-249	320 D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	ADRENALS	BLADDER	BRAIN	BREAST	HEART	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS
BK-250	3.222 H	7.36E+01	7.18E+01	8.09E+01	9.11E+01	7.10E+01	6.47E+01	7.56E+01	6.95E+01	7.54E+01
BK-251	57.0 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CF-248	333.5 D	1.03E-02	5.62E-04	1.81E-03	3.03E-01	2.38E-03	6.53E-04	4.83E-04	6.06E-03	1.54E-03
CF-249	350.6 Y	3.00E+01	2.79E+01	3.07E+01	4.05E+01	2.72E+01	2.44E+01	2.88E+01	2.69E+01	2.88E+01
CF-250	13.08 Y	1.18E-02	2.15E-03	3.58E-03	3.02E-01	3.96E-03	2.02E-03	2.10E-03	7.46E-03	3.05E-03
CF-251	9.0E2 Y	1.05E+01	9.72E+00	1.04E+01	1.89E+01	9.50E+00	8.31E+00	1.02E+01	9.34E+00	9.93E+00
CF-252	2.639 Y	1.06E-02	1.60E-03	2.88E-03	2.81E-01	3.27E-03	1.53E-03	1.52E-03	6.56E-03	2.45E-03
CF-253	17.81 D	1.74E-04	7.52E-06	3.14E-05	5.12E-03	4.09E-05	1.08E-05	7.32E-06	1.02E-04	2.24E-05
CF-254	60.5 D	1.12E-06	1.57E-06	9.92E-07	4.01E-06	9.01E-07	9.58E-07	1.24E-06	9.82E-07	1.95E-06
ES-253	20.467 D	3.34E-02	2.50E-02	2.75E-02	2.15E-01	2.56E-02	2.19E-02	2.58E-02	2.77E-02	2.63E-02
ES-254	275.7 D	3.65E-01	2.37E-01	2.58E-01	4.22E+00	2.41E-01	1.98E-01	2.30E-01	2.86E-01	2.62E-01
ES-254M	39.3 H	4.93E+01	4.71E+01	5.28E+01	6.23E+01	4.63E+01	4.17E+01	4.92E+01	4.53E+01	4.91E+01
ES-255	39.8 D	7.90E-04	5.66E-05	1.49E-04	2.19E-02	1.92E-04	6.04E-05	4.80E-05	4.73E-04	1.47E-04
FM-254	3.240 H	1.44E-02	3.53E-03	5.29E-03	3.07E-01	5.64E-03	3.29E-03	3.56E-03	9.60E-03	5.04E-03
FM-255	20.07 H	2.19E-01	1.42E-01	1.53E-01	2.61E+00	1.44E-01	1.16E-01	1.37E-01	1.71E-01	1.60E-01
FM-256	157.6 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/ISQUARE M

NUCLIDE	HALF-LIFE	LIVER	LUNGS	MARROW	RED MARROW	OVARIES	PANCREAS	SKELETON	SPLEEN	STOMACH
BK-250	3.222 H	7.14E+01	7.61E+01	8.12E+01	7.69E+01	6.91E+01	6.17E+01	8.27E+01	6.92E+01	7.05E+01
BK-251	57.0 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CF-248	333.5 D	1.40E-03	1.05E-02	1.19E-02	3.58E-03	5.91E-03	6.33E-03	1.72E-02	4.44E-03	4.68E-03
CF-249	350.6 Y	2.78E+01	3.00E+01	3.68E+01	3.08E+01	2.59E+01	2.40E+01	3.75E+01	2.74E+01	2.74E+01
CF-250	13.08 Y	3.03E-03	1.22E-02	1.49E-02	4.83E-03	7.20E-03	7.44E-03	2.03E-02	5.97E-03	6.21E-03
CF-251	9.0E2 Y	9.70E+00	1.07E+01	1.62E+01	9.68E+00	8.46E+00	8.02E+00	1.67E+01	9.64E+00	9.59E+00
CF-252	2.639 Y	2.42E-03	1.09E-02	1.31E-02	4.11E-03	6.37E-03	6.61E-03	1.81E-02	5.15E-03	5.38E-03
CF-253	17.81 D	2.28E-05	1.77E-04	1.99E-04	6.09E-05	9.94E-05	1.07E-04	2.90E-04	7.50E-05	7.88E-05
CF-254	60.5 D	1.33E-06	1.47E-06	2.65E-06	6.41E-07	1.07E-06	7.33E-07	2.70E-06	1.06E-06	1.16E-06
ES-253	20.467 D	2.55E-02	3.32E-02	4.44E-02	2.91E-02	2.52E-02	2.49E-02	4.84E-02	2.73E-02	2.72E-02
ES-254	275.7 D	2.46E-01	3.87E-01	5.42E-01	2.49E-01	2.74E-01	2.55E-01	6.20E-01	2.74E-01	2.80E-01
ES-254M	39.3 H	4.68E+01	5.02E+01	5.59E+01	5.11E+01	4.54E+01	4.04E+01	5.68E+01	4.56E+01	4.63E+01
ES-255	39.8 D	1.24E-04	8.14E-04	9.46E-04	2.79E-04	4.64E-04	4.86E-04	1.34E-03	3.52E-04	3.74E-04
FM-254	3.240 H	4.73E-03	1.51E-02	1.95E-02	6.47E-03	9.29E-03	9.22E-03	2.52E-02	8.03E-03	8.39E-03
FM-255	20.07 H	1.49E-01	2.42E-01	3.66E-01	1.32E-01	1.65E-01	1.49E-01	4.16E-01	1.66E-01	1.71E-01
FM-256	157.6 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIVE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SURFACE
IN MREM/YR PER MICROCURIE/(SQUARE M)

NUCLIDE	HALF-LIFE	TESTES	THYMUS	THYROID	UTERUS	EFFECTIVE	SKIN (PHOTON)	SKIN (ELECTRON)	SKIN (TOTAL)
BK-250	3.222 H	1.01E+02	8.05E+01	9.60E+01	6.24E+01	8.61E+01	1.18E+02	1.76E+02	2.94E+02
BK-251	57.0 M	0.0	0.0	0.0	0.0	0.0	0.0	2.93E+02	2.93E+02
CF-248	333.5 D	6.72E-02	9.35E-04	1.43E-02	2.88E-04	6.73E-02	5.05E-01	0.0	5.05E-01
CF-249	350.6 Y	4.07E+01	3.05E+01	3.78E+01	2.44E+01	3.52E+01	4.76E+01	0.0	4.76E+01
CF-250	13.08 Y	6.88E-02	2.98E-03	1.67E-02	1.70E-03	6.85E-02	5.01E-01	0.0	5.01E-01
CF-251	9.0E2 Y	1.54E+01	1.15E+01	1.48E+01	8.45E+00	1.36E+01	1.99E+01	0.0	1.99E+01
CF-252	2.639 Y	6.36E-02	2.29E-03	1.50E-02	1.21E-03	6.34E-02	4.66E-01	0.0	4.66E-01
CF-253	17.81 D	1.13E-03	1.34E-05	2.39E-04	4.95E-06	1.14E-03	8.54E-03	0.0	8.54E-03
CF-254	60.5 D	3.06E-06	2.05E-06	2.66E-06	8.79E-07	2.35E-06	3.95E-06	0.0	3.95E-06
ES-253	20.467 D	7.73E-02	2.85E-02	4.43E-02	2.20E-02	7.15E-02	3.30E-01	0.0	3.30E-01
ES-254	275.7 D	1.25E+00	2.91E-01	5.47E-01	1.92E-01	1.16E+00	6.68E+00	0.0	6.68E+00
ES-254M	39.3 H	6.72E+01	5.20E+01	6.30E+01	4.07E+01	5.74E+01	7.94E+01	6.46E+01	1.44E+02
ES-255	39.8 D	5.09E-03	9.12E-05	1.15E-03	2.84E-05	4.95E-03	3.61E-02	0.0	3.61E-02
FM-254	3.240 H	7.80E-02	4.80E-03	2.19E-02	2.81E-03	7.32E-02	4.93E-01	0.0	4.93E-01
FM-255	20.07 H	7.99E-01	1.84E-01	3.59E-01	1.11E-01	7.26E-01	4.04E+00	0.0	4.04E+00
FM-256	157.6 M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

APPENDIX B

DIAGRAMS OF RADIOACTIVE DECAY CHAINS

The following diagrams show the parent-daughter relationships for all decay chains involving radionuclides considered in this report.⁽⁷⁾ Each diagram gives the half-life, modes of decay, and decay branching fractions for each radionuclide in a decay chain. The decay modes include α , β^- , β^+ and electron capture (EC), and isomeric transitions (IT).⁽⁷⁾ The distinction between EC and β^+ decay is that the latter involves a total decay energy for a transition greater than 1022 keV, so that positron emission may occur.⁽⁷⁾ Branching fractions are given in percent, i.e., number of decays per 100 atoms of the parent radionuclide, and modes of decay with branching fractions less than 0.1% are omitted. The branching fraction for spontaneous fission decay, which is discussed in Section 3.1.1, is not indicated in the diagrams.

Neptunium Series

Uranium Series

*Branching ratio based on systematics; decay has not been observed.

Actinium Series

Thorium Series

APPENDIX C

LISTING OF THE DOSFACTOR COMPUTER CODE

This appendix gives a complete listing of the version of the DOSFACTOR computer code that was used to generate the tables of external dose-rate conversion factors for photons and electrons given in Appendix A.

```

C
C PROGRAM DOSFACTER (DOSE FACTORS FOR EXTERNAL RADIATION)
C
C A PROGRAM TO CALCULATE DOSE-RATE CONVERSION FACTORS FOR EXTERNAL EXPOSURE TO
C PHOTONS AND ELECTRONS VIA IMMERSION IN CONTAMINATED AIR, IMMERSION IN
C CONTAMINATED WATER, AND IRRADIATION FROM A CONTAMINATED GROUND SURFACE
C
C THIS VERSION OF THE PROGRAM INCLUDES THE FOLLOWING CHANGES FROM THE VERSION
C DOCUMENTED IN NUREG/CR-1918, ORNL/NUREG-79 (1981) -
C
C - ELIMINATION OF PHOTON AND ELECTRON DOSE-RATE FACTORS FOR THE BODY SURFACE
C
C - ELIMINATION OF PHOTON DOSE-RATE FACTORS FOR TOTAL BODY
C
C - REPLACEMENT OF PHOTON DOSE-RATE FACTORS FOR TOTAL BODY BY EFFECTIVE DOSE-
C RATE FACTORS FOR EXTERNAL EXPOSURE; EFFECTIVE DOSE-RATE FACTORS ARE BASED
C ON ORGAN-SPECIFIC WEIGHTING FACTORS RECOMMENDED IN ICRP PUBLICATION 26,
C AND DOSE TO SKIN IS NOT INCLUDED IN EFFECTIVE DOSE-RATE FACTORS
C
C - CALCULATION OF ELECTRON DOSE-RATE FACTORS IN SKIN AT DEPTHS BELOW THE BODY
C SURFACE OF 4, 8, AND 40 MG/(SQ CM) AND AT THE VALUE RECOMMENDED BY THE
C ICRP OF 7 MG/(SQ CM); THESE REPLACE THE PREVIOUS CALCULATIONS FOR A DEPTH
C OF 0.007 CM AND AN AVERAGE OVER THE THICKNESS OF THE DERMIS BETWEEN 0.005
C AND 0.125 CM
C
C - CORRECTION OF AN ERROR IN SUBROUTINE BGRND THAT AFFECTS CALCULATION OF
C ELECTRON DOSE-RATE FACTORS IN SKIN FOR GROUND SURFACE EXPOSURE FOR
C ELECTRON ENERGIES ABOVE ABOUT 4.5 MEV
C
C - REFORMATING OF OUTPUT SO THAT SUMMARY OF ALL RESULTS FOR EACH EXPOSURE
C MODE APPEARS IN A SINGLE TABLE - VIZ., (1) PHOTON DOSE-RATE FACTORS FOR
C ALL ORGANS EXCEPT SKIN, (2) EFFECTIVE DOSE-RATE FACTORS FOR PHOTONS BASED
C ON DOSE-RATE FACTORS FOR ALL ORGANS EXCEPT SKIN, AND (3) PHOTON, ELECTRON,
C AND PHOTON PLUS ELECTRON DOSE-RATE FACTORS FOR SKIN
C
C PROGRAM AUTHOR: D. C. KOCHER
C DOSIMETRY AND BIOPHYSICAL TRANSPORT SECTION
C HEALTH AND SAFETY RESEARCH DIVISION
C OAK RIDGE NATIONAL LABORATORY
C
C DATE: MARCH 1987
C
C INITIALIZE INDEX FOR DETECTION OF END-OF-FILE FOR INPUT DATA
C
C NQUIT=0
C
C WRITE HEADINGS FOR EACH TABLE OF OUTPUT
C
C CALL PRINT (0)
C
C PERFORM A COMPLETE SET OF CALCULATIONS FOR ONE RADIONUCLIDE AT A TIME
C
C READ INPUT DATA
C

```

```
      1 CALL DATIN (NQUIT)
C
C      TEST FOR END-OF-FILE FOR INPUT DATA TO END CALCULATIONS
C
      IF (NQUIT .NE. 0) GO TO 2
C
C      WRITE INPUT DATA
C
      CALL DATOUT
C
C      CALCULATE DOSE-RATE CONVERSION FACTORS
C
      CALL CALC
C
C      WRITE DOSE-RATE CONVERSION FACTORS
C
      CALL DOSOUT
      GO TO 1
2 STOP
END
```

```

C      SUBROUTINE PRINT (NTYPE)
C
C      WRITES HEADINGS FOR EACH TABLE OF OUTPUT
C
C      NTYPE - INDEX FOR EACH TYPE OF TABLE
C              = 0 FOR FIRST TIME THROUGH SUBROUTINE WHEN ALL TABLE HEADINGS ARE
C                WRITTEN
C              = 1 TO WRITE HEADINGS FOR RADIONUCLIDE AND SPECTRAL IDENTIFICATION
C                INPUT DATA TABLE ONLY
C              = 2 TO WRITE HEADINGS FOR BETA-PARTICLE INPUT DATA TABLE ONLY
C              = 3 TO WRITE HEADINGS FOR POSITRON INPUT DATA TABLE ONLY
C              = 4 TO WRITE HEADINGS FOR AUGER AND INTERNAL CONVERSION ELECTRON INPUT
C                DATA TABLE ONLY
C              = 5 TO WRITE HEADINGS FOR PHOTON INPUT DATA TABLE ONLY
C              = 6 TO WRITE HEADINGS FOR SUMMARY TABLES OF PHOTON DOSE-RATE FACTORS
C                FOR ALL ORGANS EXCEPT SKIN, PHOTON PLUS ELECTRON DOSE-RATE
C                FACTORS FOR SKIN, AND EFFECTIVE DOSE-RATE FACTORS FOR EACH
C                EXPOSURE MODE
C              = 7 TO WRITE HEADINGS FOR TABLES OF ELECTRON DOSE-RATE FACTORS FOR
C                DIFFERENT DEPTHS IN SKIN FOR EACH EXPOSURE MODE
C              = 8 TO WRITE HEADINGS FOR TABLES OF DOSE-RATE FACTORS FOR SKIN FOR
C                PHOTONS, ELECTRONS, AND PHOTONS PLUS ELECTRONS FOR EACH EXPOSURE
C                MODE
C              = 9 TO WRITE HEADINGS FOR TABLE OF EFFECTIVE DOSE-RATE FACTORS FOR ALL
C                THREE EXPOSURE MODES
C
C      IF (NTYPE .EQ. 0) GO TO 1
C      GO TO (1, 2, 3, 4, 5, 6, 7, 8, 9), NTYPE
C
C      RADIONUCLIDE AND SPECTRAL IDENTIFICATION
C
C      1 WRITE (10,10)
C      10 FORMAT (1H1)
C      WRITE (10,20)
C      20 FORMAT (1H0, 2X, 40HRADIONUCLIDE AND SPECTRAL IDENTIFICATION)
C      WRITE (10,21)
C      21 FORMAT (1H0, 42X, 24HNUMBER OF SPECTRAL LINES)
C      WRITE (10,22)
C      22 FORMAT (1H , 34X, 39H-----)
C      WRITE (10,23)
C      23 FORMAT (1H , 5X, 7HNUCLIDE, 8X, 9HHALF-LIFE, 5X, 5HBETAS, 4X,
C      2 9HPOSITRONS, 2X, 9HELECTRONS, 3X, 7HPHOTONS/)
C      IF (NTYPE .NE. 0) GO TO 99
C
C      BETA-PARTICLE DATA
C
C      2 WRITE (11,10)
C      WRITE (11,24)
C      24 FORMAT (1H0, 2X, 47HENERGIES AND INTENSITIES FOR EACH BETA PARTICL
C      2E)
C      WRITE (11,25)
C      25 FORMAT (1H0, 36X, 7HMAXIMUM, 9X, 7HAVERAGE, 9X, 9HINTENSITY)
C      WRITE (11,26)
C      26 FORMAT (1H , 5X, 7HNUCLIDE, 8X, 9HHALF-LIFE, 5X, 12HENERGY (MEV),

```

```

      2 4X, 12HENERGY (MEV), 5X, 11H(PER DECAY))
      IF (NTYPE .NE. 0) GO TO 99
C
C POSITRON DATA
C
      3 WRITE (12,10)
      WRITE (12,27)
      27 FORMAT (1H0, 2X, 42HENERGIES AND INTENSITIES FOR EACH POSITRON)
      WRITE (12,25)
      WRITE (12,26)
      IF (NTYPE .NE. 0) GO TO 99
C
C AUGER AND INTERNAL CONVERSION ELECTRON DATA
C
      4 WRITE (13,10)
      WRITE (13,28)
      28 FORMAT (1H0, 2X, 72HENERGIES AND INTENSITIES FOR EACH AUGER AND IN
      2TERNAL CONVERSION ELECTRON)
      WRITE (13,29)
      29 FORMAT (1H0, 37X, 6HENERGY, 9X, 9HINTENSITY)
      WRITE (13,30)
      30 FORMAT (1H , 5X, 7HNUCLIDE, 8X, 9HHALF-LIFE, 9X, 5H(MEV), 8X,
      2 11H(PER DECAY))
      IF (NTYPE .NE. 0) GO TO 99
C
C PHOTON DATA
C
      5 WRITE (14,10)
      WRITE (14,31)
      31 FORMAT (1H0, 2X, 40HENERGIES AND INTENSITIES FOR EACH PHOTON)
      WRITE (14,29)
      WRITE (14,30)
      IF (NTYPE .NE. 0) GO TO 99
C
C DOSE-RATE FACTORS FOR ALL ORGANS PLUS EFFECTIVE DOSE-RATE FACTOR
C
C AIR IMMERSION
C
      6 WRITE (15,10)
      WRITE (15,41)
      41 FORMAT (1H0, 2X, 98HDOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTIV
      2E DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED AIR)
      WRITE (15,42)
      42 FORMAT (1H , 5X, 35HIN MREM/YR PER MICROCURIE/(CUBIC M))
      WRITE (15,43)
      43 FORMAT (1H0, 92X, 5HUPPER, 6X, 5HLOWER)
      WRITE (15,44)
      44 FORMAT (1H , 81X, 5HSMALL, 6X, 5HLARGE, 6X, 5HLARGE)
      WRITE (15,45)
      45 FORMAT (1H , 1X, 7HNUCLIDE, 4X, 9HHALF-LIFE, 3X, 8HADRENALS, 4X,
      2 7HBLADDER, 5X, 5HBRAIN, 5X, 6HBREAST, 6X, 5HHEART, 4X,
      3 9HINTESTINE, 2X, 9HINTESTINE, 2X, 9HINTESTINE, 3X, 7HKIDNEYS/)
      WRITE (16,10)
      WRITE (16,41)
      WRITE (16,42)
      WRITE (16,46)
      46 FORMAT (1H0, 60X, 3HRED)
      WRITE (16,47)
      47 FORMAT (1H , 1X, 7HNUCLIDE, 4X, 9HHALF-LIFE, 5X, 5HLIVER, 6X,

```

```

2 5HLUNGS, 5X, 6HMARROW, 5X, 6HMARROW, 5X, 7HOVARIES, 3X,
3 8HPANCREAS, 3X, 8HSKELETON, 4X, 6HSPLEEN, 5X, 7HSTOMACH/)
  WRITE (17,10)
  WRITE (17,41)
  WRITE (17,42)
  WRITE (17,60)
60 FORMAT (1H0, 81X, 4HSKIN, 7X, 4HSKIN, 7X, 4HSKIN)
  WRITE (17,61)
61 FORMAT (1H , 1X, 7HNUCLIDE, 4X, 9HHALF-LIFE, 4X, 6HTESTES, 5X,
2 6HTHYMUS, 5X, 7HTHYROID, 4X, 6HUTERUS, 4X, 9HEFFECTIVE, 2X,
3 8H(PHOTON), 2X, 10HELECTRON), 3X, 7H(TOTAL)/)

C
C
C  WATER IMMERSION
  WRITE (20,10)
  WRITE (20,48)
48 FORMAT (1H0, 2X, 100HDOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTI
2VE DOSE-RATE FACTOR FOR IMMERSION IN CONTAMINATED WATER)
  WRITE (20,42)
  WRITE (20,43)
  WRITE (20,44)
  WRITE (20,45)
  WRITE (21,10)
  WRITE (21,48)
  WRITE (21,42)
  WRITE (21,46)
  WRITE (21,47)
  WRITE (22,10)
  WRITE (22,48)
  WRITE (22,42)
  WRITE (22,60)
  WRITE (22,61)

C
C
C  GROUND SURFACE EXPOSURE
  WRITE (25,10)
  WRITE (25,49)
49 FORMAT (1H0, 2X, 115HDOSE-RATE FACTORS FOR BODY ORGANS AND EFFECTI
2VE DOSE-RATE FACTOR FOR EXPOSURE 1 M ABOVE CONTAMINATED GROUND SUR
3FACE)
  WRITE (25,50)
50 FORMAT (1H , 5X, 36HIN MREM/YR PER MICROCURIE/(SQUARE M))
  WRITE (25,43)
  WRITE (25,44)
  WRITE (25,45)
  WRITE (26,10)
  WRITE (26,49)
  WRITE (26,50)
  WRITE (26,46)
  WRITE (26,47)
  WRITE (27,10)
  WRITE (27,49)
  WRITE (27,50)
  WRITE (27,60)
  WRITE (27,61)
  IF (NTYPE .NE. 0) GO TO 99

C
C  ELECTRON DOSE-RATE FACTORS FOR DIFFERENT DEPTHS IN SKIN
C

```

```

C   AIR IMMERSION
C
  7 WRITE (18,10)
    WRITE (18,51)
  51 FORMAT (1H0, 2X, 69HELECTRON DOSE-RATE FACTORS FOR SKIN FOR IMMERS
    2ION IN CONTAMINATED AIR)
    WRITE (18,42)
    WRITE (18,52)
  52 FORMAT (1H0, 37X, 8HDEPTH OF, 10X, 8HDEPTH OF, 10X, 8HDEPTH OF,
    2 10X, 8HDEPTH OF)
    WRITE (18,53)
  53 FORMAT (1H , 5X, 7HNUCLIDE, 8X, 9HHALF-LIFE, 6X, 12H4 MG/(SQ CM),
    2 6X, 12H8 MG/(SQ CM), 5X, 13H40 MG/(SQ CM), 6X, 12H7 MG/(SQ CM)/)
C
C   WATER IMMERSION
C
    WRITE (23,10)
    WRITE (23,54)
  54 FORMAT (1H0, 2X, 71HELECTRON DOSE-RATE FACTORS FOR SKIN FOR IMMERS
    2ION IN CONTAMINATED WATER)
    WRITE (23,42)
    WRITE (23,52)
    WRITE (23,53)
C
C   GROUND SURFACE EXPOSURE
C
    WRITE (28,10)
    WRITE (28,55)
  55 FORMAT (1H0, 2X, 86HELECTRON DOSE-RATE FACTORS FOR SKIN FOR EXPOSU
    2RE 1 M ABOVE CONTAMINATED GROUND SURFACE)
    WRITE (28,50)
    WRITE (28,52)
    WRITE (28,53)
    IF (NTYPE .NE. 0) GO TO 99
C
C DOSE-RATE FACTORS FOR SKIN FOR PHOTONS, ELECTRONS, AND PHOTONS PLUS ELECTRONS
C
C   AIR IMMERSION
C
  8 WRITE (19,10)
    WRITE (19,65)
  65 FORMAT (1H0, 2X, 60HDOSE-RATE FACTORS FOR SKIN FOR IMMERSION IN CO
    2NTAMINATED AIR)
    WRITE (19,42)
    WRITE (19,66)
  66 FORMAT (1H0, 5X, 58HVALUES FOR ELECTRONS CORRESPOND TO A DEPTH OF
    27 MG/(SQ CM))
    WRITE (19,67)
  67 FORMAT (1H0, 5X, 7HNUCLIDE, 8X, 9HHALF-LIFE, 9X, 6HPHOTON, 11X,
    2 8HELECTRON, 12X, 5HTOTAL/)
C
C   WATER IMMERSION
C
    WRITE (24,10)
    WRITE (24,68)
  68 FORMAT (1H0, 2X, 62HDOSE-RATE FACTORS FOR SKIN FOR IMMERSION IN CO
    2NTAMINATED WATER)
    WRITE (24,42)
    WRITE (24,66)

```



```

      WRITE (24,67)
C
C   GROUND SURFACE EXPOSURE
C
      WRITE (29,10)
      WRITE (29,69)
69  FORMAT (1H0, 2X, 77HDOSE-RATE FACTORS FOR SKIN FOR EXPOSURE 1 M AB
      2OVE CONTAMINATED GROUND SURFACE)
      WRITE (29,50)
      WRITE (29,66)
      WRITE (29,67)
      IF (NTYPE .NE. 0) GO TO 99
C
C   EFFECTIVE DOSE-RATE FACTORS FOR AIR IMMERSION, WATER IMMERSION, AND GROUND
C   SURFACE EXPOSURE
C
      9  WRITE (30,10)
      WRITE (30,32)
32  FORMAT (1H0, 2X, 54HEFFECTIVE DOSE-RATE FACTORS FOR PHOTONS PLUS E
      2LECTRONS)
      WRITE (30,33)
33  FORMAT (1H , 5X, 67HIN MREM/YR PER MICROCURIE/(CUBIC M) FOR AIR AN
      2D WATER IMMERSION AND)
      WRITE (30,34)
34  FORMAT (1H , 5X, 64HIN MREM/YR PER MICROCURIE/(SQUARE M) FOR GROUND
      2D SURFACE EXPOSURE)
      WRITE (30,35)
35  FORMAT (1H0 , 39X, 3HAIR, 14X, 5HWATER, 13X, 6HGROUND)
      WRITE (30,36)
36  FORMAT (1H , 5X, 7HNUCLIDE, 8X, 9HHALF-LIFE, 7X, 9HIMMERSION, 9X,
      2 9HIMMERSION, 10X, 7HSURFACE/)
99  RETURN
      END

```

```

C
C   SUBROUTINE DATIN (NQUIT)
C
C   READS INPUT DATA FOR EACH NUCLIDE
C
C   NQUIT - AN INDEX TO DETECT END-OF-FILE FOLLOWING DATA FOR LAST NUCLIDE
C           = 0 INITIALLY
C           = 1 AT END-OF-FILE
C
C   DIMENSION EALF(25), FALF(25), EBMX(50), EBAVG(50), FBETA(50),
C   2 EPMX(20), EPAVG(20), FPOS(20), EELEC(125), FELEC(125),
C   3 EGAM(200), FGAM(200)
C   DIMENSION INUCL(2), THALF(3), NBF(5), NPF(5)
C   COMMON/ BLK1/ INUCL, THALF
C   COMMON/ BLK2/ ATNO, NFB, NBF, NFP, NPF
C   COMMON/ BLK3/ NBETA, NPOS, NELEC, NGAM
C   COMMON/ BLK4/ EBMX, EBAVG, FBETA, EPMX, EPAVG, FPOS, EELEC,
C   2 FELEC, EGAM, FGAM
C
C   RADIONUCLIDE NAME, HALF-LIFE, AND ATOMIC NUMBER
C
C   READ (5,3,END=99) INUCL, THALF, ATNO
C   3 FORMAT (2A4, 2X, 3A4, 3X, F5.1)
C
C   NUMBER OF ALPHA PARTICLES (LIMIT OF 20); ALPHA ENERGIES AND INTENSITIES ARE
C   READ IN, BUT ARE NOT USED IN THE PROGRAM
C
C   READ (5,4) NALF
C   4 FORMAT (7I4)
C   IF (NALF .EQ. 0) GO TO 9
C
C   ALPHA ENERGIES IN MEV AND INTENSITIES IN NUMBER PER DECAY
C
C   READ (5,6) (EALF(J), FALF(J), J=1,NALF)
C   6 FORMAT (6E11.4)
C
C   NUMBER OF BETA PARTICLES (LIMIT OF 50), NUMBER OF FIRST-FORBIDDEN UNIQUE
C   TRANSITIONS (LIMIT OF 5), AND INDEX FOR EACH FIRST-FORBIDDEN UNIQUE
C   TRANSITION
C
C   9 READ (5,4) NBETA, NFB, (NBF(I), I=1,NFB)
C   IF (NBETA .EQ. 0) GO TO 5
C
C   BETA ENDPOINT AND AVERAGE ENERGIES IN MEV AND INTENSITIES IN NUMBER PER DECAY
C
C   READ (5,6) (EBMX(J), EBAVG(J), FBETA(J), J=1,NBETA)
C
C   NUMBER OF POSITRONS (LIMIT OF 20), NUMBER OF FIRST-FORBIDDEN UNIQUE
C   TRANSITIONS (LIMIT OF 5), AND INDEX FOR EACH FIRST-FORBIDDEN UNIQUE
C   TRANSITION
C
C   5 READ (5,4) NPOS, NFP, (NPF(I), I=1,NFP)
C   IF (NPOS .EQ. 0) GO TO 7
C
C   POSITRON ENDPOINT AND AVERAGE ENERGIES IN MEV AND INTENSITIES IN NUMBER PER

```

```

C   DECAY
C       READ (5,6) (EPMAX(J), EPAVG(J), FPOS(J), J=1,NPOS)
C
C   NUMBER OF AUGER AND INTERNAL CONVERSION ELECTRONS (LIMIT OF 125)
C
C       7 READ (5,4) NELEC
C       IF (NELEC .EQ. 0) GO TO 8
C
C   AUGER AND INTERNAL CONVERSION ELECTRON ENERGIES IN MEV AND INTENSITIES IN
C   NUMBER PER DECAY
C
C       READ (5,6) (EELEC(J), FELEC(J), J=1,NELEC)
C
C   NUMBER OF PHOTONS (LIMIT OF 200)
C
C       8 READ (5,4) NGAM
C       IF (NGAM .EQ. 0) GO TO 1
C
C   PHOTON ENERGIES IN MEV AND INTENSITIES IN NUMBER PER DECAY
C
C       READ (5,6) (EGAM(J), FGAM(J), J=1,NGAM)
C       GO TO 1
99 NQUIT=1
1  RETURN
END

```

```

C      SUBROUTINE DATOUT
C
C      WRITES INPUT DATA FOR EACH NUCLIDE
C
C      DIMENSION EBMAX(50), EBAVG(50), FBETA(50), EPMAX(20), EPAVG(20),
C      2 FPOS(20), EELEC(125), FELEC(125), EGAM(200), FGAM(200)
C      DIMENSION INUCL(2), THALF(3)
C      COMMON/ BLK1/ INUCL, THALF
C      COMMON/ BLK3/ NBETA, NPOS, NELEC, NGAM
C      COMMON/ BLK4/ EBMAX, EBAVG, FBETA, EPMAX, EPAVG, FPOS, EELEC,
C      2 FELEC, EGAM, FGAM
C
C      MAXIMUM NUMBER OF LINES PER PAGE FOR EACH TYPE OF DATA TABLE
C
C      DATA MAXLID/51/, MAXLSP/52/
C
C      LOGICAL FIRST/ .TRUE./
C
C      TEST FOR FIRST TIME THROUGH SUBROUTINE
C
C      IF (.NOT. FIRST) GO TO 9
C
C      INITIALIZE LINE COUNT FOR EACH TABLE; RESET LOGICAL VARIABLE
C
C      LINID=0
C      LINBET=0
C      LINPOS=0
C      LINEL=0
C      LINGAM=0
C      FIRST=.FALSE.
C
C      RADIONUCLIDE AND SPECTRAL IDENTIFICATION
C
C      9 WRITE (10,10) INUCL, THALF, NBETA, NPOS, NELEC, NGAM
C      10 FORMAT (1H, 4X, 2A4, 5X, 3A4, 4X, 14, 3(7X, 14))
C      LINID=LINID+1
C      IF (LINID .LT. MAXLID) GO TO 11
C      CALL PRINT (1)
C      LINID=0
C      11 IF (NBETA .EQ. 0) GO TO 12
C
C      BETA-PARTICLE DATA
C
C      CALL DATLIN (NBETA, EBMAX(1), EBAVG(1), FBETA(1), LINBET, MAXLSP,
C      2 1, 11, 2)
C      IF (NBETA .EQ. 1) GO TO 12
C      DO 15 J=2,NBETA
C      CALL DATLIN (NBETA, EBMAX(J), EBAVG(J), FBETA(J), LINBET, MAXLSP,
C      2 J, 11, 2)
C      15 CONTINUE
C      12 IF (NPOS .EQ. 0) GO TO 18
C
C      POSITRON DATA
C

```

```

      CALL DATLIN (NPOS, EPMAX(1), EPAVG(1), FPOS(1), LINPOS, MAXLSP, 1,
2 12, 3)
      IF (NPOS .EQ. 1) GO TO 18
      DO 20 J=2,NPOS
      CALL DATLIN (NPOS, EPMAX(J), EPAVG(J), FPOS(J), LINPOS, MAXLSP, J,
2 12, 3)
20 CONTINUE
18 IF (NELEC .EQ. 0) GO TO 21
C
C AUGER AND INTERNAL CONVERSION ELECTRON DATA
C
      CALL DATLIN (NELEC, EELEC(1), EELEC(1), FELEC(1), LINEL, MAXLSP,
2 1, 13, 4)
      IF (NELEC .EQ. 1) GO TO 21
      DO 24 J=2,NELEC
      CALL DATLIN (NELEC, EELEC(J), EELEC(J), FELEC(J), LINEL, MAXLSP,
2 J, 13, 4)
24 CONTINUE
21 IF (NGAM .EQ. 0) GO TO 26
C
C PHOTON DATA
C
      CALL DATLIN (NGAM, EGAM(1), EGAM(1), FGAM(1), LINGAM, MAXLSP, 1,
2 14, 5)
      IF (NGAM .EQ. 1) GO TO 26
      DO 28 J=2,NGAM
      CALL DATLIN (NGAM, EGAM(J), EGAM(J), FGAM(J), LINGAM, MAXLSP, J,
2 14, 5)
28 CONTINUE
26 RETURN
      END

```

```

C
C      SUBROUTINE DATLIN (NPART, EMAX, EAVG, FINT, LINE, MAXLIN, NLINE,
C      2 NPRINT, NTYPE)
C
C      WRITES EACH LINE OF BETA-PARTICLE, POSITRON, AUGER AND INTERNAL CONVERSION
C      ELECTRON, OR PHOTON DATA
C
C      NPART - NUMBER OF SPECTRAL LINES OF PARTICULAR RADIATION TYPE
C      EMAX - ENDPOINT ENERGY OF PARTICULAR SPECTRAL LINE
C      EAVG - AVERAGE ENERGY OF PARTICULAR SPECTRAL LINE
C      FINT - INTENSITY OF PARTICULAR SPECTRAL LINE
C      LINE - LINE COUNT FOR DATA TABLE FOR PARTICULAR SPECTRAL LINE
C      MAXLIN - MAXIMUM LINE COUNT FOR DATA TABLE FOR PARTICULAR RADIATION TYPE
C      NLINE - INDEX FOR SPECTRAL LINE OF PARTICULAR RADIATION TYPE
C      NPRINT - OUTPUT DEVICE NUMBER
C      NTYPE - INDEX FOR RADIATION TYPE (SEE SUBROUTINE PRINT FOR LISTING)
C
C      DIMENSION INUCL(2), THALF(3)
C      COMMON/ BLK1/ INUCL, THALF
C
C      TEST FOR FIRST SPECTRAL LINE OF PARTICULAR RADIATION TYPE
C
C      IF (NLINE .NE. 1) GO TO 1
C
C      WRITE FIRST SPECTRAL LINE
C
C      TEST FOR CONTINUOUS OR DISCRETE RADIATION
C
C      IF (EMAX .EQ. EAVG) GO TO 2
C
C      BETA-PARTICLE OR POSITRON DATA
C
C      WRITE (NPRINT,3) INUCL, THALF, EMAX, EAVG, FINT
C      3 FORMAT (1H0, 4X, 2A4, 5X, 3A4, 7X, 2(F7.4, 9X), F8.5)
C      GO TO 4
C
C      AUGER AND INTERNAL CONVERSION ELECTRON OR PHOTON DATA
C
C      2 WRITE (NPRINT,5) INUCL, THALF, EMAX, FINT
C      5 FORMAT (1H0, 4X, 2A4, 5X, 3A4, 7X, F7.4, 9X, F8.5)
C      4 LINE=LINE+2
C      GO TO 6
C
C      WRITE SECOND AND SUBSEQUENT SPECTRAL LINES USING SAME PROCEDURE AS ABOVE
C
C      1 IF (EMAX .EQ. EAVG) GO TO 7
C      WRITE (NPRINT,8) EMAX, EAVG, FINT
C      8 FORMAT (1H , 36X, 2(F7.4, 9X), F8.5)
C      GO TO 9
C      7 WRITE (NPRINT,10) EMAX, FINT
C      10 FORMAT (1H , 36X, F7.4, 9X, F8.5)
C      9 LINE=LINE+1
C
C      TEST FOR END OF PAGE
C

```

```
      6 IF (LINE .LT. MAXLIN) GO TO 11
C
C WRITE TABLE HEADINGS ON NEW PAGE AND SKIP A LINE AFTER HEADINGS
C
      CALL PRINT (NTYPE)
      LINE=0
      IF (NLINE .EQ. 1 .AND. NPART .NE. 1) WRITE (NPRINT,13)
13  FORMAT (1H )
      IF (NLINE .NE. 1 .AND. NLINE .NE. NPART) WRITE (NPRINT,13)
11  RETURN
      END
```

```

C
C      SUBROUTINE CALC
C
C      CALCULATES DOSE-RATE CONVERSION FACTORS FOR EXTERNAL EXPOSURE TO PHOTONS AND
C      ELECTRONS
C
C      DIMENSION EBMAX(50), EBAVG(50), FBETA(50), EPMAX(20), EPAVG(20),
C      2 FPOS(20), EELEC(125), FELEC(125), EGAM(200), FGAM(200)
C      DIMENSION NBF(5), NPF(5)
C      DIMENSION ER(25), FMUEAR(25), FMUEWR(25), FMUETR(25), FMUAR(25),
C      2 SPAR(25), SPWR(25), SPTR(25), RNAR(25), RNTR(25), CAR(25),
C      3 OAR(25)
C      DIMENSION EAR(8), ALPHAR(8), EARL(8), RSKN(4), RA(4), EMAX(4),
C      2 EMGR(4), CPM(6)
C      DIMENSION GTAR(25), GTWR(25), BTAR(25), BTWR(25)
C      DIMENSION EBSR(120), RTAR(600), RTWR(600), ALR(600), FIE(600)
C      DIMENSION SGAORG(23), SGWORG(23), SGGORG(23), SBASKN(4),
C      2 SBWSKN(4), SBGSKN(4)
C      DIMENSION ORGFAC(23), GFAC(4,600)
C      DIMENSION DOSORG(3,23), DOSORB(3,4), DOSSKN(3), DOSEFF(3)
C      DIMENSION DEFF(3,15), DEFFS(3,15), DUM1(15), DUM2(15)
C      COMMON/ BLK2/ ATNO, NFB, NBF, NFP, NPF
C      COMMON/ BLK3/ NBETA, NPOS, NELEC, NGAM
C      COMMON/ BLK4/ EBMAX, EBAVG, FBETA, EPMAX, EPAVG, FPOS, EELEC,
C      2 FELEC, EGAM, FGAM
C      COMMON/ BLK5/ DOSORG, DOSORB, DOSSKN, DOSEFF
C      DOUBLE PRECISION E1
C
C      ENERGIES FOR REFERENCE VALUES OF PHOTON ENERGY-ABSORPTION COEFFICIENTS,
C      ATTENUATION COEFFICIENTS, BUILDUP FACTOR PARAMETERS, AND ORGAN DOSE-RATE
C      FACTORS; AND ELECTRON STOPPING POWERS AND RANGES--VALUES IN MEV
C
C      DATA ER/      0.010,   0.015,   0.020,   0.030,   0.040,   0.050,
C      2      0.060,   0.080,   0.100,   0.150,   0.200,   0.300,   0.400,
C      3      0.500,   0.600,   0.800,   1.0,     1.5,     2.0,     3.0,
C      4      4.0,     5.0,     6.0,     8.0,     10.0/
C
C      REFERENCE VALUES OF PHOTON MASS ENERGY-ABSORPTION COEFFICIENTS IN AIR IN
C      (SQ CM)/G
C
C      DATA FMUEAR/  4.61,    1.27,    0.511,    0.148,    0.0668,    0.0406,
C      2      0.0305,  0.0243,  0.0234,  0.0250,  0.0268,  0.0287,  0.0295,
C      3      0.0296,  0.0295,  0.0289,  0.0278,  0.0254,  0.0234,  0.0205,
C      4      0.0186,  0.0174,  0.0164,  0.0152,  0.0145/
C
C      REFERENCE VALUES OF PHOTON MASS ENERGY-ABSORPTION COEFFICIENTS IN WATER IN
C      (SQ CM)/G
C
C      DATA FMUEWR/  4.79,    1.28,    0.512,    0.149,    0.0677,    0.0418,
C      2      0.0320,  0.0262,  0.0256,  0.0277,  0.0297,  0.0319,  0.0328,
C      3      0.0330,  0.0329,  0.0321,  0.0309,  0.0282,  0.0260,  0.0227,
C      4      0.0206,  0.0191,  0.0180,  0.0166,  0.0157/
C
C      REFERENCE VALUES OF PHOTON MASS ENERGY-ABSORPTION COEFFICIENTS IN TISSUE
C      (MUSCLE) IN (SQ CM)/G

```


C DATA FMUETR/ 4.87, 1.32, 0.533, 0.154, 0.0701, 0.0431,
 2 0.0328, 0.0264, 0.0256, 0.0275, 0.0294, 0.0317, 0.0325,
 3 0.0328, 0.0325, 0.0318, 0.0308, 0.0282, 0.0259, 0.0226,
 4 0.0203, 0.0188, 0.0178, 0.0163, 0.0154/

C
 C REFERENCE VALUES OF PHOTON MASS ATTENUATION COEFFICIENTS IN AIR IN
 C (SQ CM)/G

C DATA FMUAR/ 4.99, 1.55, 0.752, 0.349, 0.248, 0.208,
 2 0.188, 0.167, 0.154, 0.136, 0.123, 0.107, 0.0954,
 3 0.0870, 0.0805, 0.0707, 0.0636, 0.0518, 0.0445, 0.0358,
 4 0.0308, 0.0275, 0.0252, 0.0223, 0.0204/

C
 C REFERENCE VALUES OF PHOTON TISSUE-TO-AIR DOSE RATIO FOR IMMERSION IN
 C CONTAMINATED AIR; VALUES ARE RATIO OF MASS ENERGY-ABSORPTION COEFFICIENTS
 C AVERAGED OVER SPECTRUM OF PHOTONS IN AIR FROM MONOENERGETIC SOURCES AND ARE
 C OBTAINED FROM FIG. 6 OF DILLMAN, HEALTH PHYSICS 27, 571 (1974)

C DATA GTAR/ 0.954, 0.954, 0.956, 0.961, 0.973, 0.985,
 2 0.998, 1.018, 1.032, 1.054, 1.066, 1.078, 1.085,
 3 1.089, 1.091, 1.094, 1.096, 1.099, 1.100, 1.098,
 4 1.094, 1.090, 1.085, 1.076, 1.067/

C
 C REFERENCE VALUES OF ELECTRON MASS STOPPING POWERS IN AIR IN (MEV-SQ CM)/G

C DATA SPAR/ 19.7, 14.4, 11.6, 8.48, 6.84, 5.81,
 2 5.11, 4.20, 3.63, 2.86, 2.47, 2.09, 1.91,
 3 1.81, 1.75, 1.70, 1.68, 1.68, 1.71, 1.79,
 4 1.85, 1.91, 1.97, 2.07, 2.16/

C
 C REFERENCE VALUES OF ELECTRON MASS STOPPING POWERS IN WATER IN (MEV-SQ CM)/G

C DATA SPWR/ 23.2, 16.9, 13.5, 9.88, 7.96, 6.75,
 2 5.92, 4.86, 4.20, 3.30, 2.85, 2.40, 2.19,
 3 2.07, 2.00, 1.93, 1.89, 1.88, 1.89, 1.93,
 4 1.97, 2.01, 2.05, 2.12, 2.18/

C
 C REFERENCE VALUES OF ELECTRON MASS STOPPING POWERS IN TISSUE (MUSCLE) IN
 C (MEV-SQ CM)/G

C DATA SPTR/ 22.9, 16.7, 13.4, 9.77, 7.86, 6.67,
 2 5.86, 4.80, 4.15, 3.27, 2.82, 2.38, 2.17,
 3 2.05, 1.98, 1.92, 1.89, 1.89, 1.92, 1.99,
 4 2.06, 2.13, 2.18, 2.28, 2.37/

C
 C REFERENCE VALUES OF ELECTRON RANGES IN AIR IN G/(SQ CM)

C DATA RNAR/ 2.89E-4, 5.90E-4, 9.81E-4, 2.01E-3, 3.33E-3, 4.92E-3,
 2 6.76E-3, 0.0111, 0.0163, 0.0320, 0.0509, 0.0954, 0.146,
 3 0.200, 0.256, 0.372, 0.491, 0.799, 1.08, 1.66,
 4 2.21, 2.74, 3.25, 4.24, 5.19/

C
 C REFERENCE VALUES OF ELECTRON RANGES IN TISSUE (MUSCLE) IN G/(SQ CM)

C DATA RNTR/ 2.47E-4, 5.06E-4, 8.44E-4, 1.73E-3, 2.88E-3, 4.27E-3,
 2 5.87E-3, 9.67E-3, 0.0142, 0.0279, 0.0445, 0.0836, 0.128,
 3 0.175, 0.225, 0.328, 0.433, 0.698, 0.960, 1.47,
 4 1.96, 2.44, 2.91, 3.80, 4.66/

```

C
C REFERENCE VALUES OF BERGER C AND D COEFFICIENTS FOR PHOTON ENERGY-ABSORPTION
C BUILDUP FACTORS IN AIR
C
  DATA CAR/ 0.0330, 0.132, 0.330, 1.12, 2.31, 3.46,
2    4.20, 4.46, 4.15, 3.25, 2.70, 2.19, 1.87,
3    1.68, 1.53, 1.34, 1.21, 0.995, 0.838, 0.687,
4    0.602, 0.546, 0.508, 0.457, 0.426/
  DATA DAR/ -0.0680, -0.0693, -0.0607, -0.0230, 0.0284, 0.0743,
2    0.108, 0.151, 0.168, 0.178, 0.172, 0.142, 0.125,
3    0.106, 0.0946, 0.0745, 0.0604, 0.0373, 0.0242, 0.0100,
4    0.0032, -0.0012, -0.0029, -0.0035, -0.0033/
C
C ENERGIES FOR REFERENCE VALUES OF ELECTRON SCALING PARAMETER 'ALPHA' FOR AIR
C IMMERSION
C
  DATA EAR/ 0.010, 0.020, 0.050, 0.100, 0.200, 0.500, 1.0,
2    2.0/
C
C REFERENCE VALUES OF ELECTRON SCALING PARAMETER 'ALPHA' FOR AIR IMMERSION
C
  DATA ALPHAR/ 1.022, 1.018, 1.018, 1.018, 1.017, 1.018, 1.009,
2    0.992/
C
C FACTOR TO CONVERT ABSORBED ENERGY IN MEV TO DOSE EQUIVALENT IN REM IN
C (G-REM)/MEV
C NUMBER OF SECONDS PER YEAR
C
  DATA FK, FS/ 1.60206E-08, 3.1536E+07/
C
C DENSITY OF DRY AIR AT 20 DEG C AND 750 MM PRESSURE IN G/(CU CM)
C DENSITY OF WATER AT 20 DEG C IN G/(CU CM)
C HEIGHT OF REFERENCE POSITION FOR GROUND SURFACE EXPOSURE IN CM
C
  DATA RHOA, RHOW, Z/ 1.189E-03, 0.99823, 100.0/
C
C DEPTHS OF SKIN BELOW BODY SURFACE AT WHICH ELECTRON DOSE-RATE FACTORS ARE
C CALCULATED IN G/(SQ CM)
C
  DATA RSKN/ 4.0E-3, 8.0E-3, 4.0E-2, 7.0E-3/
C
C PARTICLE-MEDIUM DOSE-RATE CORRECTION FACTORS; ORDER IS PHOTON DOSE-RATE
C CORRECTION FACTOR FOR AIR IMMERSION, WATER IMMERSION, AND GROUND SURFACE
C EXPOSURE, AND ELECTRON DOSE-RATE CORRECTION FACTOR FOR THREE EXPOSURE MODES
C
  DATA CPM/ 0.5, 2*1.0, 3*0.5/
C
  LOGICAL FIRST/ .TRUE./
C
C TEST FOR FIRST TIME THROUGH SUBROUTINE
C
  IF (.NOT. FIRST) GO TO 19
C
C CALCULATE REFERENCE VALUES OF RATIOS OF PHOTON MASS ENERGY-ABSORPTION
C COEFFICIENTS IN TISSUE TO VALUES IN WATER AND ELECTRON MASS STOPPING POWERS
C IN TISSUE TO VALUES IN AIR AND WATER AT ENERGIES GIVEN BY VALUES OF ER
C
  DO 20 I=1,25
    GTWR(I)=FMUETR(I)/FMUEWR(I)

```

```

      BTAR(I)=SPTR(I)/SPAR(I)
      BTWR(I)=SPTR(I)/SPWR(I)
20  CONTINUE
C
C  CALCULATE CONSTANT FACTORS IN DOSE-RATE FACTOR EQUATIONS TO GIVE OUTPUT IN
C  DESIRED UNITS
C
      FAC1=37.*FS*FK
      FAC2=3700.*FS*FK
C
C  CALCULATE HEIGHT OF REFERENCE POSITION FOR GROUND SURFACE EXPOSURE IN
C  G/(SQ CM)
C
      R=RHOA*Z
C
C  CALCULATE MINIMUM ELECTRON ENERGIES CONTRIBUTING TO DOSE-RATE FACTORS FOR SKIN
C  FOR DIFFERENT DEPTHS BELOW BODY SURFACE
C
C  AIR AND WATER IMMERSION
C
      DO 61 I=1,4
      EMAW(I)=YINTER(RSKN(I), RNTR, ER, 0, 3, 25)
61  CONTINUE
C
C  GROUND SURFACE EXPOSURE: CALCULATIONS ASSUME THAT THICKNESS OF TISSUE IS
C  REPLACED BY EQUIVALENT THICKNESS OF AIR
C
      DO 62 I=1,4
      RA(I)=R+RSKN(I)*1.14
      EMGR(I)=YINTER(RA(I), RNAR, ER, 0, 3, 25)
62  CONTINUE
C
C  DEFINE ENERGIES FOR CALCULATING SPECTRUM FOR BETA PARTICLE OR POSITRON--VALUES
C  ARE EVERY 10 KEV FROM 0 TO 12 MEV
C
      EBSR(1)=0.0
      DO 39 I=2,1201
      EBSR(I)=EBSR(I-1)+0.010
39  CONTINUE
C
C  AT ENERGIES GIVEN BY ALTERNATE VALUES OF EBSR, CALCULATE RATIOS OF ELECTRON
C  MASS STOPPING POWER IN TISSUE TO VALUES IN AIR AND WATER, VALUE OF ELECTRON
C  SCALING PARAMETER 'ALPHA', AND GEOMETRICAL REDUCTION FACTORS FOR ELECTRON
C  DOSE-RATE FACTORS FOR DIFFERENT DEPTHS BELOW BODY SURFACE FOR AIR AND WATER
C  IMMERSION
C
C  CALCULATE LOGARITHM OF REFERENCE ENERGIES FOR ELECTRON SCALING PARAMETER
C
      DO 63 I=1,8
      EARL(I)=ALOG(EAR(I))
63  CONTINUE
      DO 64 J=2,1200,2
      K=J/2
C
C  CALCULATE RATIOS OF ELECTRON MASS STOPPING POWER IN TISSUE TO VALUES IN AIR
C  AND WATER
C
      RTAR(K)=YINTER(EBSR(J), ER, BTAR, 0, 3, 25)
      RTWR(K)=YINTER(EBSR(J), ER, BTWR, 0, 3, 25)

```

```

C
C CALCULATE ELECTRON SCALING PARAMETER 'ALPHA'
C
C   ALR(K)=YINTER(ALOG(EBSR(J)), EARL, ALPHAR, 0, 3, 8)
C
C CALCULATE ELECTRON GEOMETRICAL REDUCTION FACTORS FOR DIFFERENT DEPTHS BELOW
C BODY SURFACE FOR AIR AND WATER IMMERSION; RESET LOGICAL VARIABLE
C
C   DO 65 I=1,4
C   IF (EBSR(J) .GE. EMAN(I)) GO TO 66
C   GFAC(I,K)=0.0
C   GO TO 65
C 66 GFAC(I,K)=G(RSKN(I), RNTR, EBSR(J))
C 65 CONTINUE
C 64 CONTINUE
C   FIRST=.FALSE.
C
C INITIALIZE SUMMATION TERMS IN DOSE-RATE FACTOR EQUATIONS
C
C PHOTON DOSE-RATE FACTORS FOR BODY ORGANS FOR THREE EXPOSURE MODES
C
C 19 DO 1 J=1,23
C   SGAORG(J)=0.0
C   SGWORG(J)=0.0
C   SGGORG(J)=0.0
C 1 CONTINUE
C
C ELECTRON DOSE-RATE FACTORS FOR SKIN FOR THREE EXPOSURE MODES
C
C   DO 38 J=1,4
C   SBASKN(J)=0.0
C   SBWSKN(J)=0.0
C   SBGSKN(J)=0.0
C 38 CONTINUE
C   IF (NGAM .EQ. 0) GO TO 2
C
C CALCULATE SUMMATION TERMS IN PHOTON DOSE-RATE FACTOR EQUATIONS
C
C   DO 3 I=1,NGAM
C
C CALCULATE RATIOS OF MASS ENERGY-ABSORPTION COEFFICIENTS IN TISSUE TO VALUES
C IN AIR AND WATER
C
C   RTA=YINTER(EGAM(I), ER, GTAR, 0, 3, 25)
C   RTW=YINTER(EGAM(I), ER, GTWR, 0, 3, 25)
C
C CALCULATE MASS ENERGY ABSORPTION AND MASS ATTENUATION COEFFICIENTS IN AIR IN
C (SQ CM)/G
C
C   FMA=YINTER(EGAM(I), ER, FMUEAR, 0, 3, 25)
C   FMA=YINTER(EGAM(I), ER, FMUAR, 0, 3, 25)
C
C CALCULATE BERGER BUILDUP FACTOR COEFFICIENTS C AND D IN AIR
C
C   IF (EGAM(I) .GT. ER(1)) GO TO 15
C
C USE LINEAR INTERPOLATION FOR C COEFFICIENT FOR ENERGIES LESS THAN 10 KEV
C
C   CA=(EGAM(I)/ER(1))*CAR(1)

```

```

      GO TO 16
15  CA=YINTER(EGAM(I), ER, CAR, 0, 3, 25)
16  DA=YINTER(EGAM(I), ER, DAR, 0, 3, 25)
C
C  CALCULATE RATIOS OF ORGAN DOSE RATE TO DOSE RATE IN AIR FOR AIR IMMERSION
C
      DO 4 K=1,23
      ORGFAC(K)=FAC(K, EGAM(I))
4  CONTINUE
C
C  CALCULATE SUMMATION TERMS FOR AIR IMMERSION, WATER IMMERSION, AND GROUND
C  SURFACE EXPOSURE
C
      TS=FGAM(I)*EGAM(I)
      TGA=FMA*(E1(DBLE(FMAL), DBLE(R))-(CA/(DA-1.0))*EXP((DA-1.0)*FMAL*
2  R))
      DO 5 K=1,23
      SGAORG(K)=SGAORG(K)+TS*ORGFAC(K)
      SGWORG(K)=SGWORG(K)+TS*ORGFAC(K)*RTW/RTA
      SGGORG(K)=SGGORG(K)+TS*TGA*ORGFAC(K)
5  CONTINUE
3  CONTINUE
C
C  CALCULATE PHOTON DOSE-RATE FACTORS FOR BODY ORGANS FOR AIR IMMERSION, WATER
C  IMMERSION, AND GROUND SURFACE EXPOSURE
C
      2 DO 6 K=1,23
      DOSORG(1,K)=CPM(1)*FAC1*SGAORG(K)/RHOA
      DOSORG(2,K)=CPM(2)*FAC1*SGWORG(K)/RHOW
      DOSORG(3,K)=0.5*CPM(3)*FAC2*SGGORG(K)
6  CONTINUE
C
C  CALCULATE SUMMATION TERMS IN ELECTRON DOSE-RATE FACTOR EQUATIONS
C
      IF (NBETA .EQ. 0) GO TO 7
C
C  BETA-PARTICLES
C
      DO 8 I=1,NBETA
      IF (EBMAX(I) .LT. EMAW(1)) GO TO 8
C
C  CALCULATE BETA-PARTICLE SPECTRUM
C
      SET INDEX FOR ALLOWED BETA TRANSITION
C
      NCD=1
C
      TEST FOR FIRST-FORBIDDEN UNIQUE TRANSITION AND RESET INDEX
C
      IF (NFB .EQ. 0) GO TO 24
      DO 25 J=1,NFB
      IF (I .NE. NBF(J)) GO TO 25
      NCD=-1
      GO TO 24
25  CONTINUE
C
C  CALCULATE SPECTRUM
C
24  CALL BSPEC (EBMAX(I), FBETA(I), EBSR, ATNO, NCD, FIE, JSPEC, EMID)

```

```

C
C      CALCULATE RATIOS OF MASS STOPPING POWERS IN TISSUE TO VALUES IN AIR AND
C      WATER FOR ENERGY INTERVAL CONTAINING ENDPOINT ENERGY
C
RTA=YINTER(EMID, ER, BTAR, 0, 3, 25)
RTW=YINTER(EMID, ER, BTWR, 0, 3, 25)
C
C      AIR IMMERSION AND WATER IMMERSION FOR DIFFERENT DEPTHS BELOW BODY SURFACE
C
DO 28 L=1,4
IF (EBMAX(I) .LT. EMAX(L)) GO TO 28
C
C      CONTRIBUTIONS FROM ENERGY INTERVALS CENTERED AT ALTERNATE VALUES OF EBSR
C
DO 29 J=2,JSPEC,2
IF (EBSR(J) .LT. EMAX(L)) GO TO 29
K=J/2
TA=FIE(K)*EBSR(J)*RTAR(K)*GFAC(L,K)/ALR(K)
TW=FIE(K)*EBSR(J)*RTWR(K)*GFAC(L,K)
SBASKN(L)=SBASKN(L)+TA
SBWSKN(L)=SBWSKN(L)+TW
29 CONTINUE
C
C      CONTRIBUTION FROM ENERGY INTERVAL CONTAINING ENDPOINT ENERGY
C
ALEND=YINTER(ALOG(EMID), EARL, ALPHAR, 0, 3, 8)
GEND=G(RSKN(L), RNTR, EMID)
TA=FIE(K+1)*EMID*RTA*GEND/ALEND
TW=FIE(K+1)*EMID*RTW*GEND
SBASKN(L)=SBASKN(L)+TA
SBWSKN(L)=SBWSKN(L)+TW
28 CONTINUE
C
C      GROUND SURFACE EXPOSURE FOR DIFFERENT DEPTHS BELOW BODY SURFACE
C
DO 43 L=1,4
IF (EBMAX(I) .LT. EMGR(L)) GO TO 43
C
C      CONTRIBUTIONS FROM ENERGY INTERVALS CENTERED AT ALTERNATE VALUES OF EBSR
C
DO 44 J=2,JSPEC,2
IF (EBSR(J) .LT. EMGR(L)) GO TO 44
K=J/2
CALL BGRND (EBSR(J), RNAR, RA(L), RANGE, EINT)
TG=FIE(K)*EBSR(J)*RTAR(K)*EINT/RANGE
SBGSKN(L)=SBGSKN(L)+TG
44 CONTINUE
C
C      CONTRIBUTION FROM ENERGY INTERVAL CONTAINING ENDPOINT ENERGY
C
CALL BGRND (EMID, RNAR, RA(L), RANGE, EINT)
TG=FIE(K+1)*EMID*RTA*EINT/RANGE
SBGSKN(L)=SBGSKN(L)+TG
43 CONTINUE
8 CONTINUE
7 IF (NPOS .EQ. 0) GO TO 10
C
C      POSITRONS
C

```

```

DO 11 I=1,NPOS
IF (EPMAX(I) .LT. EMAX(1)) GO TO 11
C
C   CALCULATE POSITRON SPECTRUM
C
C   SET INDEX FOR ALLOWED POSITRON TRANSITION
C
NCD=2
C
C   TEST FOR FIRST-FORBIDDEN UNIQUE TRANSITION AND RESET INDEX
C
IF (NFP .EQ. 0) GO TO 67
DO 68 J=1,NFP
IF (I .NE. NPF(J)) GO TO 68
NCD=-2
GO TO 67
68 CONTINUE
C
C   CALCULATE SPECTRUM
C
67 CALL BSPEC (EPMAX(I), FPOS(I), EBSR, ATNO, NCD, FIE, JSPEC, EMID)
C
C   CALCULATE RATIOS OF MASS STOPPING POWERS IN TISSUE TO VALUES IN AIR AND
C   WATER FOR ENERGY INTERVAL CONTAINING ENDOPOINT ENERGY
C
RTA=YINTER(EMID, ER, BTAR, 0, 3, 25)
RTW=YINTER(EMID, ER, BTWR, 0, 3, 25)
C
C   AIR IMMERSION AND WATER IMMERSION FOR DIFFERENT DEPTHS BELOW BODY SURFACE
C
DO 74 L=1,4
IF (EPMAX(I) .LT. EMAX(L)) GO TO 74
C
C   CONTRIBUTIONS FROM ENERGY INTERVALS CENTERED AT ALTERNATE VALUES OF EBSR
C
DO 75 J=2,JSPEC,2
IF (EBSR(J) .LT. EMAX(L)) GO TO 75
K=J/2
TA=FIE(K)*EBSR(J)*RTAR(K)*GFAC(L,K)/ALR(K)
TW=FIE(K)*EBSR(J)*RTWR(K)*GFAC(L,K)
SBASKN(L)=SBASKN(L)+TA
SBWSKN(L)=SBWSKN(L)+TW
75 CONTINUE
C
C   CONTRIBUTION FROM ENERGY INTERVAL CONTAINING ENDOPOINT ENERGY
C
ALEND=YINTER(ALOG(EMID), EARL, ALPHAR, 0, 3, 8)
GENO=G(RSKN(L), RNTR, EMID)
TA=FIE(K+1)*EMID*RTA*GENO/ALEND
TW=FIE(K+1)*EMID*RTW*GENO
SBASKN(L)=SBASKN(L)+TA
SBWSKN(L)=SBWSKN(L)+TW
74 CONTINUE
C
C   GROUND SURFACE EXPOSURE FOR DIFFERENT DEPTHS BELOW BODY SURFACE
C
DO 78 L=1,4
IF (EPMAX(I) .LT. EMGR(L)) GO TO 78
C

```

```

C      CONTRIBUTIONS FROM ENERGY INTERVALS CENTERED AT ALTERNATE VALUES OF EBSR
C
DO 79 J=2,JSPEC,2
IF (EBSR(J) .LT. EMGR(L)) GO TO 79
K=J/2
CALL BGRND (EBSR(J), RNAR, RA(L), RANGE, EINT)
TG=FIE(K)*EBSR(J)*RTAR(K)*EINT/RANGE
SBGSKN(L)=SBGSKN(L)+TG
79 CONTINUE

C
C      CONTRIBUTION FROM ENERGY INTERVAL CONTAINING ENDPOINT ENERGY
C
CALL BGRND (EMID, RNAR, RA(L), RANGE, EINT)
TG=FIE(K+1)*EMID*RTA*EINT/RANGE
SBGSKN(L)=SBGSKN(L)+TG
78 CONTINUE
11 CONTINUE
10 IF (NELEC .EQ. 0) GO TO 13

C
C      AUGER AND CONVERSION ELECTRONS
C
DO 14 I=1,NELEC
IF (EELEC(I) .LT. EMAW(I)) GO TO 14
TS=FELEC(I)*EELEC(I)

C
C      CALCULATE RATIOS OF MASS STOPPING POWERS IN TISSUE TO VALUES IN AIR AND
C      WATER
C
RTA=YINTER(EELEC(I), ER, BTAR, 0, 3, 25)
RTW=YINTER(EELEC(I), ER, BTWR, 0, 3, 25)

C
C      AIR IMMERSION AND WATER IMMERSION FOR DIFFERENT DEPTHS BELOW BODY SURFACE
C
DO 18 L=1,4
IF (EELEC(I) .LT. EMAW(L)) GO TO 18
ALEND=YINTER(ALOG(EELEC(I)), EARL, ALPHAR, 0, 3, 8)
GENG=G(RSKN(L), RNTR, EELEC(I))
TA=TS*RTA*GENG/ALEND
TW=TS*RTW*GENG
SBASKN(L)=SBASKN(L)+TA
SBWSKN(L)=SBWSKN(L)+TW
18 CONTINUE

C
C      GROUND SURFACE EXPOSURE FOR DIFFERENT DEPTHS BELOW BODY SURFACE
C
DO 82 L=1,4
IF (EELEC(I) .LT. EMGR(L)) GO TO 82
CALL BGRND (EELEC(I), RNAR, RA(L), RANGE, EINT)
TG=TS*RTA*EINT/RANGE
SBGSKN(L)=SBGSKN(L)+TG
82 CONTINUE
14 CONTINUE

C
C      CALCULATE ELECTRON DOSE-RATE FACTORS FOR SKIN FOR DIFFERENT DEPTHS BELOW BODY
C      SURFACE FOR AIR IMMERSION, WATER IMMERSION, AND GROUND SURFACE EXPOSURE
C
13 DO 83 K=1,4
DOSORB(1,K)=FAC1*SBASKN(K)/RHDA
DOSORB(2,K)=FAC1*SBWSKN(K)/RHOW

```



```

      DOSORB(3,K)=0.5*CPM(6)*FAC2*SBGSKN(K)
      83 CONTINUE
C
C CALCULATE SUM OF PHOTON AND ELECTRON DOSE-RATE FACTORS FOR SKIN FOR AIR
C IMMERSION, WATER IMMERSION, AND GROUND SURFACE EXPOSURE USING VALUE AT DEPTH
C OF 7 MG/(SQ CM) FOR ELECTRONS
C
      DO 59 I=1,3
      DOSSKN(I)=DOSORG(I,17)+DOSORB(I,4)
      59 CONTINUE
C
C CALCULATE EFFECTIVE DOSE-RATE FACTORS FOR PHOTONS FOR AIR IMMERSION, WATER
C IMMERSION, AND GROUND SURFACE EXPOSURE USING ORGAN-SPECIFIC WEIGHTING
C FACTORS IN ICRP PUBLICATION 26
C
      DO 26 I=1,3
C
C CONTRIBUTIONS FROM GONADS (TESTES), BREAST, RED MARROW, LUNG, THYROID, AND
C BONE SURFACES
C
      DOSEFF(I)=0.25*DOSORG(I,20)+0.15*DOSORG(I,4)+0.12*(DOSORG(I,13)+
      2 DOSORG(I,11))+0.03*(DOSORG(I,22)+DOSORG(I,16))
C
C REDEFINE ARRAYS OF DOSE-RATE FACTORS FOR BODY ORGANS TO EXCLUDE ORGANS
C ALREADY CONSIDERED PLUS OVARIES AND SKIN
C
      DO 71 J=1,3
      DEFF(I,J)=DOSORG(I,J)
      71 CONTINUE
      DO 50 J=5,10
      DEFF(I,J-1)=DOSORG(I,J)
      50 CONTINUE
      DEFF(I,10)=DOSORG(I,12)
      DEFF(I,11)=DOSORG(I,15)
      DO 51 J=18,19
      DEFF(I,J-6)=DOSORG(I,J)
      51 CONTINUE
      DEFF(I,14)=DOSORG(I,21)
      DEFF(I,15)=DOSORG(I,23)
C
C SORT REDEFINED ARRAYS OF DOSE-RATE FACTORS FOR BODY ORGANS IN DECREASING
C NUMERICAL ORDER USING DUMMY ONE-DIMENSIONAL ARRAYS
C
      DO 52 J=1,15
      DUM1(J)=DEFF(I,J)
      52 CONTINUE
      CALL SORT (15, DUM1, DUM2)
      DO 53 J=1,15
      DEFFS(I,J)=DUM2(J)
      53 CONTINUE
C
C ADD CONTRIBUTIONS FROM FIVE ORGANS IN REMAINDER CATEGORY
C
      DO 54 J=1,5
      DOSEFF(I)=DOSEFF(I)+0.06*DEFFS(I,J)
      54 CONTINUE
      26 CONTINUE
      RETURN
      END

```

```

C      FUNCTION YINTER(XI, X, Y, IND1, N1, IMAX)
C
C      PERFORMS LAGRANGIAN INTERPOLATION OF A FUNCTION OF ONE VARIABLE
C
C      BASED ON DOUBLE PRECISION INTERPOLATION FUNCTION YLAG DESCRIBED IN UNION
C      CARBIDE PUBLICATION CTC-39
C
C      XI - ABCISSA OF DESIRED INTERPOLATION POINT
C      X - SINGLY DIMENSIONED ARRAY OF DISTINCT, MONOTONICALLY INCREASING ABCISSAS
C      Y - SINGLY DIMENSIONED ARRAY OF CORRESPONDING ORDINATES
C      IND1 - SET TO ZERO
C      N1 - NUMBER OF POINTS FOR THE INTERPOLATION POLYNOMIAL
C      IMAX - NUMBER OF ELEMENTS FOR THE X- OR Y-ARRAYS
C
      DIMENSION X(1), Y(1)
      IND=IND1
      N=N1
      IEX=0
      IF (N .LE. IMAX) GO TO 10
      N=IMAX
      IEX=N
10  IF (IND .GT. 0) GO TO 40
      DO 20 J=1,IMAX
        IF (XI-X(J)) 30, 130, 20
20  CONTINUE
      IEX=1
      GO TO 70
30  IND=J
40  IF (IND .GT. 1) GO TO 50.
      IEX=-1
50  INL=IND-(N+1)/2
      IF (INL .GT. 0) GO TO 60
      INL=1
60  INU=INL+N-1
      IF (INU .LE. IMAX) GO TO 80
70  INL=IMAX-N+1
      INU=IMAX
80  S=0.
      P=1.
      DO 110 J=INL,INU
        P=P*(XI-X(J))
      D=1.
      DO 100 I=INL,INU
        IF (I .NE. J) GO TO 90
        XD=XI
        GO TO 100
90  XD=X(J)
100 D=D*(XD-X(I))
110 S=S+Y(J)/D
      YINTER=S*P
120 RETURN
130 YINTER=Y(I)
      GO TO 120
      END

```

```

C
C      FUNCTION G(R, RNGTR, EB)
C
C      CALCULATES GEOMETRICAL REDUCTION FACTOR FOR ELECTRON DOSE-RATE FACTOR FOR SKIN
C      FOR AIR AND WATER IMMERSION; SEE EQS. (15)-(18) OF BERGER, HEALTH PHYSICS
C      26, 1 (1974)
C
C      R - DISTANCE FROM BODY SURFACE TO SKIN IN G/(SQ CM)
C      RNGTR - REFERENCE ARRAY OF ELECTRON RANGES IN TISSUE IN G/(SQ CM) AT
C              ENERGIES GIVEN BY VALUES OF EGR BELOW
C      EB - ELECTRON ENERGY FOR EVALUATION OF GEOMETRICAL REDUCTION FACTOR
C
C      DIMENSION RNGTR(1)
C      DIMENSION ZDRNG(21), EGR(25), GR1(25), GR2(25), GR3(25), GR4(25),
C      2 GR5(25), GR6(25), GR7(25), GR8(25), GR9(25), GR10(25), GR11(25),
C      3 GR12(25), GR13(25), GR14(25), GR15(25), GR16(25), GR17(25),
C      4 GR18(25), GR19(25), GR20(25), GR21(25), GR(25,21)
C      DIMENSION ELR(17), QLR(17), ALR(17), ZOALR(15), QZR(15)
C
C      RATIOS OF DISTANCE FROM BODY SURFACE TO ELECTRON RANGE FOR REFERENCE VALUES OF
C      ELECTRON GEOMETRICAL REDUCTION FACTORS
C
C      DATA ZDRNG/  0.0, 0.05, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35, 0.40,
C      2 0.45, 0.50, 0.55, 0.60, 0.65, 0.70, 0.75, 0.80, 0.85, 0.90, 0.95,
C      3 1.00/
C
C      ENERGIES FOR REFERENCE VALUES OF ELECTRON GEOMETRICAL REDUCTION FACTORS
C
C      DATA EGR/  0.010, 0.015, 0.020, 0.030, 0.040, 0.050, 0.060,
C      2 0.080, 0.100, 0.150, 0.200, 0.300, 0.400, 0.500, 0.600,
C      3 0.800, 1.0, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0,
C      4 8.0, 10.0/
C
C      REFERENCE VALUES OF ELECTRON GEOMETRICAL REDUCTION FACTORS
C
C      ZDRNG=0.0
C
C      DATA GR1/  0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,
C      2 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,
C      3 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5,
C      4 0.5, 0.5/
C
C      ZDRNG=0.05
C
C      DATA GR2/ 0.4188, 0.4195, 0.4200, 0.4201, 0.4200, 0.4199, 0.4197,
C      2 0.4192, 0.4187, 0.4177, 0.4168, 0.4153, 0.4143, 0.4133, 0.4123,
C      3 0.4109, 0.4098, 0.4077, 0.4063, 0.4051, 0.4045, 0.4041, 0.4039,
C      4 0.4039, 0.4041/
C
C      ZDRNG=0.10
C
C      DATA GR3/ 0.3575, 0.3587, 0.3595, 0.3598, 0.3599, 0.3599, 0.3597,
C      2 0.3591, 0.3586, 0.3573, 0.3561, 0.3540, 0.3526, 0.3512, 0.3500,
C      3 0.3480, 0.3465, 0.3436, 0.3419, 0.3403, 0.3396, 0.3393, 0.3391,
C      4 0.3392, 0.3395/

```

C
 C ZDRNG=0.15
 C
 DATA GR4/ 0.3047, 0.3063, 0.3073, 0.3079, 0.3081, 0.3081, 0.3079,
 2 0.3074, 0.3069, 0.3054, 0.3041, 0.3018, 0.3002, 0.2987, 0.2974,
 3 0.2952, 0.2937, 0.2906, 0.2887, 0.2871, 0.2865, 0.2863, 0.2862,
 4 0.2866, 0.2871/
 C
 C ZDRNG=0.20
 C
 DATA GR5/ 0.2580, 0.2600, 0.2611, 0.2618, 0.2621, 0.2621, 0.2620,
 2 0.2614, 0.2609, 0.2592, 0.2582, 0.2559, 0.2544, 0.2529, 0.2516,
 3 0.2494, 0.2479, 0.2449, 0.2431, 0.2418, 0.2414, 0.2414, 0.2414,
 4 0.2420, 0.2427/
 C
 C ZDRNG=0.25
 C
 DATA GR6/ 0.2165, 0.2186, 0.2197, 0.2205, 0.2207, 0.2208, 0.2207,
 2 0.2202, 0.2197, 0.2181, 0.2171, 0.2150, 0.2136, 0.2122, 0.2109,
 3 0.2089, 0.2077, 0.2050, 0.2034, 0.2025, 0.2023, 0.2025, 0.2027,
 4 0.2036, 0.2046/
 C
 C ZDRNG=0.30
 C
 DATA GR7/ 0.1793, 0.1815, 0.1826, 0.1833, 0.1835, 0.1835, 0.1835,
 2 0.1830, 0.1817, 0.1812, 0.1802, 0.1783, 0.1771, 0.1759, 0.1748,
 3 0.1731, 0.1720, 0.1697, 0.1685, 0.1681, 0.1682, 0.1687, 0.1691,
 4 0.1701, 0.1713/
 C
 C ZDRNG=0.35
 C
 DATA GR8/ 0.1464, 0.1485, 0.1495, 0.1501, 0.1502, 0.1501, 0.1500,
 2 0.1495, 0.1483, 0.1479, 0.1470, 0.1454, 0.1444, 0.1434, 0.1425,
 3 0.1411, 0.1403, 0.1386, 0.1378, 0.1378, 0.1383, 0.1390, 0.1395,
 4 0.1408, 0.1423/
 C
 C ZDRNG=0.40
 C
 DATA GR9/ 0.1173, 0.1192, 0.1201, 0.1205, 0.1204, 0.1203, 0.1202,
 2 0.1197, 0.1192, 0.1182, 0.1175, 0.1162, 0.1154, 0.1146, 0.1138,
 3 0.1128, 0.1122, 0.1111, 0.1107, 0.1112, 0.1120, 0.1130, 0.1137,
 4 0.1152, 0.1168/
 C
 C ZDRNG=0.45
 C
 DATA GR10/ 0.0919, 0.0937, 0.0944, 0.0946, 0.0943, 0.0941, 0.0939,
 2 0.0934, 0.0929, 0.0920, 0.0915, 0.0904, 0.0898, 0.0891, 0.0886,
 3 0.0879, 0.0876, 0.0869, 0.0869, 0.0879, 0.0890, 0.0902, 0.0910,
 4 0.0928, 0.0946/
 C
 C ZDRNG=0.50
 C
 DATA GR11/ 0.0702, 0.0717, 0.0722, 0.0722, 0.0718, 0.0714, 0.0712,
 2 0.0707, 0.0702, 0.0694, 0.0690, 0.0681, 0.0677, 0.0672, 0.0668,
 3 0.0664, 0.0662, 0.0660, 0.0664, 0.0677, 0.0690, 0.0704, 0.0713,
 4 0.0733, 0.0752/
 C
 C ZDRNG=0.55
 C

```

DATA GR12/0.0520, 0.0531, 0.0535, 0.0532, 0.0527, 0.0523, 0.0521,
2 0.0518, 0.0512, 0.0504, 0.0501, 0.0494, 0.0490, 0.0487, 0.0485,
3 0.0482, 0.0482, 0.0484, 0.0489, 0.0505, 0.0519, 0.0533, 0.0544,
4 0.0564, 0.0584/
C
C ZDRNG=0.60
C
DATA GR13/0.0371, 0.0380, 0.0382, 0.0377, 0.0372, 0.0368, 0.0365,
2 0.0361, 0.0356, 0.0349, 0.0347, 0.0341, 0.0339, 0.0337, 0.0335,
3 0.0334, 0.0335, 0.0338, 0.0345, 0.0361, 0.0376, 0.0389, 0.0400,
4 0.0421, 0.0441/
C
C ZDRNG=0.65
C
DATA GR14/0.0253, 0.0259, 0.0260, 0.0255, 0.0250, 0.0246, 0.0243,
2 0.0239, 0.0235, 0.0229, 0.0226, 0.0221, 0.0220, 0.0219, 0.0218,
3 0.0218, 0.0219, 0.0223, 0.0230, 0.0245, 0.0259, 0.0271, 0.0281,
4 0.0301, 0.0320/
C
C ZDRNG=0.70
C
DATA GR15/0.0164, 0.0168, 0.0168, 0.0163, 0.0159, 0.0155, 0.0153,
2 0.0149, 0.0145, 0.0140, 0.0138, 0.0134, 0.0133, 0.0132, 0.0132,
3 0.0132, 0.0133, 0.0137, 0.0143, 0.0155, 0.0167, 0.0178, 0.0187,
4 0.0205, 0.0222/
C
C ZDRNG=0.75
C
DATA GR16/0.0100, 0.0102, 0.0102, 0.0098, 0.0094, 0.0091, 0.0089,
2 0.0086, 0.0083, 0.0078, 0.0077, 0.0074, 0.0073, 0.0072, 0.0072,
3 0.0072, 0.0073, 0.0076, 0.0081, 0.0090, 0.0099, 0.0108, 0.0115,
4 0.0130, 0.0144/
C
C ZDRNG=0.80
C
DATA GR17/0.0056, 0.0057, 0.0057, 0.0054, 0.0051, 0.0049, 0.0048,
2 0.0045, 0.0043, 0.0040, 0.0038, 0.0036, 0.0035, 0.0035, 0.0035,
3 0.0035, 0.0036, 0.0037, 0.0040, 0.0047, 0.0053, 0.0059, 0.0064,
4 0.0075, 0.0086/
C
C ZDRNG=0.85
C
DATA GR18/0.0029, 0.0029, 0.0029, 0.0027, 0.0026, 0.0024, 0.0023,
2 0.0022, 0.0020, 0.0018, 0.0017, 0.0015, 0.0015, 0.0014, 0.0014,
3 0.0014, 0.0015, 0.0016, 0.0018, 0.0021, 0.0025, 0.0028, 0.0032,
4 0.0039, 0.0046/
C
C ZDRNG=0.90
C
DATA GR19/0.0013, 0.0013, 0.0013, 0.0012, 0.0011, 0.0011, 0.0010,
2 0.0009, 0.0008, 0.0007, 0.0006, 0.0005, 0.0005, 0.0005, 0.0005,
3 0.0005, 0.0005, 0.0005, 0.0006, 0.0008, 0.0009, 0.0011, 0.0013,
4 0.0017, 0.0021/
C
C ZDRNG=0.95
C
DATA GR20/0.0005, 0.0005, 0.0005, 0.0005, 0.0004, 0.0004, 0.0004,
2 0.0003, 0.0003, 0.0002, 0.0002, 0.0001, 0.0001, 0.0001, 0.0001,
3 0.0001, 0.0001, 0.0001, 0.0002, 0.0002, 0.0003, 0.0004, 0.0005,

```

```

      4 0.0006, 0.0008/
C
C ZDRNG=1.00
C
      DATA GR21/0.0001, 0.0001, 0.0001, 0.0001, 0.0001, 0.0001, 0.0001,
2      0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
3      0.0, 0.0, 0.0, 0.0, 0.0, 0.0001, 0.0001, 0.0001,
4      0.0002, 0.0002/
C
C ENERGIES FOR REFERENCE VALUES OF LEAKAGE CORRECTION PARAMETERS
C
      DATA ELR/ 0.020, 0.030, 0.040, 0.050, 0.060, 0.080,
2      0.100, 0.200, 0.300, 0.400, 0.500, 0.600, 0.800,
3      1.0, 2.0, 3.0, 4.0/
C
C REFERENCE VALUES OF LEAKAGE CORRECTION PARAMETER Q1
C
      DATA Q1R/ 0.122, 0.122, 0.122, 0.121, 0.121, 0.121,
2      0.121, 0.115, 0.113, 0.109, 0.105, 0.102, 0.096,
3      0.091, 0.072, 0.063, 0.057/
C
C REFERENCE VALUES OF LEAKAGE CORRECTION PARAMETER A IN CM
C
      DATA ALR/ 0.00064, 0.00130, 0.0022, 0.0032, 0.0044, 0.0073,
2      0.0106, 0.033, 0.063, 0.096, 0.131, 0.169, 0.25,
3      0.33, 0.82, 1.16, 1.57/
C
C SCALED DISTANCE Z/A FOR REFERENCE VALUES OF LEAKAGE CORRECTION PARAMETER Q2
C
      DATA ZDALR/ 0.0, 0.00625, 0.0125, 0.025, 0.050, 0.075,
2      0.10, 0.15, 0.20, 0.30, 0.40, 0.50, 0.60,
3      0.80, 1.00/
C
C REFERENCE VALUES OF LEAKAGE CORRECTION PARAMETER Q2
C
      DATA Q2R/ 1.0, 0.752, 0.639, 0.497, 0.352, 0.281,
2      0.229, 0.165, 0.120, 0.072, 0.048, 0.030, 0.018,
3      0.004, 0.001/
C
C DENSITY OF SKIN TISSUE IN G/(CM CM)
C
      DATA RHOSK/ 1.12/
C
C DEFINE EQUIVALENT TWO-DIMENSIONAL ARRAY OF GEOMETRICAL REDUCTIONS FACTORS
C
      EQUIVALENCE (GR(1,1), GR1(1)), (GR(1,2), GR2(1)), (GR(1,3),
2 GR3(1)), (GR(1,4), GR4(1)), (GR(1,5), GR5(1)), (GR(1,6), GR6(1)),
3 (GR(1,7), GR7(1)), (GR(1,8), GR8(1)), (GR(1,9), GR9(1)),
4 (GR(1,10), GR10(1)), (GR(1,11), GR11(1)), (GR(1,12), GR12(1)),
5 (GR(1,13), GR13(1)), (GR(1,14), GR14(1)), (GR(1,15), GR15(1)),
6 (GR(1,16), GR16(1)), (GR(1,17), GR17(1)), (GR(1,18), GR18(1)),
7 (GR(1,19), GR19(1)), (GR(1,20), GR20(1)), (GR(1,21), GR21(1))
C
C CALCULATE ELECTRON RANGE IN TISSUE
C
      RANGE=YINTER(EB, EGR, RNGTR, 0, 3, 25)
C
C CALCULATE RATIO OF DISTANCE FROM BODY SURFACE TO ELECTRON RANGE
C

```

```

      ZOVR=R/RANGE
C
C  CALCULATE GEOMETRICAL REDUCTION FACTOR FOR GIVEN ENERGY AND SCALED THICKNESS
C  IN TISSUE WITHOUT LEAKAGE CORRECTION
C
      G=DINTER(EB, ZOVR, EGR, ZDRNG, GR, 25, 21, 4, 25)
C
C  CALCULATE LEAKAGE CORRECTION TO GEOMETRICAL REDUCTION FACTOR
C
C  CALCULATE PARAMETERS Q1 AND A
C
      Q1=YINTER(EB, ELR, Q1R, 0, 3, 17)
      AL=YINTER(EB, ELR, ALR, 0, 3, 17)
C
C  CALCULATE SCALED DISTANCE Z/A AND PARAMETER Q2
C
      ZOAL=R/(AL*RHOSK)
      Q2=YINTER(ZOAL, ZOALR, Q2R, 0, 3, 15)
C
C  LEAKAGE CORRECTION
C
      QL=1.0-Q1*Q2
C
C  CALCULATE GEOMETRICAL REDUCTION FACTOR WITH LEAKAGE CORRECTION
C
      G=QL*G
      IF (G .LT. 0.0) G=0.0
      RETURN
      END

```

C
 C FUNCTION FAC(K, E)
 C
 C CALCULATES RATIO OF ORGAN DOSE RATE TO DOSE RATE IN AIR FOR PHOTONS AT 0 DEG C
 C AND 760 MM PRESSURE USING ORGAN DOSE-RATE FACTORS FOR MONOENERGETIC SOURCES
 C AT THE BODY SURFACE GIVEN BY O'BRIEN AND SANNA, HEALTH PHYSICS 30, 76
 C (1976), AND SPECTRA OF SCATTERED PHOTONS FOR MONOENERGETIC SOURCES IN AN
 C INFINITE ATMOSPHERIC CLOUD GIVEN BY DILLMAN, HEALTH PHYSICS 27, 571 (1974);
 C SEE ECKERMAN, KERR, AND RARIDON, HEALTH PHYSICS 39, 1054 (1980)
 C
 C K - INDEX FOR PARTICULAR ORGAN; SEE REFERENCE VALUES OF RATIOS GIVEN BELOW
 C E - PHOTON ENERGY
 C
 C DIMENSION EORG(15), ORG1(15), ORG2(15), ORG3(15), ORG4(15),
 C 2 ORG5(15), ORG6(15), ORG7(15), ORG8(15), ORG9(15), ORG10(15),
 C 3 ORG11(15), ORG12(15), ORG13(15), ORG14(15), ORG15(15), ORG16(15),
 C 4 ORG17(15), ORG18(15), ORG19(15), ORG20(15), ORG21(15), ORG22(15),
 C 5 ORG23(15), ORG15,23), ORGF(15), EORGL(15)
 C
 C ENERGIES FOR REFERENCE VALUES OF RATIOS OF ORGAN DOSE RATE TO DOSE RATE IN AIR
 C IN MEV
 C

DATA EORG/	0.010,	0.015,	0.020,	0.030,	0.050,
2 0.100,	0.200,	0.500,	1.0,	1.5,	2.0,
3 4.0,	6.0,	8.0,	10.0/		

 C REFERENCE VALUES OF RATIOS OF ORGAN DOSE RATE TO DOSE RATE IN AIR
 C
 C ADRENALS

DATA ORG1/	1.06E-03,	5.08E-03,	1.56E-02,	6.84E-02,	0.252,
2 0.490,	0.544,	0.547,	0.576,	0.556,	0.615,
3 0.638,	0.669,	0.700,	0.716/		

 C BLADDER

DATA ORG2/	1.91E-10,	2.97E-05,	4.98E-03,	9.08E-02,	0.307,
2 0.472,	0.496,	0.519,	0.562,	0.561,	0.635,
3 0.653,	0.677,	0.716,	0.745/		

 C BRAIN

DATA ORG3/	8.45E-05,	7.63E-04,	4.16E-03,	3.90E-02,	0.251,
2 0.493,	0.529,	0.578,	0.633,	0.632,	0.710,
3 0.709,	0.718,	0.741,	0.754/		

 C BREAST

DATA ORG4/	8.30E-02,	0.154,	0.238,	0.435,	0.748,
2 0.887,	0.789,	0.691,	0.703,	0.698,	0.790,
3 0.836,	0.863,	0.893,	0.905/		

 C HEART

DATA ORG5/	1.38E-04,	1.07E-03,	5.07E-03,	3.91E-02,	0.223,

	2	0.454,	0.483,	0.507,	-0.556,	0.556,	0.635,
	3	0.651,	0.667,	0.694,	0.710/		
C							
C							
C							
		SMALL INTESTINE					
		DATA ORG6/	1.78E-06,	1.77E-04,	3.19E-03,	4.42E-02,	0.215,
	2	0.392,	0.431,	0.456,	0.506,	0.516,	0.591,
	3	0.621,	0.639,	0.663,	0.673/		
C							
C							
C							
		UPPER LARGE INTESTINE					
		DATA ORG7/	2.62E-06,	4.44E-05,	9.03E-03,	7.50E-02,	0.260,
	2	0.493,	0.512,	0.538,	0.592,	0.592,	0.675,
	3	0.692,	0.713,	0.747,	0.766/		
C							
C							
C							
		LOWER LARGE INTESTINE					
		DATA ORG8/	4.35E-04,	2.93E-03,	1.08E-02,	5.55E-02,	0.225,
	2	0.439,	0.481,	0.497,	0.544,	0.546,	0.623,
	3	0.649,	0.669,	0.696,	0.710/		
C							
C							
C							
		KIDNEYS					
		DATA ORG9/	1.27E-06,	4.66E-04,	1.57E-02,	0.153,	0.351,
	2	0.481,	0.510,	0.538,	0.590,	0.592,	0.679,
	3	0.722,	0.756,	0.795,	0.817/		
C							
C							
C							
		LIVER					
		DATA ORG10/	1.03E-05,	4.95E-04,	5.71E-03,	6.79E-02,	0.289,
	2	0.469,	0.494,	0.516,	0.559,	0.561,	0.639,
	3	0.655,	0.674,	0.710,	0.736/		
C							
C							
C							
		LUNGS					
		DATA ORG11/	8.38E-04,	5.11E-03,	1.80E-02,	8.96E-02,	0.325,
	2	0.522,	0.538,	0.554,	0.595,	0.592,	0.671,
	3	0.677,	0.693,	0.726,	0.749/		
C							
C							
C							
		MARROW					
		DATA ORG12/	5.03E-04,	5.62E-03,	2.53E-02,	0.150,	0.588,
	2	0.864,	0.748,	0.640,	0.635,	0.617,	0.687,
	3	0.698,	0.726,	0.773,	0.807/		
C							
C							
C							
		RED MARROW					
		DATA ORG13/	2.75E-04,	1.72E-03,	6.12E-03,	3.28E-02,	0.155,
	2	0.413,	0.536,	0.567,	0.602,	0.597,	0.679,
	3	0.713,	0.751,	0.795,	0.825/		
C							
C							
C							
		OVARIES					
		DATA ORG14/	4.15E-04,	2.84E-03,	1.15E-02,	6.43E-02,	0.235,
	2	0.401,	0.433,	0.495,	0.541,	0.526,	0.579,
	3	0.574,	0.605,	0.661,	0.709/		
C							
C							
C							
		PANCREAS					

```

DATA ORG15/ 6.19E-04, 3.11E-03, 9.56E-03, 4.22E-02, 0.170,
2 0.365, 0.422, 0.444, 0.483, 0.487, 0.556,
3 0.589, 0.621, 0.665, 0.695/

C
C SKELETON
C
DATA ORG16/ 1.36E-03, 8.36E-03, 2.98E-02, 0.156, 0.603,
2 0.890, 0.765, 0.650, 0.646, 0.627, 0.699,
3 0.707, 0.735, 0.781, 0.815/

C
C SKIN
C
DATA ORG17/ 0.177, 0.257, 0.334, 0.491, 0.707,
2 0.807, 0.811, 0.850, 0.908, 0.885, 0.980,
3 0.961, 0.973, 1.01, 1.03/

C
C SPLEEN
C
DATA ORG18/ 2.39E-04, 2.09E-03, 9.09E-03, 5.66E-02, 0.245,
2 0.460, 0.492, 0.504, 0.541, 0.541, 0.611,
3 0.634, 0.659, 0.694, 0.719/

C
C STOMACH
C
DATA ORG19/ 2.16E-04, 2.20E-03, 1.03E-02, 6.43E-02, 0.260,
2 0.460, 0.488, 0.509, 0.552, 0.546, 0.623,
3 0.662, 0.689, 0.711, 0.719/

C
C TESTES
C
DATA ORG20/ 7.69E-03, 3.38E-02, 9.15E-02, 0.277, 0.588,
2 0.757, 0.739, 0.744, 0.785, 0.774, 0.865,
3 0.898, 0.928, 0.964, 0.984/

C
C THYMUS
C
DATA ORG21/ 1.77E-07, 1.43E-04, 5.22E-03, 0.107, 0.410,
2 0.582, 0.564, 0.562, 0.630, 0.617, 0.683,
3 0.709, 0.751, 0.802, 0.835/

C
C THYROID
C
DATA ORG22/ 5.30E-04, 6.86E-03, 3.42E-02, 0.186, 0.541,
2 0.754, 0.713, 0.688, 0.751, 0.728, 0.798,
3 0.799, 0.838, 0.893, 0.933/

C
C UTERUS
C
DATA ORG23/ 7.73E-08, 4.02E-06, 5.32E-04, 2.90E-02, 0.198,
2 0.398, 0.437, 0.451, 0.488, 0.502, 0.579,
3 0.580, 0.596, 0.642, 0.680/

C
C DEFINE EQUIVALENT TWO-DIMENSIONAL ARRAY OF RATIOS
C
EQUIVALENCE (ORG(1,1), ORG1(1)), (ORG(1,2), ORG2(1)), (ORG(1,3),
2 ORG3(1)), (ORG(1,4), ORG4(1)), (ORG(1,5), ORG5(1)), (ORG(1,6),
3 ORG6(1)), (ORG(1,7), ORG7(1)), (ORG(1,8), ORG8(1)), (ORG(1,9),
4 ORG9(1)), (ORG(1,10), ORG10(1)), (ORG(1,11), ORG11(1)),
5 (ORG(1,12), ORG12(1)), (ORG(1,13), ORG13(1)), (ORG(1,14),

```

```

6 ORG14(1), (ORG(1,15), ORG15(1)), (ORG(1,16), ORG16(1)),
7 (ORG(1,17), ORG17(1)), (ORG(1,18), ORG18(1)), (ORG(1,19),
8 ORG19(1)), (ORG(1,20), ORG20(1)), (ORG(1,21), ORG21(1)),
9 (ORG(1,22), ORG22(1)), (ORG(1,23), ORG23(1))
C
  IF (E .GT. EORG(1)) GO TO 2
C
C CALCULATE RATIO OF ORGAN DOSE RATE TO DOSE RATE IN AIR USING LINEAR
C INTERPOLATION FOR ENERGIES LESS THAN 10 KEV
C
  FAC=(E/EORG(1))*ORG(1,K)
  GO TO 3
C
C CALCULATE LOGARITHMS OF REFERENCE ENERGIES AND REFERENCE RATIOS FOR PARTICULAR
C ORGAN
C
  2 DO 1 I=1,15
    EORGL(I)=ALOG(EORG(I))
    ORGF(I)=ALOG(ORG(I,K))
  1 CONTINUE
C
C CALCULATE RATIO USING CUBIC INTERPOLATION OF LOGARITHMS
C
  FAC=EXP(YINTER(ALOG(E), EORGL, ORGF, 0, 4, 15))
3 RETURN
END

```

```

C
C      FUNCTION E1(FM, X)
C
C      CALCULATES EXPONENTIAL INTEGRALS USING POLYNOMIAL AND RATIONAL APPROXIMATIONS:
C      SEE EQS. 5.1.53 AND 5.1.56 IN HANDBOOK OF MATHEMATICAL FUNCTIONS, PG. 231
C
      DOUBLE PRECISION ARG, ALO, AL1, AL2, AL3, AL4, AL5
      DOUBLE PRECISION AG1, AG2, AG3, AG4, B1, B2, B3, B4
      DOUBLE PRECISION DNUM, DNOM, FM, X, E1
      DATA ALO, AL1, AL2, AL3, AL4, AL5/ -0.57721566D0, 0.99999193D0,
2 -0.24991055D0, 0.05519968D0, -0.00976004D0, 0.00107857D0/
      DATA AG1, AG2, AG3, AG4/ 8.5733287401D0, 18.0590169730D0,
2 8.6347608925D0, 0.2677737343D0/
      DATA B1, B2, B3, B4/ 9.5733223454D0, 25.6329561486D0,
2 21.0996530827D0, 3.9584969228D0/
      ARG=FM*X
      IF (ARG .GT. 1.0D0) GO TO 1
      E1=ALO+AL1*ARG+AL2*(ARG**2.)+AL3*(ARG**3.)+AL4*(ARG**4.)+AL5*
2 (ARG**5.)-DLOG(ARG)
2 RETURN
1 DNUM=ARG**4.+AG1*(ARG**3.)+AG2*(ARG**2.)+AG3*ARG+AG4
  DNOM=ARG**4.+B1*(ARG**3.)+B2*(ARG**2.)+B3*ARG+B4
  E1=DNUM/(DNOM*ARG*DEXP(ARG))
  GO TO 2
END

```

```

C
C      SUBROUTINE BSPEC (EN, FI, EBSR, ATNO, NCD, FIE, JSPEC, EMID)
C
C      CALCULATES NUMBER OF ELECTRONS AS A FUNCTION OF ENERGY FOR CONTINUOUS SPECTRA
C      FROM BETA DECAY; SEE EQS. (3.12)-(3.14) AND (3.22) OF EVANS, THE ATOMIC
C      NUCLEUS
C
C      EN - ENDPOINT ENERGY FOR CONTINUOUS SPECTRUM
C      FI - TOTAL INTENSITY FOR CONTINUOUS SPECTRUM
C      EBSR - ARRAY OF ENERGIES FOR CALCULATION OF CONTINUOUS SPECTRUM
C      ATNO - ATOMIC NUMBER OF PARENT RADIONUCLIDE
C      NCD - INDEX FOR TYPE OF ELECTRON
C           = 1 FOR BETA PARTICLE (-1 FOR FIRST-FORBIDDEN UNIQUE TRANSITION)
C           = 2 FOR POSITRON (-2 FOR FIRST-FORBIDDEN UNIQUE TRANSITION)
C      FIE - ARRAY OF ELECTRON INTENSITIES AT ENERGIES GIVEN BY ALTERNATE VALUES OF
C           EBSR
C      JSPEC - INDEX SPECIFYING HIGHEST FULL ENERGY INTERVAL CENTERED AT AN
C           ALTERNATE VALUE OF EBSR FOR WHICH INTENSITY IS NON-ZERO
C      EMID - ENERGY SPECIFYING LAST ENERGY INTERVAL IN SPECTRUM INCLUDING ENDOPOINT
C
C      DIMENSION EBSR(1), FIE(1), FIBS(1201), ELOW(3), FLOW(3)
C      COMPLEX*16 Z1, DCGAM, GAM
C
C      ELECTRON REST MASS IN MEV
C      FINE-STRUCTURE CONSTANT
C
C      DATA EMO, FSC/ 0.510976, 7.29729E-03/
C
C      DEFINE FUNCTIONS FOR CONTINUOUS ELECTRON SPECTRUM
C
C      STATISTICAL FACTOR FOR ALLOWED SPECTRUM
C
C      FO(W, ETA, WO)=W*ETA*((WO-W)**2.)
C
C      FIRST-FORBIDDEN UNIQUE CORRECTION FACTOR
C
C      FI(W, ETA, WO)=ETA**2.*(WO-W)**2.
C
C      COULOMB CORRECTION FACTOR
C
C      FC(ETA, S, Y, GAMSQ)=(ETA**(2.*S))*EXP(3.14159*Y)*GAMSQ
C
C      INITIALIZE STATISTICAL FACTORS AND NUMBER OF ELECTRONS AS A FUNCTION OF ENERGY
C
C      DO 10 I=1,1201
C      FIBS(I)=0.0
C      IF (I .GT. 600) GO TO 10
C      FIE(I)=0.0
C      10 CONTINUE
C
C      CALCULATE ATOMIC NUMBER OF DAUGHTER NUCLIDE
C
C      IF (IABS(NCD) .EQ. 1) ZD=ATNO+1.
C      IF (IABS(NCD) .EQ. 2) ZD=-(ATNO+1.)
C

```

```

C CALCULATE STATISTICAL FACTOR FOR ELECTRON SPECTRUM AT ENERGIES GIVEN BY VALUES
C OF EBSR; CALCULATE INTEGRAL OVER ENERGY OF STATISTICAL FACTORS USING
C TRAPEZOIDAL RULE
C
C INITIALIZE INTEGRAL AND SET FIRST-FORBIDDEN UNIQUE CORRECTION FACTOR FOR AN
C ALLOWED TRANSITION
C
  AREA=0.0
  FIC=1.0
C
C CALCULATE ENDPOINT ENERGY IN UNITS OF ELECTRON REST MASS
C
  WO=EN/EMO+1.
C
C CALCULATE CONSTANT TERM IN COULOMB CORRECTION FACTOR
C
  S=SQRT(1.-(ABS(ZD)*FSC)**2.)-1.
C
C CALCULATE STATISTICAL FACTORS AS A FUNCTION OF ENERGY
C
  DO 1 I=2,1201
  IF (EBSR(I) .GT. EN) GO TO 2
C
C CALCULATE ELECTRON TOTAL ENERGY AND MOMENTUM
C
  W=EBSR(I)/EMO+1.
  ETA=SQRT(W*W-1.)
C
C CALCULATE FIRST-FORBIDDEN UNIQUE CORRECTION FACTOR
C
  IF (NCD .LT. 0) FIC=F1(W, ETA, WO)
C
C CALCULATE TERMS IN COULOMB CORRECTION FACTOR
C
  Y=ZD*FSC*W/ETA
  ZI=DCMPLX(DBLE(1.+S), DBLE(Y))
  GAM=DCGAM(ZI)
  GAMSQ=GAM*DCONJG(GAM)
C
C CALCULATE STATISTICAL FACTOR
C
  FIBS(I)=FO(W, ETA, WO)*FIC*FC(ETA, S, Y, GAMSQ)
1 CONTINUE
C
C SET INDEX FOR LAST ENTRY IN ENERGY AND STATISTICAL FACTOR ARRAYS
C
2 NSPEC=I-1
C
C CALCULATE STATISTICAL FACTOR AT ZERO ENERGY USING QUADRATIC EXTRAPOLATION
C
  DO 3 I=1,3
  ELOW(I)=EBSR(I+1)
  FLOW(I)=FIBS(I+1)
3 CONTINUE
  FIBS(1)=YINTER(EBSR(1), ELOW, FLOW, 0, 3, 3)
C
C CALCULATE INTEGRAL OF STATISTICAL FACTORS
C
  DO 4 I=2,NSPEC

```

```

      AREA=AREA+0.5*(FIBS(I)+FIBS(I-1))*(EBSR(I)-EBSR(I-1))
4  CONTINUE
C
C   ADD CONTRIBUTION FROM ENERGY INTERVAL CONTAINING ENDOPOINT ENERGY
C
      AREA=AREA+0.5*FIBS(NSPEC)*(EN-EBSR(NSPEC))
C
C  CALCULATE NUMBER OF ELECTRONS PER DISINTEGRATION AT ENERGIES GIVEN BY
C  ALTERNATE VALUES OF EBSR USING SIMPSON'S RULE
C
C  CALCULATE INTERVAL WIDTH AND SPECIFY INDEX FOR ENERGY FOR LAST FULL INTERVAL
C
      DELEN=EBSR(2)-EBSR(1)
      JSPEC=NSPEC-1
C
C  CALCULATE SPECTRUM
C
      DO 5 I=2,JSPEC,2
      DAREA=DELEN*(FIBS(I-1)+FIBS(I+1)+4.*FIBS(I))/3.
      J=I/2
      FIE(J)=FI*DAREA/AREA
5  CONTINUE
C
C  CALCULATE CONTRIBUTION TO SPECTRUM FROM ENERGY INTERVAL CONTAINING ENDOPOINT
C  ENERGY BY BISECTING INTERVAL AND USING SIMPSON'S RULE
C
      IF (I .EQ. JSPEC) GO TO 6
      EMID=(EBSR(JSPEC)+EN)/2.
      FBMID=YINTER(EMID, EBSR, FIBS, 0, 3, NSPEC)
      DAREA=(EN-EMID)*(FIBS(JSPEC)+4.*FBMID)/3.
      GO TO 7
6  EMID=(EBSR(NSPEC)+EN)/2.
      FBMID=YINTER(EMID, EBSR, FIBS, 0, 3, NSPEC)
      DAREA=(EN-EMID)*(FIBS(NSPEC)+4.*FBMID)/3.
7  FIE(J+1)=FI*DAREA/AREA
      RETURN
      END

```

```

C
C   SUBROUTINE BGRND (EB, RNGTR, R, RANGE, EINT)
C
C   CALCULATES INTEGRAL OVER CONTAMINATED GROUND SURFACE OF ELECTRON SCALED POINT
C   KERNEL IN AIR
C
C   EB - ELECTRON ENERGY FOR EVALUATION OF INTEGRAL
C   RNGAR - REFERENCE ARRAY OF ELECTRON RANGES IN AIR IN G/(SQ CM) AT ENERGIES
C           GIVEN BY VALUES OF EBR BELOW
C   R - DISTANCE ABOVE GROUND FOR EVALUATION OF INTEGRAL IN G/(SQ CM)
C   RANGE - ELECTRON RANGE IN AIR IN G/(SQ CM) FOR ENERGY EB
C   EINT - INTEGRAL OVER GROUND SURFACE OF ELECTRON SCALED POINT KERNEL IN AIR
C           FOR ENERGY EB AND DISTANCE ABOVE GROUND R
C
C   DIMENSION RNGAR(1), EAR(8), ALPHAR(8), EARL(8)
C   DIMENSION REDISR(25), EBR(25), SPKR1(25), SPKR2(25), SPKR3(25),
C   2 SPKR4(25), SPKR5(25), SPKR6(25), SPKR7(25), SPKR8(25), SPKR9(25),
C   3 SPKR10(25), SPKR11(25), SPKR12(25), SPKR13(25), SPKR14(25),
C   4 SPKR15(25), SPKR16(25), SPKR17(25), SPKR18(25), SPKR19(25),
C   5 SPKR20(25), SPKR21(25), SPKR22(25), SPKR23(25), SPKR24(25),
C   6 SPKR25(25), SPKR(25,25)
C   DIMENSION ALPHAR(25), FAIRR(25,25), RINTZE(25,28), DISR(28),
C   2 DISLR(5)
C
C   RATIOS OF DISTANCE FROM SOURCE POINT TO ELECTRON RANGE FOR REFERENCE VALUES OF
C   ELECTRON SCALED POINT KERNELS
C
C   DATA REDISR/ 0.0, 0.05, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35, 0.40,
C   2 0.45, 0.50, 0.55, 0.60, 0.65, 0.70, 0.75, 0.80, 0.85, 0.90, 0.95,
C   3 1.00, 1.05, 1.10, 1.15, 1.20/
C
C   RATIOS OF DISTANCE FROM SOURCE POINT TO ELECTRON RANGE BETWEEN 0.0 AND 0.05 AT
C   WHICH REFERENCE ARRAY OF INTEGRALS IS TO BE CALCULATED
C
C   DATA DISLR/ 0.001, 0.002, 0.005, 0.01, 0.02/
C
C   ENERGIES FOR REFERENCE VALUES OF ELECTRON RANGES AND SCALED POINT KERNELS
C
C   DATA EBR/ 0.010, 0.015, 0.020, 0.030, 0.040, 0.050,
C   2 0.060, 0.080, 0.100, 0.150, 0.200, 0.300, 0.400,
C   3 0.500, 0.600, 0.800, 1.0, 1.5, 2.0, 3.0,
C   4 4.0, 5.0, 6.0, 8.0, 10.0/
C
C   REFERENCE VALUES OF ELECTRON SCALED POINT KERNELS IN WATER
C
C   REDISR=0.0
C
C   DATA SPKR1/ 0.508, 0.508, 0.510, 0.521, 0.528, 0.536,
C   2 0.544, 0.559, 0.572, 0.595, 0.611, 0.640, 0.660,
C   3 0.674, 0.689, 0.714, 0.736, 0.711, 0.798, 0.826,
C   4 0.835, 0.841, 0.841, 0.839, 0.833/
C
C   REDISR=0.05
C
C   DATA SPKR2/ 0.588, 0.582, 0.576, 0.579, 0.582, 0.586,

```


	2	0.592,	0.603,	0.612,	0.633,	0.648,	0.674,	0.690,
	3	0.708,	0.727,	0.752,	0.774,	0.811,	0.834,	0.856,
	4	0.868,	0.875,	0.877,	0.873,	0.867/		
C								
C								
C								
		REDISR=0.10						
		DATA SPKR3/	0.663,	0.654,	0.648,	0.643,	0.640,	0.640,
	2	0.640,	0.645,	0.648,	0.661,	0.678,	0.702,	0.725,
	3	0.744,	0.757,	0.784,	0.807,	0.845,	0.866,	0.891,
	4	0.900,	0.905,	0.906,	0.903,	0.897/		
C								
C								
C								
		REDISR=0.15						
		DATA SPKR4/	0.733,	0.717,	0.705,	0.696,	0.690,	0.690,
	2	0.688,	0.691,	0.692,	0.703,	0.718,	0.745,	0.765,
	3	0.784,	0.795,	0.820,	0.835,	0.871,	0.894,	0.913,
	4	0.924,	0.929,	0.930,	0.925,	0.917/		
C								
C								
C								
		REDISR=0.20						
		DATA SPKR5/	0.803,	0.781,	0.769,	0.754,	0.746,	0.740,
	2	0.740,	0.741,	0.744,	0.757,	0.770,	0.791,	0.807,
	3	0.821,	0.832,	0.860,	0.867,	0.897,	0.920,	0.941,
	4	0.950,	0.949,	0.948,	0.941,	0.936/		
C								
C								
C								
		REDISR=0.25						
		DATA SPKR6/	0.894,	0.869,	0.855,	0.834,	0.820,	0.814,
	2	0.810,	0.809,	0.808,	0.820,	0.828,	0.845,	0.855,
	3	0.865,	0.876,	0.892,	0.905,	0.935,	0.952,	0.967,
	4	0.970,	0.967,	0.966,	0.957,	0.948/		
C								
C								
C								
		REDISR=0.30						
		DATA SPKR7/	0.990,	0.967,	0.954,	0.932,	0.920,	0.912,
	2	0.906,	0.901,	0.899,	0.898,	0.903,	0.908,	0.912,
	3	0.919,	0.924,	0.936,	0.949,	0.969,	0.980,	0.979,
	4	0.978,	0.976,	0.972,	0.963,	0.958/		
C								
C								
C								
		REDISR=0.35						
		DATA SPKR8/	1.084,	1.062,	1.050,	1.032,	1.022,	1.010,
	2	1.009,	1.005,	1.003,	0.998,	0.997,	0.996,	0.994,
	3	0.995,	1.010,	1.012,	1.003,	1.007,	1.010,	1.007,
	4	1.002,	0.996,	0.992,	0.980,	0.964/		
C								
C								
C								
		REDISR=0.40						
		DATA SPKR9/	1.195,	1.172,	1.162,	1.151,	1.145,	1.140,
	2	1.134,	1.131,	1.131,	1.123,	1.108,	1.113,	1.109,
	3	1.104,	1.099,	1.088,	1.083,	1.071,	1.062,	1.043,
	4	1.028,	1.010,	1.000,	0.986,	0.976/		
C								
C								
C								
		REDISR=0.45						
		DATA SPKR10/	1.305,	1.281,	1.271,	1.273,	1.285,	1.290,
	2	1.292,	1.294,	1.296,	1.292,	1.283,	1.268,	1.256,
	3	1.247,	1.231,	1.211,	1.196,	1.157,	1.134,	1.093,
	4	1.066,	1.046,	1.032,	1.010,	0.988/		

C
C
C
C REDISR=0.50

DATA	SPKR11/	1.399,	1.391,	1.389,	1.403,	1.417,	1.424,
2	1.428,	1.430,	1.432,	1.426,	1.428,	1.405,	1.395,
3	1.384,	1.372,	1.355,	1.378,	1.285,	1.232,	1.161,
4	1.119,	1.090,	1.065,	1.032,	1.004/		

C
C
C
C REDISR=0.55

DATA	SPKR12/	1.472,	1.475,	1.479,	1.503,	1.525,	1.550,
2	1.556,	1.562,	1.561,	1.557,	1.536,	1.522,	1.507,
3	1.498,	1.484,	1.457,	1.435,	1.380,	1.325,	1.248,
4	1.193,	1.149,	1.119,	1.066,	1.024/		

C
C
C
C REDISR=0.60

DATA	SPKR13/	1.504,	1.519,	1.540,	1.578,	1.607,	1.622,
2	1.628,	1.638,	1.645,	1.643,	1.639,	1.622,	1.604,
3	1.579,	1.563,	1.529,	1.501,	1.438,	1.393,	1.318,
4	1.259,	1.211,	1.173,	1.110,	1.054/		

C
C
C
C REDISR=0.65

DATA	SPKR14/	1.476,	1.503,	1.528,	1.582,	1.609,	1.624,
2	1.634,	1.644,	1.649,	1.653,	1.651,	1.638,	1.622,
3	1.605,	1.587,	1.555,	1.529,	1.472,	1.423,	1.360,
4	1.303,	1.257,	1.217,	1.147,	1.086/		

C
C
C
C REDISR=0.70

DATA	SPKR15/	1.395,	1.425,	1.449,	1.479,	1.501,	1.516,
2	1.528,	1.546,	1.557,	1.563,	1.558,	1.544,	1.534,
3	1.522,	1.510,	1.489,	1.475,	1.440,	1.413,	1.358,
4	1.313,	1.275,	1.242,	1.179,	1.124/		

C
C
C
C REDISR=0.75

DATA	SPKR16/	1.241,	1.274,	1.299,	1.315,	1.323,	1.328,
2	1.336,	1.342,	1.348,	1.354,	1.359,	1.361,	1.358,
3	1.351,	1.346,	1.339,	1.334,	1.319,	1.313,	1.290,
4	1.265,	1.249,	1.226,	1.181,	1.136/		

C
C
C
C REDISR=0.80

DATA	SPKR17/	1.048,	1.074,	1.090,	1.090,	1.084,	1.080,
2	1.076,	1.073,	1.073,	1.073,	1.072,	1.071,	1.071,
3	1.070,	1.067,	1.064,	1.067,	1.077,	1.088,	1.111,
4	1.125,	1.126,	1.131,	1.130,	1.102/		

C
C
C
C REDISR=0.85

DATA	SPKR18/	0.803,	0.819,	0.815,	0.796,	0.780,	0.768,
2	0.764,	0.757,	0.752,	0.743,	0.740,	0.735,	0.735,
3	0.736,	0.739,	0.742,	0.748,	0.765,	0.782,	0.842,
4	0.900,	0.945,	0.962,	0.986,	0.998/		

C
C
C
C REDISR=0.90

```

      DATA SPKR19/ 0.548, 0.558, 0.552, 0.523, 0.506, 0.492,
2      0.484, 0.469, 0.461, 0.446, 0.438, 0.429, 0.425,
3      0.422, 0.424, 0.427, 0.431, 0.455, 0.481, 0.552,
4      0.609, 0.654, 0.694, 0.756, 0.803/

C
C REDISR=0.95
C
      DATA SPKR20/ 0.329, 0.339, 0.335, 0.313, 0.290, 0.274,
2      0.264, 0.248, 0.237, 0.219, 0.213, 0.193, 0.189,
3      0.185, 0.183, 0.184, 0.191, 0.206, 0.230, 0.273,
4      0.311, 0.352, 0.388, 0.465, 0.542/

C
C REDISR=1.00
C
      DATA SPKR21/ 0.179, 0.185, 0.181, 0.164, 0.148, 0.134,
2      0.126, 0.114, 0.100, 0.086, 0.076, 0.066, 0.060,
3      0.058, 0.056, 0.056, 0.058, 0.066, 0.078, 0.104,
4      0.129, 0.155, 0.181, 0.235, 0.295/

C
C REDISR=1.05
C
      DATA SPKR22/ 0.070, 0.072, 0.073, 0.074, 0.072, 0.070,
2      0.066, 0.058, 0.042, 0.026, 0.020, 0.014, 0.012,
3      0.010, 0.010, 0.009, 0.008, 0.008, 0.013, 0.020,
4      0.028, 0.036, 0.045, 0.067, 0.098/

C
C REDISR=1.10
C
      DATA SPKR23/ 0.024, 0.023, 0.021, 0.019, 0.016, 0.015,
2      0.013, 0.011, 0.009, 0.007, 0.005, 0.003, 0.002,
3      0.002, 0.002, 0.001, 0.001, 0.001, 0.002, 0.003,
4      0.005, 0.008, 0.012, 0.018, 0.025/

C
C REDISR=1.15
C
      DATA SPKR24/ 0.000, 0.000, 0.000, 0.000, 0.000, 0.000,
2      0.000, 0.000, 0.000, 0.000, 0.000, 0.000, 0.000,
3      0.000, 0.000, 0.000, 0.000, 0.000, 0.000, 0.001,
4      0.001, 0.002, 0.003, 0.006, 0.008/

C
C REDISR=1.20
C
      DATA SPKR25/ 0.000, 0.000, 0.000, 0.000, 0.000, 0.000,
2      0.000, 0.000, 0.000, 0.000, 0.000, 0.000, 0.000,
3      0.000, 0.000, 0.000, 0.000, 0.000, 0.000, 0.000,
4      0.000, 0.000, 0.000, 0.001, 0.003/

C
C ENERGIES FOR REFERENCE VALUES OF SCALING PARAMETER
C
      DATA EAR/ 0.010, 0.020, 0.050, 0.100, 0.200, 0.500, 1.0,
2      2.0/

C
C REFERENCE VALUES OF SCALING PARAMETER TO CONVERT ELECTRON SCALED POINT KERNELS
C IN WATER TO VALUES IN AIR
C
      DATA ALPHA/ 1.025, 1.023, 1.022, 1.021, 1.021, 1.022, 1.020,
2      1.014/

C
C DEFINE EQUIVALENT TWO-DIMENSIONAL ARRAY OF ELECTRON SCALED POINT KERNELS IN

```

```

C WATER
C
  EQUIVALENCE (SPKR(1,1), SPKR1(1)), (SPKR(1,2), SPKR2(1)),
  2 (SPKR(1,3), SPKR3(1)), (SPKR(1,4), SPKR4(1)), (SPKR(1,5),
  3 SPKR5(1)), (SPKR(1,6), SPKR6(1)), (SPKR(1,7), SPKR7(1)),
  4 (SPKR(1,8), SPKR8(1)), (SPKR(1,9), SPKR9(1)), (SPKR(1,10),
  5 SPKR10(1)), (SPKR(1,11), SPKR11(1)), (SPKR(1,12), SPKR12(1)),
  6 (SPKR(1,13), SPKR13(1)), (SPKR(1,14), SPKR14(1)), (SPKR(1,15),
  7 SPKR15(1)), (SPKR(1,16), SPKR16(1)), (SPKR(1,17), SPKR17(1)),
  8 (SPKR(1,18), SPKR18(1)), (SPKR(1,19), SPKR19(1)), (SPKR(1,20),
  9 SPKR20(1)), (SPKR(1,21), SPKR21(1)), (SPKR(1,22), SPKR22(1)),
  A (SPKR(1,23), SPKR23(1)), (SPKR(1,24), SPKR24(1)), (SPKR(1,25),
  B SPKR25(1))
C
  LOGICAL FIRST/ .TRUE./
C
C TEST FOR FIRST TIME THROUGH SUBROUTINE
C
  IF (.NOT. FIRST) GO TO 1
C
C CALCULATE TWO-DIMENSIONAL REFERENCE ARRAY OF INTEGRALS OVER GROUND SURFACE OF
C ELECTRON SCALED POINT KERNEL IN AIR AT ENERGIES GIVEN BY VALUES OF EBR AND
C AT LOWER LIMITS OF INTEGRATION GIVEN BY VALUES OF REDISR GREATER THAN 0.0
C PLUS SELECTED VALUES BETWEEN 0.0 AND 0.05
C
C CALCULATE ELECTRON SCALING PARAMETERS TO CONVERT SCALED POINT KERNELS IN
C WATER TO VALUES IN AIR AT ENERGIES GIVEN BY EBR USING LOGARITHMS OF
C ENERGIES EAR FOR INTERPOLATION
C
  DO 2 I=1,8
    EARL(I)=ALOG(EAR(I))
  2 CONTINUE
  DO 3 I=1,25
    ALPHER(I)=YINTER(ALOG(EBR(I)), EARL, ALPHAR, 0, 3, 8)
  3 CONTINUE
C
C CALCULATE TWO-DIMENSIONAL ARRAY OF SCALED POINT KERNELS IN AIR
C
  DO 4 I=1,25
    DO 5 J=1,25
      IF (J .LE. 23) GO TO 10
C
C SCALED POINT KERNELS IN AIR ARE TAKEN EQUAL TO VALUES IN WATER AT TWO
C LARGEST DISTANCES
C
      FAIRR(I,J)=SPKR(I,J)
      GO TO 5
C
C CALCULATE SCALED DISTANCE IN AIR
C
  10 ATR=ALPHER(I)*REDISR(J)
C
C CALCULATE SCALED POINT KERNEL IN AIR
C
      FAIRR(I,J)=ALPHER(I)*DINTER(EBR(I), ATR, EBR, REDISP, SPKR, 25,
      2 24, 4, 25)
  5 CONTINUE
  4 CONTINUE
C

```

```

C   CALCULATE INTEGRALS AT EACH ENERGY USING SIMPSON'S RULE
C
C   DO 6 I=1,25
C
C   CALCULATE INTEGRALS AT REDISR=0.05, 0.15, 0.25, ..., 1.15
C
C   DO 7 J=2,24,2
C
C   INITIALIZE INNER TERMS IN SIMPSON'S RULE
C
C   T2=0.0
C   T3=0.0
C
C   CALCULATE OUTER TERM ASSUMING SCALED POINT KERNEL IS ZERO AT REDISR=1.25
C
C   T1=FAIRR(I,J)/REDISR(J)
C
C   CALCULATE INNER TERMS
C
C   J1=J+1
C   DO 8 K=J1,25,2
C   T2=T2+FAIRR(I,K)/REDISR(K)
8  CONTINUE
C   IF (J .EQ. 24) GO TO 11
C   J2=J+2
C   DO 9 K=J2,24,2
C   T3=T3+FAIRR(I,K)/REDISR(K)
9  CONTINUE
C
C   REDEFINE INDEX FOR VARIABLE REDISR SO THAT VALUE IS SIX AT REDISR=0.05;
C   THIS ALLOWS ROOM FOR CALCULATING INTEGRALS FOR FIVE VALUES OF REDISR
C   BETWEEN 0.0 AND 0.05
C
11 K=J+4
C
C   COMBINE TERMS TO OBTAIN INTEGRAL; INTERVAL WIDTH IS 0.05
C
C   RINTZE(I,K)=0.05*(T1+4.0*T2+2.0*T3)/3.
7  CONTINUE
C
C   CALCULATE INTEGRALS AT REDISR=0.10, 0.20, 0.30, ..., 1.10 USING SAME
C   PROCEDURE AS ABOVE, EXCEPT FOR ASSUMPTION FOR OUTER TERM
C
C
C   DO 12 J=3,23,2
C   T2=0.0
C   T3=0.0
C   T1=FAIRR(I,J)/REDISR(J)+FAIRR(I,25)/REDISR(25)
C   J1=J+1
C   DO 13 K=J1,24,2
C   T2=T2+FAIRR(I,K)/REDISR(K)
13  CONTINUE
C   IF (J .EQ. 23) GO TO 14
C   J2=J+2
C   DO 15 K=J2,23,2
C   T3=T3+FAIRR(I,K)/REDISR(K)
15  CONTINUE
14 K=J+4
C   RINTZE(I,K)=0.05*(T1+4.0*T2+2.0*T3)/3.
12 CONTINUE

```

```

C
C   CALCULATE INTEGRALS AT REDISR=0.001, 0.002, 0.005, 0.01, 0.02 BY ASSUMING
C   THAT SCALED POINT KERNEL FOR ANY ENERGY VARIES LINEARLY WITH SCALED
C   DISTANCE FOR VALUES BETWEEN 0.0 AND 0.05
C
C   DO 17 K=1,5
C     RINTZE(I,K)=FAIRR(I,1)*ALOG(0.05/DISLR(K))+((FAIRR(I,2)-
C       2 FAIRR(I,1))/0.05)*(0.05-DISLR(K))+RINTZE(I,6)
C   17 CONTINUE
C   6 CONTINUE

C
C   DEFINE NEW REFERENCE ARRAY OF SCALED DISTANCES CORRESPONDING TO LOWER LIMITS
C   OF INTEGRATION FOR WHICH REFERENCE INTEGRALS WERE CALCULATED; RESET LOGICAL
C   VARIABLE
C
C   DO 16 I=1,5
C     DISR(I)=DISLR(I)
C   16 CONTINUE
C   DO 18 I=1,23
C     DISR(I+5)=REDISR(I+1)
C   18 CONTINUE
C   FIRST=.FALSE.

C
C   CALCULATE ELECTRON RANGE IN AIR FOR ENERGY EB IN G/(SQ CM)
C
C   1 RANGE=YINTER(EB, EBR, RNGAR, 0, 3, 25)

C
C   CALCULATE INTEGRAL OVER GROUND SURFACE FOR ENERGY EB AND DISTANCE ABOVE GROUND
C   R
C
C   TLOWER=R/RANGE
C   EINT=DINTER(EB, TLOWER, EBR, DISR, RINTZE, 25, 23, 4, 25)
C   IF (EINT .LT. 0.0) EINT=0.0
C   RETURN
C   END

```

```

C      FUNCTION DINTER(XX, YY, X, Y, Z, NX, NY, M, ID)
C
C PERFORMS LAGRANGIAN INTERPOLATION OF A FUNCTION OF TWO VARIABLES
C
C BASED ON DOUBLE PRECISION INTERPOLATION FUNCTION DLAG DESCRIBED IN UNION
C CARBIDE PUBLICATION CTC-39
C
C XX - ABCISSA OF DESIRED INTERPOLATION POINT
C YY - ORDINATE OF DESIRED INTERPOLATION POINT
C X - SINGLY DIMENSIONED ARRAY OF ABCISSAS
C Y - SINGLY DIMENSIONED ARRAY OF ORDINATES
C Z - DOUBLY DIMENSIONED ARRAY OF FUNCTION VALUES GIVEN BY Z(I,J)=
C     F(X(I),Y(J))
C NX - NUMBER OF ELEMENTS FOR THE X-ARRAY
C NY - NUMBER OF ELEMENTS FOR THE Y-ARRAY
C M - NUMBER OF POINTS IS M*M FOR THE INTERPOLATION
C ID - FIRST DIMENSION OF Z IN CALLING PROGRAM
C
C     DIMENSION Z(ID,1), X(1), Y(1), XLAG(100)
C     LOGICAL QUITX, QUITY
C
C INITIALIZE
C
C     QUITX=.FALSE.
C     QUITY=.FALSE.
C     M1=M
C     IEXTX=0
C     IEXTY=0
C
C FIND THE RANGE OF INTERPOLATION ALONG X
C
C     IF (M1 .LE. NX) GO TO 10
C     M1=NX
10  DO 20 I=1,NX
C     IF (XX-X(I)) 30, 90, 20
20  CONTINUE
C     IEXTX=1
C     GO TO 80
30  MIDX=I
C     IF (MIDX .GT. 1) GO TO 40
C     IEXTX=-1
C     GO TO 50
40  IF (ABS(XX-X(MIDX)) .GE. ABS(XX-X(MIDX-1))) GO TO 50
C     ISXPT=MIDX-(M1/2)
C     GO TO 60
50  ISXPT=MIDX-((M1+1)/2)
60  IF (ISXPT .GT. 0) GO TO 70
C     ISXPT=1
70  IEXPT=ISXPT+M1-1
C     IF (IEXPT .LE. NX) GO TO 100
80  ISXPT=NX-M1+1
C     IEXPT=NX
C     GO TO 100
90  QUITX=.TRUE.

```

```

C
C FIND THE RANGE OF INTERPOLATION ALONG Y
C
100 M1=M
   IF (M1 .LE. NY) GO TO 110
   M1=NY
110 DO 120 J=1,NY
   IF (YY-Y(J)) 130, 190, 120
120 CONTINUE
   IEXTY=1
   GO TO 180
130 MIDY=J
   IF (MIDY .GT. 1) GO TO 140
   IEXTY=-1
   GO TO 150
140 IF (ABS(YY-Y(MIDY)) .GE. ABS(YY-Y(MIDY-1))) GO TO 150
   ISYPT=MIDY-(M1/2)
   GO TO 160
150 ISYPT=MIDY-((M1+1)/2)
160 IF (ISYPT .GT. 0) GO TO 170
   ISYPT=1
170 IEYPT=ISYPT+M1-1
   IF (IEYPT .LE. NY) GO TO 200
180 ISYPT=NY-M1+1
   IEYPT=NY
   GO TO 200
190 QUITY=.TRUE.
200 IF (QUITX .AND. QUITY) GO TO 270
   IF (QUITX .AND. .NOT. QUITY) GO TO 240
   IF (.NOT. QUITX .AND. QUITY) GO TO 230
C
C INTERPOLATE ALONG X
C
210 DO 220 K=ISYPT,IEYPT
220 CALL INTER (XX, Z(1,K), X, ISXPT, IEXPT, XLAG(K))
   GO TO 260
230 CALL INTER (XX, Z(1,J), X, ISXPT, IEXPT, XLAG(J))
   DINTER=XLAG(J)
   GO TO 280
C
C INTERPOLATE ALONG Y
C
240 DO 250 L=ISYPT,IEYPT
250 XLAG(L)=Z(1,L)
260 CALL INTER (YY, XLAG, Y, ISYPT, IEYPT, YLAG)
   DINTER=YLAG
   GO TO 280
270 DINTER=Z(1,J)
280 RETURN
   END

```



```
C      SUBROUTINE INTER (PT, FUN, ORD, ISPT, IEPT, ALAG)
C
C      AN INTERPOLATION ROUTINE DESCRIBED IN UNION CARBIDE PUBLICATION CTC-39
C
      DIMENSION FUN(1), ORD(1)
      SUM=0.0
      PROD=1.
      DO 30 J=ISPT,IEPT
      PROD=PROD*(PT-ORD(J))
      DENOM=1.
      DO 20 K=ISPT,IEPT
      IF (K .NE. J) GO TO 10
      D=PT
      GO TO 20
10  D=ORD(J)
20  DENOM=DENOM*(D-ORD(K))
30  SUM=SUM+FUN(J)/DENOM
      ALAG=SUM*PROD
      RETURN
      END
```

```

C
  FUNCTION DCGAM(Z)
C
C CALCULATES GAMMA FUNCTIONS OF A COMPLEX ARGUMENT USING A SERIES EXPANSION; SEE
C EQ. 6.1.34 IN HANDBOOK OF MATHEMATICAL FUNCTIONS, PG. 256
C
  COMPLEX*16 Z, SUM, DCGAM
  DOUBLE PRECISION C(26)
  DATA C/ 1.0, 5.772156649015329D-01, -6.558780715202538D-01,
2 -4.20026350340952D-02, 1.665386113822915D-01,
3 -4.21977345555443D-02, -9.6219715278770D-03, 7.2189432466630D-03,
4 -1.1651675918591D-03, -2.152416741149D-04, 1.280502823882D-04,
5 -2.01348547807D-05, -1.2504934821D-06, 1.1330272320D-06,
6 -2.056338417D-07, 6.1160950D-09, 5.0020075D-09, -1.1812746D-09,
7 1.043427D-10, 7.7823D-12, -3.6968D-12, 5.100D-13, -2.06D-14,
8 -5.4D-15, 1.4D-15, 1.D-16/
  SUM=0.0D0
  DO 1 I=1,26
    SUM=SUM+C(I)*(Z**I)
1 CONTINUE
  DCGAM=1.0D0/SUM
  RETURN
  END

```

```

C      SUBROUTINE SORT (N, A, B)
C
C      SORTS A ONE-DIMENSIONAL ARRAY IN DECREASING NUMERICAL ORDER
C
C      N - NUMBER OF ELEMENTS IN ARRAY
C      A - INPUT ARRAY
C      B - SORTED ARRAY
C
      DIMENSION A(1), B(1)
      NI=N-1
      DO 1 I=1,NI
      NI=N-I
      DO 1 K=1,NI
      IF (A(K) .LE. A(K+1)) GO TO 1
      T=A(K)
      A(K)=A(K+1)
      A(K+1)=T
1  CONTINUE
      DO 2 I=1,N
      NI=N-I+1
      B(I)=A(NI)
2  CONTINUE
      RETURN
      END

```

```

C      SUBROUTINE DOSOUT
C
C      WRITES DOSE-RATE FACTORS IN TABLES AND ON PUNCHED CARDS
C
C      DIMENSION INUCL(21, THALF(3)
C      DIMENSION DOSORG(3,23), DOSORB(3,4), DOSSKN(3), DOSEFF(3)
C      COMMON/ BLK1/ INUCL, THALF
C      COMMON/ BLK5/ DOSORG, DOSORB, DOSSKN, DOSEFF
C
C      MAXIMUM NUMBER OF LINES OF OUTPUT PER PAGE FOR EACH TYPE OF DOSE-RATE FACTOR
C      TABLE
C
C      DATA MAXLOF/40/, MAXSKN/50/, MAXSKT/50/, MAXEFF/50/
C
C      NUMBER OF LINES OF OUTPUT BETWEEN SPACES FOR SUMMARY TABLE OF ORGAN AND
C      EFFECTIVE DOSE-RATE FACTORS
C
C      DATA MAXSKP/5/
C
C      LOGICAL FIRST/ .TRUE./
C
C      TEST FOR FIRST TIME THROUGH SUBROUTINE
C
C      IF (.NOT. FIRST) GO TO 1
C
C      INITIALIZE LINE COUNTS WITHIN EACH TABLE AND RESET LOGICAL VARIABLE
C
C      LINORG=0
C      LINSKP=0
C      LINSKN=0
C      LINSKT=0
C      LINEFF=0
C      FIRST=.FALSE.
C
C      WRITE DOSE-RATE FACTORS IN TABLES
C
C      PHOTON DOSE-RATE FACTORS FOR ALL ORGANS EXCEPT SKIN, PHOTON PLUS ELECTRON
C      DOSE-RATE FACTORS FOR SKIN, AND EFFECTIVE DOSE-RATE FACTORS FOR THREE
C      EXPOSURE MODES
C
C      AIR IMMERSION
C
C      1 WRITE (15,4) INUCL, THALF, (DOSORG(1,J), J=1,9)
C      4 FORMAT (1H , 2A4, 1X, 3A4, 9(1PE11.2))
C      WRITE (16,4) INUCL, THALF, (DOSORG(1,J), J=10,16), (DOSORG(1,J),
C      2 J=18,19)
C      WRITE (17,4) INUCL, THALF, (DOSORG(1,J), J=20,23), DOSEFF(1),
C      2 DOSORG(1,17), DOSORB(1,4), DOSSKN(1)
C
C      WATER IMMERSION
C
C      WRITE (20,4) INUCL, THALF, (DOSORG(2,J), J=1,9)
C      WRITE (21,4) INUCL, THALF, (DOSORG(2,J), J=10,16), (DOSORG(2,J),
C      2 J=18,19)

```

```

      WRITE (22,4) INUCL, THALF, (DOSORG(2,J), J=20,23), DOSEFF(2),
2 DOSORG(2,17), DOSORB(2,4), DOSSKN(2)
C
C      GROUND SURFACE EXPOSURE
C
      WRITE (25,4) INUCL, THALF, (DOSORG(3,J), J=1,9)
      WRITE (26,4) INUCL, THALF, (DOSORG(3,J), J=10,16), (DOSORG(3,J),
2 J=18,19)
      WRITE (27,4) INUCL, THALF, (DOSORG(3,J), J=20,23), DOSEFF(3),
2 DOSORG(3,17), DOSORB(3,4), DOSSKN(3)
      LINSKP=LINSKP+1
      IF (LINSKP.LT. MAXSKP) GO TO 3
      WRITE (15,15)
15 FORMAT (1H )
      WRITE (16,15)
      WRITE (17,15)
      WRITE (20,15)
      WRITE (21,15)
      WRITE (22,15)
      WRITE (25,15)
      WRITE (26,15)
      WRITE (27,15)
      LINSKP=0
      3 LINORG=LINORG+1
      IF (LINORG.LT. MAXLOF) GO TO 5
      CALL PRINT (6)
      LINORG=0
C
C      ELECTRON DOSE-RATE FACTORS FOR DIFFERENT DEPTHS IN SKIN FOR THREE EXPOSURE
C      MODES
C
      5 WRITE (18,2) INUCL, THALF, (DOSORB(1,J), J=1,4)
      2 FORMAT (1H , 4X, 2A4, 5X, 3A4, 6X, 1PE10.2, 3(8X, 1PE10.2))
      WRITE (23,2) INUCL, THALF, (DOSORB(2,J), J=1,4)
      WRITE (28,2) INUCL, THALF, (DOSORB(3,J), J=1,4)
      LINSKN=LINSKN+1
      IF (LINSKN.LT. MAXSKN) GO TO 11
      CALL PRINT (7)
      LINSKN=0
C
C      DOSE-RATE FACTORS FOR SKIN FOR PHOTONS, ELECTRONS, AND PHOTONS PLUS
C      ELECTRONS FOR THREE EXPOSURE MODES
C
      11 WRITE (19,2) INUCL, THALF, DOSORG(1,17), DOSORB(1,4), DOSSKN(1)
      WRITE (24,2) INUCL, THALF, DOSORG(2,17), DOSORB(2,4), DOSSKN(2)
      WRITE (29,2) INUCL, THALF, DOSORG(3,17), DOSORB(3,4), DOSSKN(3)
      LINSKT=LINSKT+1
      IF (LINSKT.LT. MAXSKT) GO TO 9
      CALL PRINT (8)
      LINSKT=0
C
C      EFFECTIVE DOSE-RATE FACTORS FOR THREE EXPOSURE MODES
C
      9 WRITE (30,2) INUCL, THALF, (DOSEFF(I), I=1,3)
      LINEFF=LINEFF+1
      IF (LINEFF.LT. MAXEFF) GO TO 20
      CALL PRINT (9)
      LINEFF=0
C

```

```

C WRITE DOSE-RATE FACTORS ON PUNCHED CARDS
C
C RADIONUCLIDE IDENTIFICATION
C
C 20 WRITE (7,6) INUCL, THALF
C 6 FORMAT (2A4, 2X, 3A4)
C
C PHOTON DOSE-RATE FACTORS FOR ALL ORGANS EXCEPT SKIN, EFFECTIVE DOSE-RATE
C FACTORS FOR PHOTONS, AND PHOTON PLUS ELECTRON DOSE-RATE FACTORS FOR SKIN
C FOR THREE EXPOSURE MODES
C
C DO 8 I=1,3
C WRITE (7,7) (DOSORG(I,J), J=1,16), (DOSORG(I,J), J=18,23),
C 2 DOSEFF(I), DOSSKN(I)
C 7 FORMAT (8(1PE10.2))
C 8 CONTINUE
C
C ELECTRON DOSE-RATE FACTORS FOR DIFFERENT DEPTHS IN SKIN FOR THREE EXPOSURE
C MODES
C
C DO 10 I=1,3
C WRITE (7,7) (DOSORB(I,J), J=1,4)
C 10 CONTINUE
C
C DOSE-RATE FACTORS FOR SKIN FOR PHOTONS, ELECTRONS, AND PHOTONS PLUS
C ELECTRONS FOR THREE EXPOSURE MODES
C
C DO 12 I=1,3
C WRITE (7,7) DOSORG(I,17), DOSORB(I,4), DOSSKN(I)
C 12 CONTINUE
C
C EFFECTIVE DOSE-RATE FACTORS FOR THREE EXPOSURE MODES
C
C WRITE (7,7) (DOSEFF(I), I=1,3)
C RETURN
C END

```