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# ICRP

## Annals of the ICRP

ICRP Publication 119

Compendium of Dose Coefficients based  
on ICRP Publication 60



# Annals of the ICRP

Published on behalf of the International Commission on Radiological Protection

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## Aims and Scope

The International Commission on Radiological Protection (ICRP) is the primary body in protection against ionising radiation. ICRP is a registered charity and is thus an independent non-governmental organisation created by the 1928 International Congress of Radiology to advance for the public benefit the science of radiological protection. The ICRP provides recommendations and guidance on protection against the risks associated with ionising radiation, from artificial sources widely used in medicine, general industry and nuclear enterprises, and from naturally occurring sources. These reports and recommendations are published approximately four times each year on behalf of the ICRP as the journal *Annals of the ICRP*. Each issue provides in-depth coverage of a specific subject area.

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ICRP is composed of a Main Commission, a Scientific Secretariat, and five standing Committees on: radiation effects, doses from radiation exposure, protection in medicine, the application of ICRP recommendations, and protection of the environment. The Main Commission consists of a Chair and twelve other members. Committees typically comprise 10–15 members.

ICRP uses Working Parties to develop ideas and Task Groups to prepare its reports. A Task Group is usually chaired by an ICRP Committee member and usually contains a number of specialists from outside ICRP. Thus, ICRP is an independent international network of specialists in various fields of radiological protection. At any one time, about two hundred eminent scientists and policy makers are actively involved in the work of ICRP. The Task Groups are assigned the responsibility for drafting documents on various subjects, which are reviewed and finally approved by the Main Commission. These documents are then published as the *Annals of the ICRP*.

## International Commission on Radiological Protection

Scientific Secretary: **C.H. Clement**, *ICRP, Ottawa, Ontario, Canada*; [sci.sec@icrp.org](mailto:sci.sec@icrp.org)

Chair: **Dr. C. Cousins**, *Department of Radiology, Addenbrooke's Hospital, Cambridge, UK*

Vice-Chair: **Dr. A.J. González**, *Argentina Nuclear Regulatory Authority, Buenos Aires, Argentina*

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## Compendium of Dose Coefficients based on ICRP Publication 60

Editor  
C.H. CLEMENT

Authors on behalf of ICRP  
K. Eckerman, J. Harrison, H-G. Menzel, C.H. Clement

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# Compendium of Dose Coefficients based on ICRP Publication 60

## ICRP PUBLICATION 119

Approved by the Commission in October 2011

**Abstract**—This report is a compilation of dose coefficients for intakes of radionuclides by workers and members of the public, and conversion coefficients for use in occupational radiological protection against external radiation from *Publications 68, 72, and 74* (ICRP, 1994b, 1996a,b). It serves as a comprehensive reference for dose coefficients based on the primary radiation protection guidance given in the *Publication 60* recommendations (ICRP, 1991). The coefficients tabulated in this publication will be superseded in due course by values based on the *Publication 103* recommendations (ICRP, 2007).

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*Keywords:* Dose; Conversion; Coefficients

AUTHORS ON BEHALF OF ICRP

K. ECKERMAN, J. HARRISON, H-G. MENZEL, C.H. CLEMENT



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## PREFACE

In addition to the development of a system of radiological protection that is used as the basis for regulations and practices worldwide, the International Commission on Radiological Protection (ICRP) also provides information essential to the implementation of the system. Central to the application of the system is the use of the protection quantities ‘equivalent dose’ and ‘effective dose’. ICRP has provided sets of dose coefficients (dose per unit exposure) to allow users to calculate equivalent and effective doses for intakes of radionuclides or exposure to external radiation for comparison with dose limits, constraints, and reference levels as recommended by ICRP.

Over the years, dose coefficients have been published in various ICRP reports. The present publication compiles coefficients provided previously in *Publications 68, 72, and 74* (ICRP, 1994b, 1996a,b) for intakes of radionuclides by workers and members of the public, and occupational exposures to external sources of radiation. The dose coefficients in this compendium are calculated as specified in the *Publication 60* recommendations (ICRP, 1991).

As this report is published, work is in progress to develop a new set of coefficients calculated in accordance with the *Publication 103* recommendations (ICRP, 2007). However, that effort will require several years to complete. In the meantime, the present publication serves as a comprehensive tabulation of pre-*Publication 103* coefficients.

The membership of the Task Group on Dose Calculations at the time of completion of this report was:

### *Members*

W.E. Bolch (Chair)	V. Berkovski	L. Bertelli	K.F. Eckerman
A. Endo	T. Fell	N.E. Hertel	J.G.S. Hunt
N. Ishigure	D. Nosske	N. Petoussi-Henss	M. Pelliccioni
M. Zankl			

### *Corresponding members*

A. Birchall	G. Gualdrini	D. Jokisch	C. Lee
H. Schlattl	M. Stabin	R. Tanner	X.G. Xu

The membership of the Task Group on Internal Dosimetry at the time of completion of this report was:

### *Members*

F. Paquet (Chair)	E. Ansoborlo	M.R. Bailey	E.J.A. Blanchardon
H. Doerfel	G. Etherington	A. Giussani	R.A. Guilmette
J.D. Harrison	R.W. Leggett	J.L. Lipsztein	D. Melo

*Corresponding members*

A. Bouville	C-M. Castellani	R. Cruz-Suarez	C. Hurtgen
A. Luciani	D. Newton	D. Nosske	D.M. Taylor
D. Whillans			

The membership of Committee 2 at the time of completion of this report was:

H-G. Menzel (Chair)	M.R. Bailey	M. Balonov	D. Bartlett
V. Berkovski	W.E. Bolch	R. Cox	G. Dietze
K.F. Eckerman	A. Endo	J.D. Harrison	N. Ishigure
R.W. Leggett	J.L. Lipsztein	J. Ma	F. Paquet
N. Petoussi-Hens	A.S. Pradhan		

The membership of the ICRP Main Commission approving this publication was:

C. Cousins (Chair)	A.J. González	J. Boice	J. Cooper
J. Lee	J. Lochard	H-G. Menzel	O. Niwa
Z. Pan	R.J. Pentreath	R.J. Preston	N. Shandala
E. Vañó			

## GLOSSARY

### Absorbed dose ( $D$ )

The physical dose quantity given by  $D = \frac{d\bar{\epsilon}}{dm}$  where  $d\bar{\epsilon}$  is the mean energy imparted by ionising radiation to matter in a volume element, and  $dm$  is the mass of matter in this volume element. The SI unit for absorbed dose is joule per kilogram (J/kg) and its special name is gray (Gy).

### Absorption

Movement of material to blood regardless of mechanism. Generally applies to dissociation of particles and uptake into blood of soluble substances and material dissociated from particles.

### Aerodynamic diameter ( $d_{ae}$ )

Diameter ( $\mu\text{m}$ ) of unit density sphere that has same terminal settling velocity in air as the particle of interest.

### Activity median aerodynamic diameter (AMAD)

Fifty percent of the activity in an aerosol is associated with particles of aerodynamic diameter ( $d_{ae}$ ) greater than the AMAD. Applies to an aerosol where its deposition depends upon the inertial impaction and sedimentation, typically when  $\text{AMAD} > 0.5 \mu\text{m}$ .

### Becquerel (Bq)

The name for the SI unit of activity,  $1 \text{ Bq} = 1/\text{s}$ .

### Class SR-1 gases

Soluble and reactive gases and vapours.

### Class SR-2 gases

Highly soluble and reactive gases and vapours.

### Class SR-0 gases

Insoluble and non-reactive gases and vapours.

### Clearance

The removal of material from the respiratory tract by particle transport and absorption into blood.

### Committed effective dose [ $E(\tau)$ ]

The sum of the products of the committed organ or tissue equivalent doses and the appropriate organ or tissue weighting factors ( $w_T$ ), where  $\tau$  is the integration time in years following the intake. The integration time is 50 years for adults and up to age 70 years for children.

**Committed equivalent dose [ $H_T(\tau)$ ]**

The time integral of the equivalent dose rate in organ or tissue  $T$  that will be received by an individual following intake of radioactive material into the body, where  $\tau$  is the integration time in years following the intake. The integration time is 50 years for adults and up to age 70 years for children.

**Deposition**

Refers to the initial processes determining how much of the material in the inspired air remains behind after expiration. Deposition of material may occur during inspiration and expiration.

**Dose coefficient**

Committed tissue equivalent dose per unit acute intake  $h_T(\tau)$  or committed effective dose per unit acute intake  $e(\tau)$ , where  $\tau$  is the time period in years over which the dose is calculated [e.g.  $e(50)$ ].

**Effective dose ( $E$ )**

The sum of the weighted equivalent doses in all tissues and organs of the body, given by the expression  $E = \sum_T w_T H_T$ , where  $H_T$  is the equivalent dose in organ or tissue  $T$ , and  $w_T$  is the weighting factor for tissue  $T$ .

**Equivalent dose ( $H_T$ )**

The equivalent dose,  $H_{T,R}$ , in tissue or organ  $T$  due to radiation  $R$ , is given by  $H_{T,R} = w_R D_{T,R}$  where  $D_{T,R}$  is the average absorbed dose from radiation  $R$  in tissue  $T$  and  $w_R$  is the radiation weighting factor. Since  $w_R$  is dimensionless, the units are the same as for absorbed dose (J/kg) and its special name is sievert (Sv). The total equivalent dose  $H_T$  is the sum of  $H_{T,R}$  over all radiation types:  $H_T = \sum_R H_{T,R}$ .

**Fluence**

Denoted as  $\Phi$ , fluence is the quotient of  $dN$  by  $da$ , where  $dN$  is the number of particles incident on a sphere of cross-sectional area  $da$ , thus  $\Phi = \frac{dN}{da}$ .

**Fractional absorption in the gastrointestinal tract ( $f_1$ )**

The  $f_1$  value is the fraction of an ingested element absorbed directly into body fluids.

**Gray (Gy)**

The special name for the SI unit of absorbed dose,  $1 \text{ Gy} = 1 \text{ J/kg}$ .

**Intake**

Activity that enters the respiratory or gastrointestinal tract from the environment.

**Kerma ( $K$ )**

The quotient of  $dE_{tr}$  by  $dm$ , where  $dE_{tr}$  is the sum of the initial kinetic energies of all the charged ionising particles liberated by uncharged ionising particles in a volume element of mass  $dm$ , thus  $K = \frac{dE_{tr}}{dm}$ . The unit of kerma is joule per kilogram (J/kg) and its special name is gray (Gy).

Physical half life ( $T_{1/2}$ )

The time interval required for an amount of a certain radioactive nuclei to decay to half of its original value. The units of time are second-s, minute-m, hour-h, day-d, and year-y.

Radiation weighting factor ( $w_R$ )

The radiation weighting factor is a dimensionless factor to derive the equivalent dose from the absorbed dose averaged over a tissue or organ, and is based on the quality of the radiation.

Radiation weighting factors*	
Type and energy range	$w_R$
Photons, all energies	1
Electrons and muons, all energies	1
Neutrons, energy <10 keV	5
10 keV–100 keV	10
>100 keV–2 MeV	20
>2 MeV–20 MeV	10
>20 MeV	5
Protons, other than recoil, energy >2 MeV	5
Alpha particles, fission fragments, heavy nuclei	20

\* See Table 1 of *Publication 60* for further details (ICRP, 1991).

Reference Man

A person with anatomical and physiological characteristics defined in reports by ICRP.

Sievert (Sv)

The name for the SI unit of equivalent and effective dose; 1 Sv = 1 J/kg.

Source region ( $S$ )

Region within the body containing the radionuclide. The region may be an organ, a tissue, the contents of the gastrointestinal tract or urinary bladder, or the surfaces of tissues (e.g. in the skeleton and the respiratory tract).

Specific effective energy  $\{[SEE(T \leftarrow S)]_R\}$

The energy, suitably modified for radiation weighting factor, imparted per unit mass of a target tissue  $T$  as a consequence of the emission of a specified radiation  $R$  from a nuclear transformation occurring in source region  $S$ , expressed as J s/Bq kg or Sv/Bq s.

Target tissue ( $T$ )

Tissue or organ in which radiation is absorbed.

### Tissue weighting factor ( $w_T$ )

The factor by which the equivalent dose in a tissue or organ is weighted to represent the relative contributions of that issue or organ to the total detriment resulting from uniform irradiation of the body.

Tissue weighting factors*		
Tissue or organ	$w_T$	$\sum w_T$
Gonads	0.20	0.20
Red marrow, colon, lung, stomach	0.12	0.48
Bladder, breast, liver, oesophagus, thyroid, remainder*	0.05	0.30
Skin, bone surface	0.01	0.02
	Total	1.0

\* See Table 2 of *Publication 60* for further details (ICRP, 1991).

### Type F materials

Deposited materials that are readily absorbed into blood from the respiratory tract (fast rate of absorption).

### Type M materials

Deposited materials that have intermediate rates of absorption into blood from the respiratory tract (moderate rate of absorption).

### Type S materials

Deposited materials that are relatively insoluble in the respiratory tract (slow rate of absorption).

### Type V materials

Deposited materials that, for dosimetric purposes, are assumed to be instantaneously absorbed into body fluids from the respiratory tract; this only applies to certain gases and vapours (very fast absorption).

### Uptake

Activity that enters the body fluids from the respiratory tract, gastrointestinal tract, or through the skin.

## 1. INFORMATION PROVIDED IN THIS PUBLICATION

### 1.1. Dose coefficients for intakes of radionuclides by workers

(1) Committed effective dose coefficients for inhalation and ingestion intakes of radionuclides by workers, as compiled in *Publication 68* (ICRP, 1994b), are reproduced in Annexes A, B, and C of this report. *Publication 68* dose coefficients were calculated using the *Publication 66* (ICRP, 1994a) model of the human respiratory tract and the *Publication 30* (ICRP, 1979) model of the gastrointestinal tract. The biokinetic models used to describe the distribution, tissue retention, and excretion of individual elements and their radioisotopes following their absorption into blood were those developed for the *Publication 30* series (ICRP, 1979, 1980, 1981, 1988), except for cases for which updates were provided in *Publications 56, 67, and 69* (ICRP, 1990, 1992, 1995a). The dosimetric models used were those specified in *Publications 30 and 66* (ICRP, 1979, 1994a). The radiation and tissue weighting factors used were those given in the *Publication 60* recommendations (ICRP, 1991).

(2) Annex A gives committed effective dose coefficients for radionuclides inhaled as particulates or ingested. The coefficients apply to a Reference Worker with an average breathing rate of 1.2 m<sup>3</sup>/h during an 8-h working day (daily air intake of 9.6 m<sup>3</sup>) (ICRP, 1994a). For particulate aerosols, a default activity median aerodynamic diameter (AMAD) of 5 µm was used, but values are also given in Annex A for 1-µm particles. Annex B gives dose coefficients for inhalation of soluble or reactive gases for workers, and Annex C gives effective dose rate coefficients for inert gases that apply to adult members of the public as well as workers.

(3) Annexes D and E tabulate  $f_1$  values and lung clearance types used in the derivation of the dose coefficients given in Annex A. As explained in *Publications 30 and 68* (ICRP, 1979, 1994b), the fractional absorption of an ingested radionuclide from the gastrointestinal tract to blood is specified as an  $f_1$  value. For most elements, a single  $f_1$  value is used for all chemical forms, but in some cases, there is sufficient information to support the use of different  $f_1$  values for compounds of an element exhibiting different solubilities and intestinal absorption (Annex D). As explained in *Publications 66 and 68* (ICRP, 1994a,b), the solubility of particulate materials deposited in the respiratory tract is specified in terms of lung clearance types, with Types 'F', 'M', and 'S' referring to fast, moderate, and slow rates of absorption into blood, respectively. *Publications 66 and 68* also explain the treatment of inhaled gases and vapours, with Classes SR-0, SR-1, and SR-2 depending on solubility and reactivity. Class SR-0 applies to inert gases that are insoluble and non-reactive, for which dose coefficients take account of external irradiation from submersion in the cloud of gas, and internal irradiation from gas within the respiratory tract (Annex C). Class SR-2 applies to highly soluble and reactive gases and vapours, for which there is assumed to be complete and instantaneous absorption of all inhaled activity into blood. Class SR-1 applies to soluble and reactive gases and vapours, for which absorption into blood may account for less than 100% of inhaled activity.

## 1.2. Dose coefficients for intakes of radionuclides by members of the public

(4) Dose coefficients for intakes of radionuclides by 3-month-old infants, 1-, 5-, 10-, and 15-year-old children, and adults, as compiled in *Publication 72* (ICRP, 1996a), are reproduced in Annexes F, G, and H of this report. *Publication 72* dose coefficients were calculated using the *Publication 66* (ICRP, 1994a) model of the human respiratory tract and the *Publication 30* (ICRP, 1979) model of the gastrointestinal tract. The biokinetic models used to describe the distribution, retention, and excretion of radionuclides were developed to consider age dependence in the case of radioisotopes of the 31 elements for which dose coefficients were given in *Publications 56, 67, 69, and 71* (ICRP, 1990, 1992, 1995a,b). *Publication 72* also gave dose coefficients for radioisotopes of an additional 60 elements using biokinetic models developed for the *Publication 30* series (ICRP, 1979, 1980, 1981, 1988) for workers. The dose coefficients for the radioisotopes of these additional elements take account of age-related changes in intestinal absorption ( $f_1$  values), body and organ masses, and excretion rates from the urinary bladder, but not in the biokinetics of organ retention and excretion following absorption into blood. It was stated in *Publication 72* that the use of adult biokinetic parameters in the calculation of dose coefficients for children will tend to overestimate doses because rates of elimination from tissues and excretion are generally greater at younger ages.

(5) Ingestion dose coefficients are given in Annex F, inhalation dose coefficients for intakes of particulate aerosols are given in Annex G, and dose coefficients for inhalation of soluble and reactive gases are given in Annex H. As explained in *Publications 56 and 72* (ICRP, 1990, 1996a), ingestion dose coefficients are calculated using higher  $f_1$  values for 3-month-old infants than older individuals. For most elements, adult values are applied to 1-, 5-, 10-, and 15-year-old children. However, intermediate values are used for children in the cases of calcium, iron, cobalt, strontium, barium, lead, and radium (ICRP, 1990, 1996b). As explained in *Publications 71 and 72* (ICRP, 1995b, 1996a), inhalation dose coefficients are calculated assuming that clearance from the respiratory tract and absorption into blood is independent of age and sex. For particulate aerosols, an AMAD of 1  $\mu\text{m}$  was used. Daily air intake, averaged over a 24-h period, was taken to be 2.9, 5.2, 8.7, 15, 20, and 22  $\text{m}^3$  for the 3-month-old infant, 1-, 5-, 10-, and 15-year-old children, and adult, respectively.

(6) The dose coefficients compiled in *Publications 68 and 72* (ICRP, 1994b, 1996a) have also been made available in electronic form on CD (ICRP, 1996c). In preparing the CD, small errors and methodological discrepancies were identified and rectified, leading to small changes in dose coefficients. The corrected values given on the CD are included in this report, and the changes are detailed in Chapter 2.

## 1.3. Conversion coefficients for external radiation

(7) Conversion coefficients for use in occupational radiological protection against external radiation, abstracted from *Publication 74* (ICRP, 1996b), are given in Annexes I, J, and K. These conversion coefficients were derived assuming whole-body irradiation by mono-energetic photons, electrons, and neutrons in a number of



idealised standard exposure geometries. The following describes the irradiation geometries used, shown schematically in Fig. 1.1.

(8) Antero-posterior geometry – the irradiation geometry in which a mono-energetic parallel beam of ionising radiation is incident on the front of the body in a direction orthogonal to the long axis of the body.

(9) Postero-anterior geometry – the irradiation geometry in which a mono-energetic parallel beam of ionising radiation is incident on the back of the body in a direction orthogonal to the long axis of the body.

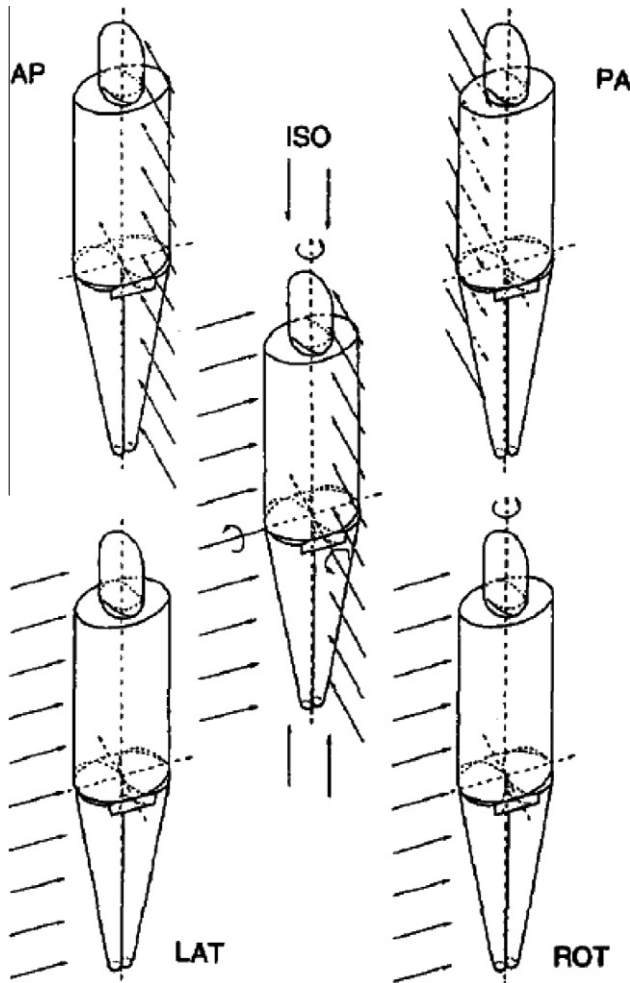


Fig. 1.1. Irradiation geometries of an anthropomorphic phantom. AP, antero-posterior; PA, postero-anterior; LAT, lateral; ROT, rotational; ISO, isotropic.

(10) Lateral geometry – the irradiation geometry in which a mono-energetic parallel beam of ionising radiation is incident from either side of the body in a direction orthogonal to the long axis of the body. When it is necessary to be more specific, right lateral (from the right side to the left side of the body) and left lateral (from the left side to the right side of the body) are used.

(11) Rotational geometry – the geometry in which the body is irradiated by a mono-energetic parallel beam of ionising radiation, from a direction orthogonal to the long axis of the body, which rotates at a uniform rate around the long axis. Alternatively, this geometry may be defined by rotating the body at a uniform rate about its long axis, while irradiating the body by a broad beam of ionising radiation from a stationary source located on an axis at right angles to the long axis of the body.

(12) Isotropic geometry – defined by a radiation field in which the mono-energetic particle fluence per unit of solid angle is independent of direction.

(13) The reader should refer to *Publication 74* (ICRP, 1996b) for additional information on these coefficients.

#### **1.4. Contents of the supplemental Excel file**

(14) A Microsoft Excel workbook accompanies this publication to provide the coefficients in machine-readable form. This file, named 'ICRP\_2011.xls', includes one worksheet for each of the tables in the annexes of this publication. Comma separated variable (CSV) and flat ASCII files are also provided, containing exactly the same data as the Excel workbook but in more flexible formats. Further details regarding these files are given in Annex L.

## 2. DIFFERENCES BETWEEN THIS PUBLICATION AND *PUBLICATIONS 68 AND 72*

(15) During preparation of the ICRP Database of Dose Coefficients: Workers and Members of the Public CD1 (ICRP, 1996c), small errors were discovered in dose coefficients for protactinium-232 and uranium-231 in *Publications 68* and *72* (ICRP, 1994b, 1996a). These errors were addressed in the CD1 database, thus resulting in discrepancies between the database and the publications. For both radionuclides, the differences are less than 30%; the corrected values in the database are included in this report and shown in Tables 2.1 and 2.2.

(16) In the calculation of dose coefficients for members of the public, improved biokinetic modelling was applied to radioactive progeny formed in body organs, as described in *Publication 71* (ICRP, 1995b). The revised methodology was applied consistently in the calculation of coefficients for the CD compilation (ICRP, 1996c), leading to some discrepancies from values given in *Publications 68* and *72* (ICRP, 1994b, 1996a). In most cases, the impact on effective dose coefficients is negligible, but differences of up to 30% were found for thorium-228.

(17) The ICRP Database of Dose Coefficients included dose coefficients for gases and vapour forms in the workplace that were not addressed in *Publication 68* (ICRP, 1994b) but were considered later in *Publication 71* (ICRP, 1996a). Thus, Annex B tabulates dose coefficients for tritiated methane, radiocarbon-labelled methane, ruthenium tetroxide, tellurium vapour, and methyl iodide that do not appear in *Publication 68*.

(18) The nuclear decay data used in the calculations of the dose coefficients of *Publications 68* and *72* (ICRP, 1994b, 1996a) were taken from *Publication 38* (ICRP, 1983). The physical data available during the preparation of *Publication 38* were insufficient to identify the ground and excited state of a few radionuclides. These nuclides were assigned an ad-hoc designation for the CD compilation (ICRP, 1996c) based on their physical half-life. The *Publication 107* (ICRP, 2008) update of *Publication 38* identified ground and excited states for these nuclides. The notation of *Publication 107* is used in the tabulations of this publication as shown in Table 2.3.

Table 2.1. Correction to effective dose coefficients for ingested activity.

Nuclide	Age	$f_1$	Current*	Previous
Th-228	10 y	5.0E-04	1.4E-07	1.5E-07 <sup>†</sup>
Th-228	Worker	5.0E-04	7.2E-08	7.0E-08 <sup>‡</sup>
Pa-232	3 m	0.005	7.2E-09	6.3E-09 <sup>†</sup>
Pa-232	1 y	5.0E-04	4.3E-09	4.2E-09 <sup>†</sup>
Pa-232	5 y	5.0E-04	2.3E-09	2.2E-09 <sup>†</sup>
U-231	15 y	0.02	3.6E-10	3.5E-10 <sup>†</sup>

$f_1$ , fractional absorption in the gastrointestinal tract; m, months; y, years.

\* Values given in CD1 (ICRP, 1996c) and included in Annexes A and F.

<sup>†</sup> Value given in *Publication 72* (ICRP, 1996a).

<sup>‡</sup> Value given in *Publication 68* (ICRP, 1994b).

Table 2.2. Corrections to effective dose coefficients for inhaled activity.

Nuclide	Age	AMAD	Type	Current*	Previous
Th-228	20 y	1	F	3.0E-05	2.9E-05 <sup>†</sup>
Th-228	15 y	1	F	3.5E-05	3.6E-05 <sup>†</sup>
Th-228	Worker	1	M	3.0E-05	3.1E-05 <sup>‡</sup>
Th-228	Worker	5	M	2.2E-05	2.3E-05 <sup>‡</sup>
Th-228	Worker	1	S	3.7E-05	3.9E-05 <sup>‡</sup>
Th-228	Worker	5	S	2.5E-05	3.2E-05 <sup>‡</sup>
U-231	20 y	1	F	6.4E-11	6.2E-11 <sup>†</sup>
U-231	20 y	1	M	4.7E-10	3.8E-10 <sup>†</sup>
U-231	20 y	1	S	5.2E-10	4.0E-10 <sup>†</sup>
U-231	3 m	1	F	1.0E-09	8.9E-10 <sup>†</sup>
U-231	3 m	1	M	2.5E-09	2.4E-09 <sup>†</sup>
U-231	3 m	1	S	2.7E-09	2.6E-09 <sup>†</sup>
U-231	1 y	1	F	6.8E-10	6.2E-10 <sup>†</sup>
U-231	1 y	1	M	2.0E-09	1.7E-09 <sup>†</sup>
U-231	1 y	1	S	2.0E-09	1.9E-09 <sup>†</sup>
U-231	5 y	1	F	3.2E-10	3.1E-10 <sup>†</sup>
U-231	5 y	1	M	1.0E-09	9.4E-10 <sup>†</sup>
U-231	5 y	1	S	1.1E-09	9.0E-10 <sup>†</sup>
U-231	10 y	1	F	1.5E-10	1.4E-10 <sup>†</sup>
U-231	10 y	1	M	6.9E-10	5.5E-10 <sup>†</sup>
U-231	10 y	1	S	7.7E-10	6.1E-10 <sup>†</sup>
U-231	15 y	1	M	5.7E-10	4.6E-10 <sup>†</sup>
U-231	15 y	1	S	6.3E-10	4.9E-10 <sup>†</sup>
U-231	Worker	1	F	6.7E-11	8.3E-11 <sup>‡</sup>
U-231	Worker	5	F	1.6E-10	1.4E-10 <sup>‡</sup>
U-231	Worker	1	M	4.3E-10	3.4E-10 <sup>‡</sup>
U-231	Worker	5	M	4.5E-10	3.7E-10 <sup>‡</sup>
U-231	Worker	1	S	4.8E-10	3.7E-10 <sup>‡</sup>
U-231	Worker	5	S	4.9E-10	4.0E-10 <sup>‡</sup>

\* Values given in CD1 (ICRP, 1996c) and included in Annexes A and G.

<sup>†</sup> Value given in *Publication 72* (ICRP, 1996a).

<sup>‡</sup> Value given in *Publication 68* (ICRP, 1994b).

Table 2.3. Radionuclides for which *Publication 107* (ICRP, 2008) identifies ground and excited states.

CD1 Nuclide*	$T_{1/2}$	<i>Publication 107</i> Nuclide
Nb-89s	66 m	Nb-89m
Nb-89l	122 m	Nb-89
In-110s	69.1 m	In-110m
In-110l	4.9 h	In-110
Sb-120s	15.98 m	Sb-120
Sb-120l	5.76 d	Sb-120m
Sb-124ml	20.2 m	Sb-124n <sup>†</sup>
Sb-128s	10.4 m	Sb-128m
Sb-128l	9.01 h	Sb-128
Eu-150s	12.62 h	Eu-150m
Eu-150l	34.2 y	Eu-150
Tb-156ms	5.0 h	Tb-156n
Tb-156ml	24.4 h	Tb-156m
Ta-178s	9.31 m	Ta-178
Ta-178l	2.2 h	Ta-178m
Re-182s	12.7 h	Re-182m
Re-182l	64.0 h	Re-182
Ir-186s	1.75 h	Ir-186m
Ir-186l	15.8 h	Ir-186
Ir-190ms	1.2 h	Ir-190m
Ir-190ml	3.1 h	Ir-190n
Np-236s	22.5 h	Np-236m
Np-236l	115E3 y	Np-236

\* Ad-hoc notations 's' and 'l' denote short and long physical half-lives employed in CD1 (ICRP, 1996c).

<sup>†</sup> This metastable state is of higher energy than the first metastable state (Sb-124m), and is hence denoted by 'n'.



### 3. ASSESSMENT OF EFFECTIVE DOSE USING DOSE COEFFICIENTS

(19) The protection quantity ‘effective dose’ is the primary dose quantity of ICRP’s system of radiation protection. Effective dose, in a single quantity, characterises the exposure of an individual to both internal and external radiation sources in a manner that is independent of the individual’s body-related parameters, such as sex, age (for adults), anatomy, physiology, race, and other factors. In order to achieve wide applicability, the protection quantities (effective dose and equivalent dose) are defined using mathematical models with broad averaging of body-related parameter values. Specifically, anatomical and physiological parameters of reference individuals, collectively referred to as Reference Man, are given in *Publications 23* and *89* (ICRP, 1975, 2002) which serve as the basis of reference biokinetic models describing the fate of inhaled and ingested radionuclides and as the basis of computational phantoms (Cristy and Eckerman, 1987) used in the calculation of dose coefficients for Reference Worker and members of the public (ICRP, 1994b, 1996c).

(20) Effective dose is not an individual-specific dose quantity, but rather the dose to a Reference Person under the specified exposure conditions. The Reference Person can be either a worker or a member of the public of a specified age.

(21) The model-based protection quantities, equivalent dose and effective dose, are not directly measurable and their values must be assessed using the results of measurements of the related physical quantities in combination with the dose coefficients given in this publication. For internal exposure, the dose can be inferred by measurement of the radionuclides in the air or in the human body and its excretions. In contrast, the operational quantities for exposure to external radiation fields are directly measurable.

#### 3.1. Occupational exposures

(22) For external radiation of the body, it is possible to define a set of operational quantities for specific external exposure geometries which are measurable in terms of the basic physical quantities ‘fluence’ and ‘air kerma free-in-air’. The relationship between the physical and operational quantities is detailed in *Publication 74* (ICRP, 1996b). Workplace and individual monitoring of external exposure by active or passive means is carried out with devices calibrated in terms of the operational quantities. Additional guidance on assessment of occupational exposure due to external sources of radiation is given by IAEA (1999a).

(23) The assessments of internal exposure of workers should be based on:

- prospective exposure parameters, such as the duration of exposure, concentration of radionuclides in the breathing zone, AMAD, and type of materials of radioactive aerosols; and/or
- retrospective parameters based on individual and workplace monitoring programmes, such as the content of radionuclides in the body and excreta, and integrated air concentrations.

(24) *Publication 78* (ICRP, 1997) and IAEA Safety Series 37 (IAEA, 2004) provide general guidance on the design of individual monitoring programmes and the interpretation of results of bioassay monitoring data. The intake (activity of a radionuclide entering the body by inhalation or ingestion) can be assessed from measurements of the retained or excreted activity using information in the ‘special monitoring’ tables in the annex of *Publication 78*. IAEA Safety Series 37 also contains information on the retention and excretion of selected radionuclides. In the case of air sampling, the intake is approximated by the product of the reference breathing rate, the observed air concentration, and the duration of the exposure. The committed effective dose is obtained by multiplying the worker’s activity intake by the tabulated effective dose coefficient for the indicated route of intake, typically inhalation. Additional guidance on assessment of occupational exposure due to intake of radionuclides is given by IAEA (1999b, 2004).

### 3.2. Public exposures

(25) The assessment of public exposure is typically based on so-called ‘source terms’ that list the radionuclides and their activity discharged from a nuclear facility through monitored release points, information on direct radiation from the facility, observed content of radionuclides in monitored environmental media (foodstuffs, drinking water, etc.), and information on habit data with regard to use of environmental media (exposure scenarios). To derive the annual committed effective dose, the dose coefficients given in this publication should be applied to the annual integrated airborne concentration of the radionuclide, or to the annual intake by inhalation and ingestion of environmental media.

(26) The individual monitoring of members of the public may be used in assessment of public exposure in emergency situations. In such situations, the interpretation of results of individual monitoring should be similar to the procedures described for workers, although dose coefficients for members of the public would be used.

(27) *Publication 101* (ICRP, 2006) provides further guidance on estimating dose to the representative person for public exposures. Detailed approaches to the formulation of monitoring programmes and the assessment of public exposure in planned, existing, and emergency exposure situations are provided by IAEA (2010).

## APPENDIX A. SUPPLEMENTARY MATERIAL

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.ympcv.2012.04.018>.



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## ANNEX A. EFFECTIVE DOSE COEFFICIENTS FOR INGESTED AND INHALED PARTICULATES FOR WORKERS

Table A.1. Effective dose coefficients ( $e$ ) for ingested and inhaled particulates (activity median aerodynamic diameters of 1 and 5  $\mu\text{m}$ ) for workers.

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
<b>Hydrogen</b>							
H-3	12.35 y	See Table B.1 for inhalation dose coefficients				1.0	4.2E-11
						1.0	1.8E-11
<b>Beryllium</b>							
Be-7	53.3 d	M	0.005	4.8E-11	4.3E-11	0.005	2.8E-11
		S	0.005	5.2E-11	4.6E-11		
Be-10	1.6E6 y	M	0.005	9.1E-09	6.7E-09	0.005	1.1E-09
		S	0.005	3.2E-08	1.9E-08		
<b>Carbon</b>							
C-11	20.38 m	See Table B.1 for inhalation dose coefficients				1.0	2.4E-11
C-14	5730 y	See Table B.1 for inhalation dose coefficients				1.0	5.8E-10
<b>Fluorine</b>							
F-18	109.77 m	F	1.0	3.0E-11	5.4E-11	1.0	4.9E-11
		M	1.0	5.7E-11	8.9E-11		
		S	1.0	6.0E-11	9.3E-11		
<b>Sodium</b>							
Na-22	2.602 y	F	1.0	1.3E-09	2.0E-09	1.0	3.2E-09
Na-24	15.00 h	F	1.0	2.9E-10	5.3E-10	1.0	4.3E-10
<b>Magnesium</b>							
Mg-28	20.91 h	F	0.5	6.4E-10	1.1E-09	0.5	2.2E-09
		M	0.5	1.2E-09	1.7E-09		
<b>Aluminium</b>							
Al-26	7.16E5 y	F	0.01	1.1E-08	1.4E-08	0.01	3.5E-09
		M	0.01	1.8E-08	1.2E-08		
<b>Silicon</b>							
Si-31	157.3 m	F	0.01	2.9E-11	5.1E-11	0.01	1.6E-10
		M	0.01	7.5E-11	1.1E-10		
		S	0.01	8.0E-11	1.1E-10		
Si-32	450 y	F	0.01	3.2E-09	3.7E-09	0.01	5.6E-10
		M	0.01	1.5E-08	9.6E-09		
		S	0.01	1.1E-07	5.5E-08		
<b>Phosphorus</b>							
P-32	14.29 d	F	0.8	8.0E-10	1.1E-09	0.8	2.4E-09
		M	0.8	3.2E-09	2.9E-09		

*(continued on next page)*

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
P-33	25.4 d	F	0.8	9.6E-11	1.4E-10	0.8	2.4E-10
		M	0.8	1.4E-09	1.3E-09		
<b>Sulphur</b>							
S-35	87.44 d	F	0.8	5.3E-11	8.0E-11	0.8*	1.4E-10
		M	0.8	1.3E-09	1.1E-09	0.1*	1.9E-10
		See Table B.1 for inhalation of organic sulphur					1.0 <sup>†</sup>
<b>Chlorine</b>							
Cl-36	3.01E5 y	F	1.0	3.4E-10	4.9E-10	1.0	9.3E-10
		M	1.0	6.9E-09	5.1E-09		
Cl-38	37.21 m	F	1.0	2.7E-11	4.6E-11	1.0	1.2E-10
		M	1.0	4.7E-11	7.3E-11		
Cl-39	55.6 m	F	1.0	2.7E-11	4.8E-11	1.0	8.5E-11
		M	1.0	4.8E-11	7.6E-11		
<b>Potassium</b>							
K-40	1.28E9 y	F	1.0	2.1E-09	3.0E-09	1.0	6.2E-09
K-42	12.36 h	F	1.0	1.3E-10	2.0E-10	1.0	4.3E-10
K-43	22.6 h	F	1.0	1.5E-10	2.6E-10	1.0	2.5E-10
K-44	22.13 m	F	1.0	2.1E-11	3.7E-11	1.0	8.4E-11
K-45	20 m	F	1.0	1.6E-11	2.8E-11	1.0	5.4E-11
<b>Calcium</b>							
Ca-41	1.4E5 y	M	0.3	1.7E-10	1.9E-10	0.3	2.9E-10
Ca-45	163 d	M	0.3	2.7E-09	2.3E-09	0.3	7.6E-10
Ca-47	4.53 d	M	0.3	1.8E-09	2.1E-09	0.3	1.6E-09
<b>Scandium</b>							
Sc-43	3.891 h	S	0.0001	1.2E-10	1.8E-10	0.0001	1.9E-10
Sc-44	3.927 h	S	0.0001	1.9E-10	3.0E-10	0.0001	3.5E-10
Sc-44m	58.6 h	S	0.0001	1.5E-09	2.0E-09	0.0001	2.4E-09
Sc-46	83.83 d	S	0.0001	6.4E-09	4.8E-09	0.0001	1.5E-09
Sc-47	3.351 d	S	0.0001	7.0E-10	7.3E-10	0.0001	5.4E-10
Sc-48	43.7 h	S	0.0001	1.1E-09	1.6E-09	0.0001	1.7E-09
Sc-49	57.4 m	S	0.0001	4.1E-11	6.1E-11	0.0001	8.2E-11
<b>Titanium</b>							
Ti-44	47.3 y	F	0.01	6.1E-08	7.2E-08	0.01	5.8E-09
		M	0.01	4.0E-08	2.7E-08		
		S	0.01	1.2E-07	6.2E-08		
Ti-45	3.08 h	F	0.01	4.6E-11	8.3E-11	0.01	1.5E-10
		M	0.01	9.1E-11	1.4E-10		
		S	0.01	9.6E-11	1.5E-10		
<b>Vanadium</b>							
V-47	32.6 m	F	0.01	1.9E-11	3.2E-11	0.01	6.3E-11
		M	0.01	3.1E-11	5.0E-11		

\* Inorganic sulphur.

† Organic sulphur.

Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_i$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_i$	$e$ (Sv/Bq)
V-48	16.238 d	F	0.01	1.1E-09	1.7E-09	0.01	2.0E-09
		M	0.01	2.3E-09	2.7E-09		
V-49	330 d	F	0.01	2.1E-11	2.6E-11	0.01	1.8E-11
		M	0.01	3.2E-11	2.3E-11		
<b>Chromium</b>							
Cr-48	22.96 h	F	0.1	1.0E-10	1.7E-10	0.1	2.0E-10
		M	0.1	2.0E-10	2.3E-10		
		S	0.1	2.2E-10	2.5E-10		
Cr-49	42.09 m	F	0.1	2.0E-11	3.5E-11	0.1	6.1E-11
		M	0.1	3.5E-11	5.6E-11		
		S	0.1	3.7E-11	5.9E-11		
Cr-51	27.704 d	F	0.1	2.1E-11	3.0E-11	0.1	3.8E-11
		M	0.1	3.1E-11	3.4E-11		
		S	0.1	3.6E-11	3.6E-11		
<b>Manganese</b>							
Mn-51	46.2 m	F	0.1	2.4E-11	4.2E-11	0.1	9.3E-11
		M	0.1	4.3E-11	6.8E-11		
Mn-52	5.591 d	F	0.1	9.9E-10	1.6E-09	0.1	1.8E-09
		M	0.1	1.4E-09	1.8E-09		
Mn-52m	21.1 m	F	0.1	2.0E-11	3.5E-11	0.1	6.9E-11
		M	0.1	3.0E-11	5.0E-11		
Mn-53	3.7E6 y	F	0.1	2.9E-11	3.6E-11	0.1	3.0E-11
		M	0.1	5.2E-11	3.6E-11		
Mn-54	312.5 d	F	0.1	8.7E-10	1.1E-09	0.1	7.1E-10
		M	0.1	1.5E-09	1.2E-09		
Mn-56	2.5785 h	F	0.1	6.9E-11	1.2E-10	0.1	2.5E-10
		M	0.1	1.3E-10	2.0E-10		
<b>Iron</b>							
Fe-52	8.275 h	F	0.1	4.1E-10	6.9E-10	0.1	1.4E-09
		M	0.1	6.3E-10	9.5E-10		
Fe-55	2.7 y	F	0.1	7.7E-10	9.2E-10	0.1	3.3E-10
		M	0.1	3.7E-10	3.3E-10		
Fe-59	44.529 d	F	0.1	2.2E-09	3.0E-09	0.1	1.8E-09
		M	0.1	3.5E-09	3.2E-09		
Fe-60	1E5 y	F	0.1	2.8E-07	3.3E-07	0.1	1.1E-07
		M	0.1	1.3E-07	1.2E-07		
<b>Cobalt</b>							
Co-55	17.54 h	M	0.1	5.1E-10	7.8E-10	0.1	1.0E-09
		S	0.05	5.5E-10	8.3E-10		
Co-56	78.76 d	M	0.1	4.6E-09	4.0E-09	0.1	2.5E-09
		S	0.05	6.3E-09	4.9E-09		
Co-57	270.9 d	M	0.1	5.2E-10	3.9E-10	0.1	2.1E-10
		S	0.05	9.4E-10	6.0E-10		
Co-58	70.80 d	M	0.1	1.5E-09	1.4E-09	0.1	7.4E-10
		S	0.05	2.0E-09	1.7E-09		

(continued on next page)

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Co-58m	9.15 h	M	0.1	1.3E-11	1.5E-11	0.1	2.4E-11
		S	0.05	1.6E-11	1.7E-11	0.05	2.4E-11
Co-60	5.271 y	M	0.1	9.6E-09	7.1E-09	0.1	3.4E-09
		S	0.05	2.9E-08	1.7E-08	0.05	2.5E-09
Co-60m	10.47 m	M	0.1	1.1E-12	1.2E-12	0.1	1.7E-12
		S	0.05	1.3E-12	1.2E-12	0.05	1.7E-12
Co-61	1.65 h	M	0.1	4.8E-11	7.1E-11	0.1	7.4E-11
		S	0.05	5.1E-11	7.5E-11	0.05	7.4E-11
Co-62m	13.91 m	M	0.1	2.1E-11	3.6E-11	0.1	4.7E-11
		S	0.05	2.2E-11	3.7E-11	0.05	4.7E-11
<b>Nickel</b>							
Ni-56	6.10 d	F	0.05	5.1E-10	7.9E-10	0.05	8.6E-10
		M	0.05	8.6E-10	9.6E-10		
Ni-57	36.08 h	F	0.05	2.8E-10	5.0E-10	0.05	8.7E-10
		M	0.05	5.1E-10	7.6E-10		
Ni-59	7.5E4 y	F	0.05	1.8E-10	2.2E-10	0.05	6.3E-11
		M	0.05	1.3E-10	9.4E-11		
Ni-63	96 y	F	0.05	4.4E-10	5.2E-10	0.05	1.5E-10
		M	0.05	4.4E-10	3.1E-10		
Ni-65	2.520 h	F	0.05	4.4E-11	7.5E-11	0.05	1.8E-10
		M	0.05	8.7E-11	1.3E-10		
Ni-66	54.6 h	F	0.05	4.5E-10	7.6E-10	0.05	3.0E-09
		M	0.05	1.6E-09	1.9E-09		
<b>Copper</b>							
Cu-60	23.2 m	F	0.5	2.4E-11	4.4E-11	0.5	7.0E-11
		M	0.5	3.5E-11	6.0E-11		
		S	0.5	3.6E-11	6.2E-11		
Cu-61	3.408 h	F	0.5	4.0E-11	7.3E-11	0.5	1.2E-10
		M	0.5	7.6E-11	1.2E-10		
Cu-64	12.701 h	S	0.5	8.0E-11	1.2E-10		
		F	0.5	3.8E-11	6.8E-11	0.5	1.2E-10
		M	0.5	1.1E-10	1.5E-10		
Cu-67	61.86 h	S	0.5	1.2E-10	1.5E-10		
		F	0.5	1.1E-10	1.8E-10	0.5	3.4E-10
		M	0.5	5.2E-10	5.3E-10		
Cu-67	61.86 h	S	0.5	5.8E-10	5.8E-10		
<b>Zinc</b>							
Zn-62	9.26 h	S	0.5	4.7E-10	6.6E-10	0.5	9.4E-10
Zn-63	38.1 m	S	0.5	3.8E-11	6.1E-11	0.5	7.9E-11
Zn-65	243.9 d	S	0.5	2.9E-09	2.8E-09	0.5	3.9E-09
Zn-69	57 m	S	0.5	2.8E-11	4.3E-11	0.5	3.1E-11
Zn-69m	13.76 h	S	0.5	2.6E-10	3.3E-10	0.5	3.3E-10
Zn-71m	3.92 h	S	0.5	1.6E-10	2.4E-10	0.5	2.4E-10
Zn-72	46.5 h	S	0.5	1.2E-09	1.5E-09	0.5	1.4E-09

Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	T <sub>½</sub>	Inhalation				Ingestion	
		Type	f <sub>i</sub>	e (Sv/Bq) (1 µm)	e (Sv/Bq) (5 µm)	f <sub>i</sub>	e (Sv/Bq)
<b>Gallium</b>							
Ga-65	15.2 m	F	0.001	1.2E-11	2.0E-11	0.001	3.7E-11
		M	0.001	1.8E-11	2.9E-11		
Ga-66	9.40 h	F	0.001	2.7E-10	4.7E-10	0.001	1.2E-09
		M	0.001	4.6E-10	7.1E-10		
Ga-67	78.26 h	F	0.001	6.8E-11	1.1E-10	0.001	1.9E-10
		M	0.001	2.3E-10	2.8E-10		
Ga-68	68.0 m	F	0.001	2.8E-11	4.9E-11	0.001	1.0E-10
		M	0.001	5.1E-11	8.1E-11		
Ga-70	21.15 m	F	0.001	9.3E-12	1.6E-11	0.001	3.1E-11
		M	0.001	1.6E-11	2.6E-11		
Ga-72	14.1 h	F	0.001	3.1E-10	5.6E-10	0.001	1.1E-09
		M	0.001	5.5E-10	8.4E-10		
Ga-73	4.91 h	F	0.001	5.8E-11	1.0E-10	0.001	2.6E-10
		M	0.001	1.5E-10	2.0E-10		
<b>Germanium</b>							
Ge-66	2.27 h	F	1.0	5.7E-11	9.9E-11	1.0	1.0E-10
		M	1.0	9.2E-11	1.3E-10		
Ge-67	18.7 m	F	1.0	1.6E-11	2.8E-11	1.0	6.5E-11
		M	1.0	2.6E-11	4.2E-11		
Ge-68	288 d	F	1.0	5.4E-10	8.3E-10	1.0	1.3E-09
		M	1.0	1.3E-08	7.9E-09		
Ge-69	39.05 h	F	1.0	1.4E-10	2.5E-10	1.0	2.4E-10
		M	1.0	2.9E-10	3.7E-10		
Ge-71	11.8 d	F	1.0	5.0E-12	7.8E-12	1.0	1.2E-11
		M	1.0	1.0E-11	1.1E-11		
Ge-75	82.78 m	F	1.0	1.6E-11	2.7E-11	1.0	4.6E-11
		M	1.0	3.7E-11	5.4E-11		
Ge-77	11.30 h	F	1.0	1.5E-10	2.5E-10	1.0	3.3E-10
		M	1.0	3.6E-10	4.5E-10		
Ge-78	87 m	F	1.0	4.8E-11	8.1E-11	1.0	1.2E-10
		M	1.0	9.7E-11	1.4E-10		
<b>Arsenic</b>							
As-69	15.2 m	M	0.5	2.2E-11	3.5E-11	0.5	5.7E-11
As-70	52.6 m	M	0.5	7.2E-11	1.2E-10	0.5	1.3E-10
As-71	64.8 h	M	0.5	4.0E-10	5.0E-10	0.5	4.6E-10
As-72	26.0 h	M	0.5	9.2E-10	1.3E-09	0.5	1.8E-09
As-73	80.30 d	M	0.5	9.3E-10	6.5E-10	0.5	2.6E-10
As-74	17.76 d	M	0.5	2.1E-09	1.8E-09	0.5	1.3E-09
As-76	26.32 h	M	0.5	7.4E-10	9.2E-10	0.5	1.6E-09
As-77	38.8 h	M	0.5	3.8E-10	4.2E-10	0.5	4.0E-10
As-78	90.7 m	M	0.5	9.2E-11	1.4E-10	0.5	2.1E-10
<b>Selenium</b>							
Se-70	41.0 m	F	0.8	4.5E-11	8.2E-11	0.8	1.2E-10
		M	0.8	7.3E-11	1.2E-10	0.05	1.4E-10

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Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Se-73	7.15 h	F	0.8	8.6E-11	1.5E-10	0.8	2.1E-10
		M	0.8	1.6E-10	2.4E-10	0.05	3.9E-10
Se-73m	39 m	F	0.8	9.9E-12	1.7E-11	0.8	2.8E-11
		M	0.8	1.8E-11	2.7E-11	0.05	4.1E-11
Se-75	119.8 d	F	0.8	1.0E-09	1.4E-09	0.8	2.6E-09
		M	0.8	1.4E-09	1.7E-09	0.05	4.1E-10
Se-79	65000 y	F	0.8	1.2E-09	1.6E-09	0.8	2.9E-09
		M	0.8	2.9E-09	3.1E-09	0.05	3.9E-10
Se-81	18.5 m	F	0.8	8.6E-12	1.4E-11	0.8	2.7E-11
		M	0.8	1.5E-11	2.4E-11	0.05	2.7E-11
Se-81m	57.25 m	F	0.8	1.7E-11	3.0E-11	0.8	5.3E-11
		M	0.8	4.7E-11	6.8E-11	0.05	5.9E-11
Se-83	22.5 m	F	0.8	1.9E-11	3.4E-11	0.8	4.7E-11
		M	0.8	3.3E-11	5.3E-11	0.05	5.1E-11
<b>Bromine</b>							
Br-74	25.3 m	F	1.0	2.8E-11	5.0E-11	1.0	8.4E-11
		M	1.0	4.1E-11	6.8E-11		
Br-74m	41.5 m	F	1.0	4.2E-11	7.5E-11	1.0	1.4E-10
		M	1.0	6.5E-11	1.1E-10		
Br-75	98 m	F	1.0	3.1E-11	5.6E-11	1.0	7.9E-11
		M	1.0	5.5E-11	8.5E-11		
Br-76	16.2 h	F	1.0	2.6E-10	4.5E-10	1.0	4.6E-10
		M	1.0	4.2E-10	5.8E-10		
Br-77	56 h	F	1.0	6.7E-11	1.2E-10	1.0	9.6E-11
		M	1.0	8.7E-11	1.3E-10		
Br-80	17.4 m	F	1.0	6.3E-12	1.1E-11	1.0	3.1E-11
		M	1.0	1.0E-11	1.7E-11		
Br-80m	4.42 h	F	1.0	3.5E-11	5.8E-11	1.0	1.1E-10
		M	1.0	7.6E-11	1.0E-10		
Br-82	35.30 h	F	1.0	3.7E-10	6.4E-10	1.0	5.4E-10
		M	1.0	6.4E-10	8.8E-10		
Br-83	2.39 h	F	1.0	1.7E-11	2.9E-11	1.0	4.3E-11
		M	1.0	4.8E-11	6.7E-11		
Br-84	31.80 m	F	1.0	2.3E-11	4.0E-11	1.0	8.8E-11
		M	1.0	3.9E-11	6.2E-11		
<b>Rubidium</b>							
Rb-79	22.9 m	F	1.0	1.7E-11	3.0E-11	1.0	5.0E-11
Rb-81	4.58 h	F	1.0	3.7E-11	6.8E-11	1.0	5.4E-11
Rb-81m	32 m	F	1.0	7.3E-12	1.3E-11	1.0	9.7E-12
Rb-82m	6.2 h	F	1.0	1.2E-10	2.2E-10	1.0	1.3E-10
Rb-83	86.2 d	F	1.0	7.1E-10	1.0E-09	1.0	1.9E-09
Rb-84	32.77 d	F	1.0	1.1E-09	1.5E-09	1.0	2.8E-09
Rb-86	18.66 d	F	1.0	9.6E-10	1.3E-09	1.0	2.8E-09
Rb-87	4.7E10 y	F	1.0	5.1E-10	7.6E-10	1.0	1.5E-09
Rb-88	17.8 m	F	1.0	1.7E-11	2.8E-11	1.0	9.0E-11



Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	T <sub>1/2</sub>	Inhalation				Ingestion	
		Type	f <sub>i</sub>	e (Sv/Bq) (1 μm)	e (Sv/Bq) (5 μm)	f <sub>i</sub>	e (Sv/Bq)
Rb-89	15.2 m	F	1.0	1.4E-11	2.5E-11	1.0	4.7E-11
<b>Strontium</b>							
Sr-80	100 m	F	0.3	7.6E-11	1.3E-10	0.3	3.4E-10
		S	0.01	1.4E-10	2.1E-10	0.01	3.5E-10
Sr-81	25.5 m	F	0.3	2.2E-11	3.9E-11	0.3	7.7E-11
		S	0.01	3.8E-11	6.1E-11	0.01	7.8E-11
Sr-82	25.0 d	F	0.3	2.2E-09	3.3E-09	0.3	6.1E-09
		S	0.01	1.0E-08	7.7E-09	0.01	6.0E-09
Sr-83	32.4 h	F	0.3	1.7E-10	3.0E-10	0.3	4.9E-10
		S	0.01	3.4E-10	4.9E-10	0.01	5.8E-10
Sr-85	64.84 d	F	0.3	3.9E-10	5.6E-10	0.3	5.6E-10
		S	0.01	7.7E-10	6.4E-10	0.01	3.3E-10
Sr-85m	69.5 m	F	0.3	3.1E-12	5.6E-12	0.3	6.1E-12
		S	0.01	4.5E-12	7.4E-12	0.01	6.1E-12
Sr-87m	2.805 h	F	0.3	1.2E-11	2.2E-11	0.3	3.0E-11
		S	0.01	2.2E-11	3.5E-11	0.01	3.3E-11
Sr-89	50.5 d	F	0.3	1.0E-09	1.4E-09	0.3	2.6E-09
		S	0.01	7.5E-09	5.6E-09	0.01	2.3E-09
Sr-90	29.12 y	F	0.3	2.4E-08	3.0E-08	0.3	2.8E-08
		S	0.01	1.5E-07	7.7E-08	0.01	2.7E-09
Sr-91	9.5 h	F	0.3	1.7E-10	2.9E-10	0.3	6.5E-10
		S	0.01	4.1E-10	5.7E-10	0.01	7.6E-10
Sr-92	2.71 h	F	0.3	1.1E-10	1.8E-10	0.3	4.3E-10
		S	0.01	2.3E-10	3.4E-10	0.01	4.9E-10
<b>Yttrium</b>							
Y-86	14.74 h	M	0.0001	4.8E-10	8.0E-10	0.0001	9.6E-10
		S	0.0001	4.9E-10	8.1E-10		
Y-86m	48 m	M	0.0001	2.9E-11	4.8E-11	0.0001	5.6E-11
		S	0.0001	3.0E-11	4.9E-11		
Y-87	80.3 h	M	0.0001	3.8E-10	5.2E-10	0.0001	5.5E-10
		S	0.0001	4.0E-10	5.3E-10		
Y-88	106.64 d	M	0.0001	3.9E-09	3.3E-09	0.0001	1.3E-09
		S	0.0001	4.1E-09	3.0E-09		
Y-90	64.0 h	M	0.0001	1.4E-09	1.6E-09	0.0001	2.7E-09
		S	0.0001	1.5E-09	1.7E-09		
Y-90m	3.19 h	M	0.0001	9.6E-11	1.3E-10	0.0001	1.7E-10
		S	0.0001	1.0E-10	1.3E-10		
Y-91	58.51 d	M	0.0001	6.7E-09	5.2E-09	0.0001	2.4E-09
		S	0.0001	8.4E-09	6.1E-09		
Y-91m	49.71 m	M	0.0001	1.0E-11	1.4E-11	0.0001	1.1E-11
		S	0.0001	1.1E-11	1.5E-11		
Y-92	3.54 h	M	0.0001	1.9E-10	2.7E-10	0.0001	4.9E-10
		S	0.0001	2.0E-10	2.8E-10		
Y-93	10.1 h	M	0.0001	4.1E-10	5.7E-10	0.0001	1.2E-09
		S	0.0001	4.3E-10	6.0E-10		

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Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) ( $1\ \mu\text{m}$ )	$e$ (Sv/Bq) ( $5\ \mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Y-94	19.1 m	M	0.0001	$2.8\text{E}-11$	$4.4\text{E}-11$	0.0001	$8.1\text{E}-11$
		S	0.0001	$2.9\text{E}-11$	$4.6\text{E}-11$		
Y-95	10.7 m	M	0.0001	$1.6\text{E}-11$	$2.5\text{E}-11$	0.0001	$4.6\text{E}-11$
		S	0.0001	$1.7\text{E}-11$	$2.6\text{E}-11$		
<b>Zirconium</b>							
Zr-86	16.5 h	F	0.002	$3.0\text{E}-10$	$5.2\text{E}-10$	0.002	$8.6\text{E}-10$
		M	0.002	$4.3\text{E}-10$	$6.8\text{E}-10$		
		S	0.002	$4.5\text{E}-10$	$7.0\text{E}-10$		
Zr-88	83.4 d	F	0.002	$3.5\text{E}-09$	$4.1\text{E}-09$	0.002	$3.3\text{E}-10$
		M	0.002	$2.5\text{E}-09$	$1.7\text{E}-09$		
		S	0.002	$3.3\text{E}-09$	$1.8\text{E}-09$		
Zr-89	78.43 h	F	0.002	$3.1\text{E}-10$	$5.2\text{E}-10$	0.002	$7.9\text{E}-10$
		M	0.002	$5.3\text{E}-10$	$7.2\text{E}-10$		
		S	0.002	$5.5\text{E}-10$	$7.5\text{E}-10$		
Zr-93	1.53E6 y	F	0.002	$2.5\text{E}-08$	$2.9\text{E}-08$	0.002	$2.8\text{E}-10$
		M	0.002	$9.6\text{E}-09$	$6.6\text{E}-09$		
		S	0.002	$3.1\text{E}-09$	$1.7\text{E}-09$		
Zr-95	63.98 d	F	0.002	$2.5\text{E}-09$	$3.0\text{E}-09$	0.002	$8.8\text{E}-10$
		M	0.002	$4.5\text{E}-09$	$3.6\text{E}-09$		
		S	0.002	$5.5\text{E}-09$	$4.2\text{E}-09$		
Zr-97	16.90 h	F	0.002	$4.2\text{E}-10$	$7.4\text{E}-10$	0.002	$2.1\text{E}-09$
		M	0.002	$9.4\text{E}-10$	$1.3\text{E}-09$		
		S	0.002	$1.0\text{E}-09$	$1.4\text{E}-09$		
<b>Niobium</b>							
Nb-88	14.3 m	M	0.01	$2.9\text{E}-11$	$4.8\text{E}-11$	0.01	$6.3\text{E}-11$
		S	0.01	$3.0\text{E}-11$	$5.0\text{E}-11$		
Nb-89	122 m	M	0.01	$1.2\text{E}-10$	$1.8\text{E}-10$	0.01	$3.0\text{E}-10$
		S	0.01	$1.3\text{E}-10$	$1.9\text{E}-10$		
Nb-89m	66 m	M	0.01	$7.1\text{E}-11$	$1.1\text{E}-10$	0.01	$1.4\text{E}-10$
		S	0.01	$7.4\text{E}-11$	$1.2\text{E}-10$		
Nb-90	14.60 h	M	0.01	$6.6\text{E}-10$	$1.0\text{E}-09$	0.01	$1.2\text{E}-09$
		S	0.01	$6.9\text{E}-10$	$1.1\text{E}-09$		
Nb-93m	13.6 y	M	0.01	$4.6\text{E}-10$	$2.9\text{E}-10$	0.01	$1.2\text{E}-10$
		S	0.01	$1.6\text{E}-09$	$8.6\text{E}-10$		
Nb-94	2.03E4 y	M	0.01	$1.0\text{E}-08$	$7.2\text{E}-09$	0.01	$1.7\text{E}-09$
		S	0.01	$4.5\text{E}-08$	$2.5\text{E}-08$		
Nb-95	35.15 d	M	0.01	$1.4\text{E}-09$	$1.3\text{E}-09$	0.01	$5.8\text{E}-10$
		S	0.01	$1.6\text{E}-09$	$1.3\text{E}-09$		
Nb-95m	86.6 h	M	0.01	$7.6\text{E}-10$	$7.7\text{E}-10$	0.01	$5.6\text{E}-10$
		S	0.01	$8.5\text{E}-10$	$8.5\text{E}-10$		
Nb-96	23.35 h	M	0.01	$6.5\text{E}-10$	$9.7\text{E}-10$	0.01	$1.1\text{E}-09$
		S	0.01	$6.8\text{E}-10$	$1.0\text{E}-09$		
Nb-97	72.1 m	M	0.01	$4.4\text{E}-11$	$6.9\text{E}-11$	0.01	$6.8\text{E}-11$
		S	0.01	$4.7\text{E}-11$	$7.2\text{E}-11$		
Nb-98	51.5 m	M	0.01	$5.9\text{E}-11$	$9.6\text{E}-11$	0.01	$1.1\text{E}-10$
		S	0.01	$6.1\text{E}-11$	$9.9\text{E}-11$		

Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	T <sub>1/2</sub>	Inhalation				Ingestion	
		Type	f <sub>1</sub>	e (Sv/Bq) (1 µm)	e (Sv/Bq) (5 µm)	f <sub>1</sub>	e (Sv/Bq)
<b>Molybdenum</b>							
Mo-90	5.67 h	F	0.8	1.7E-10	2.9E-10	0.8	3.1E-10
		S	0.05	3.7E-10	5.6E-10	0.05	6.2E-10
Mo-93	3.5E3 y	F	0.8	1.0E-09	1.4E-09	0.8	2.6E-09
		S	0.05	2.2E-09	1.2E-09	0.05	2.0E-10
Mo-93m	6.85 h	F	0.8	1.0E-10	1.9E-10	0.8	1.6E-10
		S	0.05	1.8E-10	3.0E-10	0.05	2.8E-10
Mo-99	66.0 h	F	0.8	2.3E-10	3.6E-10	0.8	7.4E-10
		S	0.05	9.7E-10	1.1E-09	0.05	1.2E-09
Mo-101	14.62 m	F	0.8	1.5E-11	2.7E-11	0.8	4.2E-11
		S	0.05	2.7E-11	4.5E-11	0.05	4.2E-11
<b>Technetium</b>							
Tc-93	2.75 h	F	0.8	3.4E-11	6.2E-11	0.8	4.9E-11
		M	0.8	3.6E-11	6.5E-11		
Tc-93m	43.5 m	F	0.8	1.5E-11	2.6E-11	0.8	2.4E-11
		M	0.8	1.7E-11	3.1E-11		
Tc-94	293 m	F	0.8	1.2E-10	2.1E-10	0.8	1.8E-10
		M	0.8	1.3E-10	2.2E-10		
Tc-94m	52 m	F	0.8	4.3E-11	6.9E-11	0.8	1.1E-10
		M	0.8	4.9E-11	8.0E-11		
Tc-95	20.0 h	F	0.8	1.0E-10	1.8E-10	0.8	1.6E-10
		M	0.8	1.0E-10	1.8E-10		
Tc-95m	61 d	F	0.8	3.1E-10	4.8E-10	0.8	6.2E-10
		M	0.8	8.7E-10	8.6E-10		
Tc-96	4.28 d	F	0.8	6.0E-10	9.8E-10	0.8	1.1E-09
		M	0.8	7.1E-10	1.0E-09		
Tc-96m	51.5 m	F	0.8	6.5E-12	1.1E-11	0.8	1.3E-11
		M	0.8	7.7E-12	1.1E-11		
Tc-97	2.6E6 y	F	0.8	4.5E-11	7.2E-11	0.8	8.3E-11
		M	0.8	2.1E-10	1.6E-10		
Tc-97m	87 d	F	0.8	2.8E-10	4.0E-10	0.8	6.6E-10
		M	0.8	3.1E-09	2.7E-09		
Tc-98	4.2E6 y	F	0.8	1.0E-09	1.5E-09	0.8	2.3E-09
		M	0.8	8.1E-09	6.1E-09		
Tc-99	2.13E5 y	F	0.8	2.9E-10	4.0E-10	0.8	7.8E-10
		M	0.8	3.9E-09	3.2E-09		
Tc-99m	6.02 h	F	0.8	1.2E-11	2.0E-11	0.8	2.2E-11
		M	0.8	1.9E-11	2.9E-11		
Tc-101	14.2 m	F	0.8	8.7E-12	1.5E-11	0.8	1.9E-11
		M	0.8	1.3E-11	2.1E-11		
Tc-104	18.2 m	F	0.8	2.4E-11	3.9E-11	0.8	8.1E-11
		M	0.8	3.0E-11	4.8E-11		
<b>Ruthenium</b>							
Ru-94	51.8 m	F	0.05	2.7E-11	4.9E-11	0.05	9.4E-11
		M	0.05	4.4E-11	7.2E-11		
		S	0.05	4.6E-11	7.4E-11		

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Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Ru-97	2.9 d	F	0.05	6.7E-11	1.2E-10	0.05	1.5E-10
		M	0.05	1.1E-10	1.6E-10		
		S	0.05	1.1E-10	1.6E-10		
Ru-103	39.28 d	F	0.05	4.9E-10	6.8E-10	0.05	7.3E-10
		M	0.05	2.3E-09	1.9E-09		
		S	0.05	2.8E-09	2.2E-09		
Ru-105	4.44 h	F	0.05	7.1E-11	1.3E-10	0.05	2.6E-10
		M	0.05	1.7E-10	2.4E-10		
		S	0.05	1.8E-10	2.5E-10		
Ru-106	368.2 d	F	0.05	8.0E-09	9.8E-09	0.05	7.0E-09
		M	0.05	2.6E-08	1.7E-08		
		S	0.05	6.2E-08	3.5E-08		
<b>Rhodium</b>							
Rh-99	16 d	F	0.05	3.3E-10	4.9E-10	0.05	5.1E-10
		M	0.05	7.3E-10	8.2E-10		
		S	0.05	8.3E-10	8.9E-10		
Rh-99m	4.7 h	F	0.05	3.0E-11	5.7E-11	0.05	6.6E-11
		M	0.05	4.1E-11	7.2E-11		
		S	0.05	4.3E-11	7.3E-11		
Rh-100	20.8 h	F	0.05	2.8E-10	5.1E-10	0.05	7.1E-10
		M	0.05	3.6E-10	6.2E-10		
		S	0.05	3.7E-10	6.3E-10		
Rh-101	3.2 y	F	0.05	1.4E-09	1.7E-09	0.05	5.5E-10
		M	0.05	2.2E-09	1.7E-09		
		S	0.05	5.0E-09	3.1E-09		
Rh-101m	4.34 d	F	0.05	1.0E-10	1.7E-10	0.05	2.2E-10
		M	0.05	2.0E-10	2.5E-10		
		S	0.05	2.1E-10	2.7E-10		
Rh-102	2.9 y	F	0.05	7.3E-09	8.9E-09	0.05	2.6E-09
		M	0.05	6.5E-09	5.0E-09		
		S	0.05	1.6E-08	9.0E-09		
Rh-102m	207 d	F	0.05	1.5E-09	1.9E-09	0.05	1.2E-09
		M	0.05	3.8E-09	2.7E-09		
		S	0.05	6.7E-09	4.2E-09		
Rh-103m	56.12 m	F	0.05	8.6E-13	1.2E-12	0.05	3.8E-12
		M	0.05	2.3E-12	2.4E-12		
		S	0.05	2.5E-12	2.5E-12		
Rh-105	35.36 h	F	0.05	8.7E-11	1.5E-10	0.05	3.7E-10
		M	0.05	3.1E-10	4.1E-10		
		S	0.05	3.4E-10	4.4E-10		
Rh-106m	132 m	F	0.05	7.0E-11	1.3E-10	0.05	1.6E-10
		M	0.05	1.1E-10	1.8E-10		
		S	0.05	1.2E-10	1.9E-10		
Rh-107	21.7 m	F	0.05	9.6E-12	1.6E-11	0.05	2.4E-11
		M	0.05	1.7E-11	2.7E-11		
		S	0.05	1.7E-11	2.8E-11		

Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
<b>Palladium</b>							
Pd-100	3.63 d	F	0.005	4.9E-10	7.6E-10	0.005	9.4E-10
		M	0.005	7.9E-10	9.5E-10		
		S	0.005	8.3E-10	9.7E-10		
Pd-101	8.27 h	F	0.005	4.2E-11	7.5E-11	0.005	9.4E-11
		M	0.005	6.2E-11	9.8E-11		
		S	0.005	6.4E-11	1.0E-10		
Pd-103	16.96 d	F	0.005	9.0E-11	1.2E-10	0.005	1.9E-10
		M	0.005	3.5E-10	3.0E-10		
		S	0.005	4.0E-10	2.9E-10		
Pd-107	6.5E6 y	F	0.005	2.6E-11	3.3E-11	0.005	3.7E-11
		M	0.005	8.0E-11	5.2E-11		
		S	0.005	5.5E-10	2.9E-10		
Pd-109	13.427 h	F	0.005	1.2E-10	2.1E-10	0.005	5.5E-10
		M	0.005	3.4E-10	4.7E-10		
		S	0.005	3.6E-10	5.0E-10		
<b>Silver</b>							
Ag-102	12.9 m	F	0.05	1.4E-11	2.4E-11	0.05	4.0E-11
		M	0.05	1.8E-11	3.2E-11		
		S	0.05	1.9E-11	3.2E-11		
Ag-103	65.7 m	F	0.05	1.6E-11	2.8E-11	0.05	4.3E-11
		M	0.05	2.7E-11	4.3E-11		
		S	0.05	2.8E-11	4.5E-11		
Ag-104	69.2 m	F	0.05	3.0E-11	5.7E-11	0.05	6.0E-11
		M	0.05	3.9E-11	6.9E-11		
		S	0.05	4.0E-11	7.1E-11		
Ag-104m	33.5 m	F	0.05	1.7E-11	3.1E-11	0.05	5.4E-11
		M	0.05	2.6E-11	4.4E-11		
		S	0.05	2.7E-11	4.5E-11		
Ag-105	41.0 d	F	0.05	5.4E-10	8.0E-10	0.05	4.7E-10
		M	0.05	6.9E-10	7.0E-10		
		S	0.05	7.8E-10	7.3E-10		
Ag-106	23.96 m	F	0.05	9.8E-12	1.7E-11	0.05	3.2E-11
		M	0.05	1.6E-11	2.6E-11		
		S	0.05	1.6E-11	2.7E-11		
Ag-106m	8.41 d	F	0.05	1.1E-09	1.6E-09	0.05	1.5E-09
		M	0.05	1.1E-09	1.5E-09		
		S	0.05	1.1E-09	1.4E-09		
Ag-108m	127 y	F	0.05	6.1E-09	7.3E-09	0.05	2.3E-09
		M	0.05	7.0E-09	5.2E-09		
		S	0.05	3.5E-08	1.9E-08		
Ag-110m	249.9 d	F	0.05	5.5E-09	6.7E-09	0.05	2.8E-09
		M	0.05	7.2E-09	5.9E-09		
		S	0.05	1.2E-08	7.3E-09		

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Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Ag-111	7.45 d	F	0.05	4.1E-10	5.7E-10	0.05	1.3E-09
		M	0.05	1.5E-09	1.5E-09		
		S	0.05	1.7E-09	1.6E-09		
Ag-112	3.12 h	F	0.05	8.2E-11	1.4E-10	0.05	4.3E-10
		M	0.05	1.7E-10	2.5E-10		
		S	0.05	1.8E-10	2.6E-10		
Ag-115	20.0 m	F	0.05	1.6E-11	2.6E-11	0.05	6.0E-11
		M	0.05	2.8E-11	4.3E-11		
		S	0.05	3.0E-11	4.4E-11		
<b>Cadmium</b>							
Cd-104	57.7 m	F	0.05	2.7E-11	5.0E-11	0.05	5.8E-11
		M	0.05	3.6E-11	6.2E-11		
		S	0.05	3.7E-11	6.3E-11		
Cd-107	6.49 h	F	0.05	2.3E-11	4.2E-11	0.05	6.2E-11
		M	0.05	8.1E-11	1.0E-10		
		S	0.05	8.7E-11	1.1E-10		
Cd-109	464 d	F	0.05	8.1E-09	9.6E-09	0.05	2.0E-09
		M	0.05	6.2E-09	5.1E-09		
		S	0.05	5.8E-09	4.4E-09		
Cd-113	9.3E15 y	F	0.05	1.2E-07	1.4E-07	0.05	2.5E-08
		M	0.05	5.3E-08	4.3E-08		
		S	0.05	2.5E-08	2.1E-08		
Cd-113m	13.6 y	F	0.05	1.1E-07	1.3E-07	0.05	2.3E-08
		M	0.05	5.0E-08	4.0E-08		
		S	0.05	3.0E-08	2.4E-08		
Cd-115	53.46 h	F	0.05	3.7E-10	5.4E-10	0.05	1.4E-09
		M	0.05	9.7E-10	1.2E-09		
		S	0.05	1.1E-09	1.3E-09		
Cd-115m	44.6 d	F	0.05	5.3E-09	6.4E-09	0.05	3.3E-09
		M	0.05	5.9E-09	5.5E-09		
		S	0.05	7.3E-09	5.5E-09		
Cd-117	2.49 h	F	0.05	7.3E-11	1.3E-10	0.05	2.8E-10
		M	0.05	1.6E-10	2.4E-10		
		S	0.05	1.7E-10	2.5E-10		
Cd-117m	3.36 h	F	0.05	1.0E-10	1.9E-10	0.05	2.8E-10
		M	0.05	2.0E-10	3.1E-10		
		S	0.05	2.1E-10	3.2E-10		
<b>Indium</b>							
In-109	4.2 h	F	0.02	3.2E-11	5.7E-11	0.02	6.6E-11
		M	0.02	4.4E-11	7.3E-11		
In-110	4.9 h	F	0.02	1.2E-10	2.2E-10	0.02	2.4E-10
		M	0.02	1.4E-10	2.5E-10		
In-110m	69.1 m	F	0.02	3.1E-11	5.5E-11	0.02	1.0E-10
		M	0.02	5.0E-11	8.1E-11		
In-111	2.83 d	F	0.02	1.3E-10	2.2E-10	0.02	2.9E-10
		M	0.02	2.3E-10	3.1E-10		

Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) ( $1 \mu\text{m}$ )	$e$ (Sv/Bq) ( $5 \mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
In-112	14.4 m	F	0.02	5.0E-12	8.6E-12	0.02	1.0E-11
		M	0.02	7.8E-12	1.3E-11		
In-113m	1.658 h	F	0.02	1.0E-11	1.9E-11	0.02	2.8E-11
		M	0.02	2.0E-11	3.2E-11		
In-114m	49.51 d	F	0.02	9.3E-09	1.1E-08	0.02	4.1E-09
		M	0.02	5.9E-09	5.9E-09		
In-115	5.1E15 y	F	0.02	3.9E-07	4.5E-07	0.02	3.2E-08
		M	0.02	1.5E-07	1.1E-07		
In-115m	4.486 h	F	0.02	2.5E-11	4.5E-11	0.02	8.6E-11
		M	0.02	6.0E-11	8.7E-11		
In-116m	54.15 m	F	0.02	3.0E-11	5.5E-11	0.02	6.4E-11
		M	0.02	4.8E-11	8.0E-11		
In-117	43.8 m	F	0.02	1.6E-11	2.8E-11	0.02	3.1E-11
		M	0.02	3.0E-11	4.8E-11		
In-117m	116.5 m	F	0.02	3.1E-11	5.5E-11	0.02	1.2E-10
		M	0.02	7.3E-11	1.1E-10		
In-119m	18.0 m	F	0.02	1.1E-11	1.8E-11	0.02	4.7E-11
		M	0.02	1.8E-11	2.9E-11		
<b>Tin</b>							
Sn-110	4.0 h	F	0.02	1.1E-10	1.9E-10	0.02	3.5E-10
		M	0.02	1.6E-10	2.6E-10		
Sn-111	35.3 m	F	0.02	8.3E-12	1.5E-11	0.02	2.3E-11
		M	0.02	1.4E-11	2.2E-11		
Sn-113	115.1 d	F	0.02	5.4E-10	7.9E-10	0.02	7.3E-10
		M	0.02	2.5E-09	1.9E-09		
Sn-117m	13.61 d	F	0.02	2.9E-10	3.9E-10	0.02	7.1E-10
		M	0.02	2.3E-09	2.2E-09		
Sn-119m	293.0 d	F	0.02	2.9E-10	3.6E-10	0.02	3.4E-10
		M	0.02	2.0E-09	1.5E-09		
Sn-121	27.06 h	F	0.02	6.4E-11	1.0E-10	0.02	2.3E-10
		M	0.02	2.2E-10	2.8E-10		
Sn-121m	55 y	F	0.02	8.0E-10	9.7E-10	0.02	3.8E-10
		M	0.02	4.2E-09	3.3E-09		
Sn-123	129.2 d	F	0.02	1.2E-09	1.6E-09	0.02	2.1E-09
		M	0.02	7.7E-09	5.6E-09		
Sn-123m	40.08 m	F	0.02	1.4E-11	2.4E-11	0.02	3.8E-11
		M	0.02	2.8E-11	4.4E-11		
Sn-125	9.64 d	F	0.02	9.2E-10	1.3E-09	0.02	3.1E-09
		M	0.02	3.0E-09	2.8E-09		
Sn-126	1.0E5 y	F	0.02	1.1E-08	1.4E-08	0.02	4.7E-09
		M	0.02	2.7E-08	1.8E-08		
Sn-127	2.10 h	F	0.02	6.9E-11	1.2E-10	0.02	2.0E-10
		M	0.02	1.3E-10	2.0E-10		
Sn-128	59.1 m	F	0.02	5.4E-11	9.5E-11	0.02	1.5E-10
		M	0.02	9.6E-11	1.5E-10		

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Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu$ m)	$e$ (Sv/Bq) (5 $\mu$ m)	$f_1$	$e$ (Sv/Bq)
<b>Antimony</b>							
Sb-115	31.8 m	F	0.1	9.2E-12	1.7E-11	0.1	2.4E-11
		M	0.01	1.4E-11	2.3E-11		
Sb-116	15.8 m	F	0.1	9.9E-12	1.8E-11	0.1	2.6E-11
		M	0.01	1.4E-11	2.3E-11		
Sb-116m	60.3 m	F	0.1	3.5E-11	6.4E-11	0.1	6.7E-11
		M	0.01	5.0E-11	8.5E-11		
Sb-117	2.80 h	F	0.1	9.3E-12	1.7E-11	0.1	1.8E-11
		M	0.01	1.7E-11	2.7E-11		
Sb-118m	5.00 h	F	0.1	1.0E-10	1.9E-10	0.1	2.1E-10
		M	0.01	1.3E-10	2.3E-10		
Sb-119	38.1 h	F	0.1	2.5E-11	4.5E-11	0.1	8.1E-11
		M	0.01	3.7E-11	5.9E-11		
Sb-120m	5.76 d	F	0.1	5.9E-10	9.8E-10	.1	1.2E-09
		M	0.01	1.0E-09	1.3E-09		
Sb-120	15.89 m	F	0.1	4.9E-12	8.5E-12	0.1	1.4E-11
		M	0.01	7.4E-12	1.2E-11		
Sb-122	2.70 d	F	0.1	3.9E-10	6.3E-10	0.1	1.7E-09
		M	0.01	1.0E-09	1.2E-09		
Sb-124	60.20 d	F	0.1	1.3E-09	1.9E-09	0.1	2.5E-09
		M	0.01	6.1E-09	4.7E-09		
Sb-124n	20.2 m	F	0.1	3.0E-12	5.3E-12	0.1	8.0E-12
		M	0.01	5.5E-12	8.3E-12		
Sb-125	2.77 y	F	0.1	1.4E-09	1.7E-09	0.1	1.1E-09
		M	0.01	4.5E-09	3.3E-09		
Sb-126	12.4 d	F	0.1	1.1E-09	1.7E-09	0.1	2.4E-09
		M	0.01	2.7E-09	3.2E-09		
Sb-126m	19.0 m	F	0.1	1.3E-11	2.3E-11	0.1	3.6E-11
		M	0.01	2.0E-11	3.3E-11		
Sb-127	3.85 d	F	0.1	4.6E-10	7.4E-10	0.1	1.7E-09
		M	0.01	1.6E-09	1.7E-09		
Sb-128	9.01 h	F	0.1	2.5E-10	4.6E-10	0.1	7.6E-10
		M	0.01	4.2E-10	6.7E-10		
Sb-128m	10.4 m	F	0.1	1.1E-11	1.9E-11	0.1	3.3E-11
		M	0.01	1.5E-11	2.6E-11		
Sb-129	4.32 h	F	0.1	1.1E-10	2.0E-10	0.1	4.2E-10
		M	0.01	2.4E-10	3.5E-10		
Sb-130	40 m	F	0.1	3.5E-11	6.3E-11	0.1	9.1E-11
		M	0.01	5.4E-11	9.1E-11		
Sb-131	23 m	F	0.1	3.7E-11	5.9E-11	0.1	1.0E-10
		M	0.01	5.2E-11	8.3E-11		
<b>Tellurium</b>							
Te-116	2.49 h	F	0.3	6.3E-11	1.2E-10	0.3	1.7E-10
		M	0.3	1.1E-10	1.7E-10		
Te-121	17 d	F	0.3	2.5E-10	3.9E-10	0.3	4.3E-10
		M	0.3	3.9E-10	4.4E-10		



Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Te-121m	154 d	F	0.3	1.8E-09	2.3E-09	0.3	2.3E-09
		M	0.3	4.2E-09	3.6E-09		
Te-123	1E13 y	F	0.3	4.0E-09	5.0E-09	0.3	4.4E-09
		M	0.3	2.6E-09	2.8E-09		
Te-123m	119.7 d	F	0.3	9.7E-10	1.2E-09	0.3	1.4E-09
		M	0.3	3.9E-09	3.4E-09		
Te-125m	58 d	F	0.3	5.1E-10	6.7E-10	0.3	8.7E-10
		M	0.3	3.3E-09	2.9E-09		
Te-127	9.35 h	F	0.3	4.2E-11	7.2E-11	0.3	1.7E-10
		M	0.3	1.2E-10	1.8E-10		
Te-127m	109 d	F	0.3	1.6E-09	2.0E-09	0.3	2.3E-09
		M	0.3	7.2E-09	6.2E-09		
Te-129	69.6 m	F	0.3	1.7E-11	2.9E-11	0.3	6.3E-11
		M	0.3	3.8E-11	5.7E-11		
Te-129m	33.6 d	F	0.3	1.3E-09	1.8E-09	0.3	3.0E-09
		M	0.3	6.3E-09	5.4E-09		
Te-131	25.0 m	F	0.3	2.3E-11	4.6E-11	0.3	8.7E-11
		M	0.3	3.8E-11	6.1E-11		
Te-131m	30 h	F	0.3	8.7E-10	1.2E-09	0.3	1.9E-09
		M	0.3	1.1E-09	1.6E-09		
Te-132	78.2 h	F	0.3	1.8E-09	2.4E-09	0.3	3.7E-09
		M	0.3	2.2E-09	3.0E-09		
Te-133	12.45 m	F	0.3	2.0E-11	3.8E-11	0.3	7.2E-11
		M	0.3	2.7E-11	4.4E-11		
Te-133m	55.4 m	F	0.3	8.4E-11	1.2E-10	0.3	2.8E-10
		M	0.3	1.2E-10	1.9E-10		
Te-134	41.8 m	F	0.3	5.0E-11	8.3E-11	0.3	1.1E-10
		M	0.3	7.1E-11	1.1E-10		
<b>Iodine</b>							
I-120	81.0 m	F	1.0	1.0E-10	1.9E-10	1.00	3.4E-10
I-120m	53 m	F	1.0	8.7E-11	1.4E-10	1.00	2.1E-10
I-121	2.12 h	F	1.0	2.8E-11	3.9E-11	1.00	8.2E-11
I-123	13.2 h	F	1.0	7.6E-11	1.1E-10	1.00	2.1E-10
I-124	4.18 d	F	1.0	4.5E-09	6.3E-09	1.00	1.3E-08
I-125	60.14 d	F	1.0	5.3E-09	7.3E-09	1.00	1.5E-08
I-126	13.02 d	F	1.0	1.0E-08	1.4E-08	1.00	2.9E-08
I-128	24.99 m	F	1.0	1.4E-11	2.2E-11	1.00	4.6E-11
I-129	1.57E7 y	F	1.0	3.7E-08	5.1E-08	1.00	1.1E-07
I-130	12.36 h	F	1.0	6.9E-10	9.6E-10	1.00	2.0E-09
I-131	8.04 d	F	1.0	7.6E-09	1.1E-08	1.00	2.2E-08
I-132	2.30 h	F	1.0	9.6E-11	2.0E-10	1.00	2.9E-10
I-132m	83.6 m	F	1.0	8.1E-11	1.1E-10	1.00	2.2E-10
I-133	20.8 h	F	1.0	1.5E-09	2.1E-09	1.00	4.3E-09
I-134	52.6 m	F	1.0	4.8E-11	7.9E-11	1.00	1.1E-10
I-135	6.61 h	F	1.0	3.3E-10	4.6E-10	1.00	9.3E-10

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Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
<b>Caesium</b>							
Cs-125	45 m	F	1.0	1.3E-11	2.3E-11	1.00	3.5E-11
Cs-127	6.25 h	F	1.0	2.2E-11	4.0E-11	1.00	2.4E-11
Cs-129	32.06 h	F	1.0	4.5E-11	8.1E-11	1.00	6.0E-11
Cs-130	29.9 m	F	1.0	8.4E-12	1.5E-11	1.00	2.8E-11
Cs-131	9.69 d	F	1.0	2.8E-11	4.5E-11	1.00	5.8E-11
Cs-132	6.475 d	F	1.0	2.4E-10	3.8E-10	1.00	5.0E-10
Cs-134	2.062 y	F	1.0	6.8E-09	9.6E-09	1.00	1.9E-08
Cs-134m	2.90 h	F	1.0	1.5E-11	2.6E-11	1.00	2.0E-11
Cs-135	2.3E6 y	F	1.0	7.1E-10	9.9E-10	1.00	2.0E-09
Cs-135m	53 m	F	1.0	1.3E-11	2.4E-11	1.00	1.9E-11
Cs-136	13.1 d	F	1.0	1.3E-09	1.9E-09	1.00	3.0E-09
Cs-137	30.0 y	F	1.0	4.8E-09	6.7E-09	1.00	1.3E-08
Cs-138	32.2 m	F	1.0	2.6E-11	4.6E-11	1.00	9.2E-11
<b>Barium</b>							
Ba-126	96.5 m	F	0.1	7.8E-11	1.2E-10	0.1	2.6E-10
Ba-128	2.43 d	F	0.1	8.0E-10	1.3E-09	0.1	2.7E-09
Ba-131	11.8 d	F	0.1	2.3E-10	3.5E-10	0.1	4.5E-10
Ba-131m	14.6 m	F	0.1	4.1E-12	6.4E-12	0.1	4.9E-12
Ba-133	10.74 y	F	0.1	1.5E-09	1.8E-09	0.1	1.0E-09
Ba-133m	38.9 h	F	0.1	1.9E-10	2.8E-10	0.1	5.5E-10
Ba-135m	28.7 h	F	0.1	1.5E-10	2.3E-10	0.1	4.5E-10
Ba-139	82.7 m	F	0.1	3.5E-11	5.5E-11	0.1	1.2E-10
Ba-140	12.74 d	F	0.1	1.0E-09	1.6E-09	0.1	2.5E-09
Ba-141	18.27 m	F	0.1	2.2E-11	3.5E-11	0.1	7.0E-11
Ba-142	10.6 m	F	0.1	1.6E-11	2.7E-11	0.1	3.5E-11
<b>Lanthanum</b>							
La-131	59 m	F	0.0005	1.4E-11	2.4E-11	0.0005	3.5E-11
		M	0.0005	2.3E-11	3.6E-11		
La-132	4.8 h	F	0.0005	1.1E-10	2.0E-10	0.0005	3.9E-10
		M	0.0005	1.7E-10	2.8E-10		
La-135	19.5 h	F	0.0005	1.1E-11	2.0E-11	0.0005	3.0E-11
		M	0.0005	1.5E-11	2.5E-11		
La-137	6E4 y	F	0.0005	8.6E-09	1.0E-08	0.0005	8.1E-11
		M	0.0005	3.4E-09	2.3E-09		
La-138	1.35E11 y	F	0.0005	1.5E-07	1.8E-07	0.0005	1.1E-09
		M	0.0005	6.1E-08	4.2E-08		
La-140	40.272 h	F	0.0005	6.0E-10	1.0E-09	0.0005	2.0E-09
		M	0.0005	1.1E-09	1.5E-09		
La-141	3.93 h	F	0.0005	6.7E-11	1.1E-10	0.0005	3.6E-10
		M	0.0005	1.5E-10	2.2E-10		
La-142	92.5 m	F	0.0005	5.6E-11	1.0E-10	0.0005	1.8E-10
		M	0.0005	9.3E-11	1.5E-10		
La-143	14.23 m	F	0.0005	1.2E-11	2.0E-11	0.0005	5.6E-11
		M	0.0005	2.2E-11	3.3E-11		

Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
<b>Cerium</b>							
Ce-134	72.0 h	M	0.0005	1.3E-09	1.5E-09	0.0005	2.5E-09
		S	0.0005	1.3E-09	1.6E-09		
Ce-135	17.6 h	M	0.0005	4.9E-10	7.3E-10	0.0005	7.9E-10
		S	0.0005	5.1E-10	7.6E-10		
Ce-137	9.0 h	M	0.0005	1.0E-11	1.8E-11	0.0005	2.5E-11
		S	0.0005	1.1E-11	1.9E-11		
Ce-137m	34.4 h	M	0.0005	4.0E-10	5.5E-10	0.0005	5.4E-10
		S	0.0005	4.3E-10	5.9E-10		
Ce-139	137.66 d	M	0.0005	1.6E-09	1.3E-09	0.0005	2.6E-10
		S	0.0005	1.8E-09	1.4E-09		
Ce-141	32.501 d	M	0.0005	3.1E-09	2.7E-09	0.0005	7.1E-10
		S	0.0005	3.6E-09	3.1E-09		
Ce-143	33.0 h	M	0.0005	7.4E-10	9.5E-10	0.0005	1.1E-09
		S	0.0005	8.1E-10	1.0E-09		
Ce-144	284.3 d	M	0.0005	3.4E-08	2.3E-08	0.0005	5.2E-09
		S	0.0005	4.9E-08	2.9E-08		
<b>Praseodymium</b>							
Pr-136	13.1 m	M	0.0005	1.4E-11	2.4E-11	0.0005	3.3E-11
		S	0.0005	1.5E-11	2.5E-11		
Pr-137	76.6 m	M	0.0005	2.1E-11	3.4E-11	0.0005	4.0E-11
		S	0.0005	2.2E-11	3.5E-11		
Pr-138m	2.1 h	M	0.0005	7.6E-11	1.3E-10	0.0005	1.3E-10
		S	0.0005	7.9E-11	1.3E-10		
Pr-139	4.51 h	M	0.0005	1.9E-11	2.9E-11	0.0005	3.1E-11
		S	0.0005	2.0E-11	3.0E-11		
Pr-142	19.13 h	M	0.0005	5.3E-10	7.0E-10	0.0005	1.3E-09
		S	0.0005	5.6E-10	7.4E-10		
Pr-142m	14.6 m	M	0.0005	6.7E-12	8.9E-12	0.0005	1.7E-11
		S	0.0005	7.1E-12	9.4E-12		
Pr-143	13.56 d	M	0.0005	2.1E-09	1.9E-09	0.0005	1.2E-09
		S	0.0005	2.3E-09	2.2E-09		
Pr-144	17.28 m	M	0.0005	1.8E-11	2.9E-11	0.0005	5.0E-11
		S	0.0005	1.9E-11	3.0E-11		
Pr-145	5.98 h	M	0.0005	1.6E-10	2.5E-10	0.0005	3.9E-10
		S	0.0005	1.7E-10	2.6E-10		
Pr-147	13.6 m	M	0.0005	1.8E-11	2.9E-11	0.0005	3.3E-11
		S	0.0005	1.9E-11	3.0E-11		
<b>Neodymium</b>							
Nd-136	50.65 m	M	0.0005	5.3E-11	8.5E-11	0.0005	9.9E-11
		S	0.0005	5.6E-11	8.9E-11		
Nd-138	5.04 h	M	0.0005	2.4E-10	3.7E-10	0.0005	6.4E-10
		S	0.0005	2.6E-10	3.8E-10		
Nd-139	29.7 m	M	0.0005	1.0E-11	1.7E-11	0.0005	2.0E-11
		S	0.0005	1.1E-11	1.7E-11		

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Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Nd-139m	5.5 h	M	0.0005	1.5E-10	2.5E-10	0.0005	2.5E-10
		S	0.0005	1.6E-10	2.5E-10		
Nd-141	2.49 h	M	0.0005	5.1E-12	8.5E-12	0.0005	8.3E-12
		S	0.0005	5.3E-12	8.8E-12		
Nd-147	10.98 d	M	0.0005	2.0E-09	1.9E-09	0.0005	1.1E-09
		S	0.0005	2.3E-09	2.1E-09		
Nd-149	1.73 h	M	0.0005	8.5E-11	1.2E-10	0.0005	1.2E-10
		S	0.0005	9.0E-11	1.3E-10		
Nd-151	12.44 m	M	0.0005	1.7E-11	2.8E-11	0.0005	3.0E-11
		S	0.0005	1.8E-11	2.9E-11		
<b>Promethium</b>							
Pm-141	20.90 m	M	0.0005	1.5E-11	2.4E-11	0.0005	3.6E-11
		S	0.0005	1.6E-11	2.5E-11		
Pm-143	265 d	M	0.0005	1.4E-09	9.6E-10	0.0005	2.3E-10
		S	0.0005	1.3E-09	8.3E-10		
Pm-144	363 d	M	0.0005	7.8E-09	5.4E-09	0.0005	9.7E-10
		S	0.0005	7.0E-09	3.9E-09		
Pm-145	17.7 y	M	0.0005	3.4E-09	2.4E-09	0.0005	1.1E-10
		S	0.0005	2.1E-09	1.2E-09		
Pm-146	2020 d	M	0.0005	1.9E-08	1.3E-08	0.0005	9.0E-10
		S	0.0005	1.6E-08	9.0E-09		
Pm-147	2.6234 y	M	0.0005	4.7E-09	3.5E-09	0.0005	2.6E-10
		S	0.0005	4.6E-09	3.2E-09		
Pm-148	5.37 d	M	0.0005	2.0E-09	2.1E-09	0.0005	2.7E-09
		S	0.0005	2.1E-09	2.2E-09		
Pm-148m	41.3 d	M	0.0005	4.9E-09	4.1E-09	0.0005	1.8E-09
		S	0.0005	5.4E-09	4.3E-09		
Pm-149	53.08 h	M	0.0005	6.6E-10	7.6E-10	0.0005	9.9E-10
		S	0.0005	7.2E-10	8.2E-10		
Pm-150	2.68 h	M	0.0005	1.3E-10	2.0E-10	0.0005	2.6E-10
		S	0.0005	1.4E-10	2.1E-10		
Pm-151	28.40 h	M	0.0005	4.2E-10	6.1E-10	0.0005	7.3E-10
		S	0.0005	4.5E-10	6.4E-10		
<b>Samarium</b>							
Sm-141	10.2 m	M	0.0005	1.6E-11	2.7E-11	0.0005	3.9E-11
Sm-141m	22.6 m	M	0.0005	3.4E-11	5.6E-11	0.0005	6.5E-11
Sm-142	72.49 m	M	0.0005	7.4E-11	1.1E-10	0.0005	1.9E-10
Sm-145	340 d	M	0.0005	1.5E-09	1.1E-09	0.0005	2.1E-10
Sm-146	1.03E8 y	M	0.0005	9.9E-06	6.7E-06	0.0005	5.4E-08
Sm-147	1.06E11 y	M	0.0005	8.9E-06	6.1E-06	0.0005	4.9E-08
Sm-151	90 y	M	0.0005	3.7E-09	2.6E-09	0.0005	9.8E-11
Sm-153	46.7 h	M	0.0005	6.1E-10	6.8E-10	0.0005	7.4E-10
Sm-155	22.1 m	M	0.0005	1.7E-11	2.8E-11	0.0005	2.9E-11
Sm-156	9.4 h	M	0.0005	2.1E-10	2.8E-10	0.0005	2.5E-10

Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
<b>Europium</b>							
Eu-145	5.94 d	M	0.0005	5.6E-10	7.3E-10	0.0005	7.5E-10
Eu-146	4.61 d	M	0.0005	8.2E-10	1.2E-09	0.0005	1.3E-09
Eu-147	24 d	M	0.0005	1.0E-09	1.0E-09	0.0005	4.4E-10
Eu-148	54.5 d	M	0.0005	2.7E-09	2.3E-09	0.0005	1.3E-09
Eu-149	93.1 d	M	0.0005	2.7E-10	2.3E-10	0.0005	1.0E-10
Eu-150	34.2 y	M	0.0005	5.0E-08	3.4E-08	0.0005	1.3E-09
Eu-150m	12.62 h	M	0.0005	1.9E-10	2.8E-10	0.0005	3.8E-10
Eu-152	13.33 y	M	0.0005	3.9E-08	2.7E-08	0.0005	1.4E-09
Eu-152m	9.32 h	M	0.0005	2.2E-10	3.2E-10	0.0005	5.0E-10
Eu-154	8.8 y	M	0.0005	5.0E-08	3.5E-08	0.0005	2.0E-09
Eu-155	4.96 y	M	0.0005	6.5E-09	4.7E-09	0.0005	3.2E-10
Eu-156	15.19 d	M	0.0005	3.3E-09	3.0E-09	0.0005	2.2E-09
Eu-157	15.15 h	M	0.0005	3.2E-10	4.4E-10	0.0005	6.0E-10
Eu-158	45.9 m	M	0.0005	4.8E-11	7.5E-11	0.0005	9.4E-11
<b>Gadolinium</b>							
Gd-145	22.9 m	F	0.0005	1.5E-11	2.6E-11	0.0005	4.4E-11
		M	0.0005	2.1E-11	3.5E-11		
Gd-146	48.3 d	F	0.0005	4.4E-09	5.2E-09	0.0005	9.6E-10
		M	0.0005	6.0E-09	4.6E-09		
Gd-147	38.1 h	F	0.0005	2.7E-10	4.5E-10	0.0005	6.1E-10
		M	0.0005	4.1E-10	5.9E-10		
Gd-148	93 y	F	0.0005	2.5E-05	3.0E-05	0.0005	5.5E-08
		M	0.0005	1.1E-05	7.2E-06		
Gd-149	9.4 d	F	0.0005	2.6E-10	4.5E-10	0.0005	4.5E-10
		M	0.0005	7.0E-10	7.9E-10		
Gd-151	120 d	F	0.0005	7.8E-10	9.3E-10	0.0005	2.0E-10
		M	0.0005	8.1E-10	6.5E-10		
Gd-152	1.08E14 y	F	0.0005	1.9E-05	2.2E-05	0.0005	4.1E-08
		M	0.0005	7.4E-06	5.0E-06		
Gd-153	242 d	F	0.0005	2.1E-09	2.5E-09	0.0005	2.7E-10
		M	0.0005	1.9E-09	1.4E-09		
Gd-159	18.56 h	F	0.0005	1.1E-10	1.8E-10	0.0005	4.9E-10
		M	0.0005	2.7E-10	3.9E-10		
<b>Terbium</b>							
Tb-147	1.65 h	M	0.0005	7.9E-11	1.2E-10	0.0005	1.6E-10
Tb-149	4.15 h	M	0.0005	4.3E-09	3.1E-09	0.0005	2.5E-10
Tb-150	3.27 h	M	0.0005	1.1E-10	1.8E-10	0.0005	2.5E-10
Tb-151	17.6 h	M	0.0005	2.3E-10	3.3E-10	0.0005	3.4E-10
Tb-153	2.34 d	M	0.0005	2.0E-10	2.4E-10	0.0005	2.5E-10
Tb-154	21.4 h	M	0.0005	3.8E-10	6.0E-10	0.0005	6.5E-10
Tb-155	5.32 d	M	0.0005	2.1E-10	2.5E-10	0.0005	2.1E-10
Tb-156	5.34 d	M	0.0005	1.2E-09	1.4E-09	0.0005	1.2E-09
Tb-156n	5.0 h	M	0.0005	9.2E-11	1.3E-10	0.0005	8.1E-11
Tb-156m	24.4 h	M	0.0005	2.0E-10	2.3E-10	0.0005	1.7E-10

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Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Tb-157	150 y	M	0.0005	1.1E-09	7.9E-10	0.0005	3.4E-11
Tb-158	150 y	M	0.0005	4.3E-08	3.0E-08	0.0005	1.1E-09
Tb-160	72.3 d	M	0.0005	6.6E-09	5.4E-09	0.0005	1.6E-09
Tb-161	6.91 d	M	0.0005	1.2E-09	1.2E-09	0.0005	7.2E-10
<b>Dysprosium</b>							
Dy-155	10.0 h	M	0.0005	8.0E-11	1.2E-10	0.0005	1.3E-10
Dy-157	8.1 h	M	0.0005	3.2E-11	5.5E-11	0.0005	6.1E-11
Dy-159	144.4 d	M	0.0005	3.5E-10	2.5E-10	0.0005	1.0E-10
Dy-165	2.334 h	M	0.0005	6.1E-11	8.7E-11	0.0005	1.1E-10
Dy-166	81.6 h	M	0.0005	1.8E-09	1.8E-09	0.0005	1.6E-09
<b>Holmium</b>							
Ho-155	48 m	M	0.0005	2.0E-11	3.2E-11	0.0005	3.7E-11
Ho-157	12.6 m	M	0.0005	4.5E-12	7.6E-12	0.0005	6.5E-12
Ho-159	33 m	M	0.0005	6.3E-12	1.0E-11	0.0005	7.9E-12
Ho-161	2.5 h	M	0.0005	6.3E-12	1.0E-11	0.0005	1.3E-11
Ho-162	15 m	M	0.0005	2.9E-12	4.5E-12	0.0005	3.3E-12
Ho-162m	68 m	M	0.0005	2.2E-11	3.3E-11	0.0005	2.6E-11
Ho-164	29 m	M	0.0005	8.6E-12	1.3E-11	0.0005	9.5E-12
Ho-164m	37.5 m	M	0.0005	1.2E-11	1.6E-11	0.0005	1.6E-11
Ho-166	26.80 h	M	0.0005	6.6E-10	8.3E-10	0.0005	1.4E-09
Ho-166m	1.20E3 y	M	0.0005	1.1E-07	7.8E-08	0.0005	2.0E-09
Ho-167	3.1 h	M	0.0005	7.1E-11	1.0E-10	0.0005	8.3E-11
<b>Erbium</b>							
Er-161	3.24 h	M	0.0005	5.1E-11	8.5E-11	0.0005	8.0E-11
Er-165	10.36 h	M	0.0005	8.3E-12	1.4E-11	0.0005	1.9E-11
Er-169	9.3 d	M	0.0005	9.8E-10	9.2E-10	0.0005	3.7E-10
Er-171	7.52 h	M	0.0005	2.2E-10	3.0E-10	0.0005	3.6E-10
Er-172	49.3 h	M	0.0005	1.1E-09	1.2E-09	0.0005	1.0E-09
<b>Thulium</b>							
Tm-162	21.7 m	M	0.0005	1.6E-11	2.7E-11	0.0005	2.9E-11
Tm-166	7.70 h	M	0.0005	1.8E-10	2.8E-10	0.0005	2.8E-10
Tm-167	9.24 d	M	0.0005	1.1E-09	1.0E-09	0.0005	5.6E-10
Tm-170	128.6 d	M	0.0005	6.6E-09	5.2E-09	0.0005	1.3E-09
Tm-171	1.92 y	M	0.0005	1.3E-09	9.1E-10	0.0005	1.1E-10
Tm-172	63.6 h	M	0.0005	1.1E-09	1.4E-09	0.0005	1.7E-09
Tm-173	8.24 h	M	0.0005	1.8E-10	2.6E-10	0.0005	3.1E-10
Tm-175	15.2 m	M	0.0005	1.9E-11	3.1E-11	0.0005	2.7E-11
<b>Ytterbium</b>							
Yb-162	18.9 m	M	0.0005	1.4E-11	2.2E-11	0.0005	2.3E-11
		S	0.0005	1.4E-11	2.3E-11		
Yb-166	56.7 h	M	0.0005	7.2E-10	9.1E-10	0.0005	9.5E-10
		S	0.0005	7.6E-10	9.5E-10		
Yb-167	17.5 m	M	0.0005	6.5E-12	9.0E-12	0.0005	6.7E-12
		S	0.0005	6.9E-12	9.5E-12		

Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_i$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_i$	$e$ (Sv/Bq)
Yb-169	32.01 d	M	0.0005	2.4E-09	2.1E-09	0.0005	7.1E-10
		S	0.0005	2.8E-09	2.4E-09		
Yb-175	4.19 d	M	0.0005	6.3E-10	6.4E-10	0.0005	4.4E-10
		S	0.0005	7.0E-10	7.0E-10		
Yb-177	1.9 h	M	0.0005	6.4E-11	8.8E-11	0.0005	9.7E-11
		S	0.0005	6.9E-11	9.4E-11		
Yb-178	74 m	M	0.0005	7.1E-11	1.0E-10	0.0005	1.2E-10
		S	0.0005	7.6E-11	1.1E-10		
<b>Lutetium</b>							
Lu-169	34.06 h	M	0.0005	3.5E-10	4.7E-10	0.0005	4.6E-10
		S	0.0005	3.8E-10	4.9E-10		
Lu-170	2.00 d	M	0.0005	6.4E-10	9.3E-10	0.0005	9.9E-10
		S	0.0005	6.7E-10	9.5E-10		
Lu-171	8.22 d	M	0.0005	7.6E-10	8.8E-10	0.0005	6.7E-10
		S	0.0005	8.3E-10	9.3E-10		
Lu-172	6.70 d	M	0.0005	1.4E-09	1.7E-09	0.0005	1.3E-09
		S	0.0005	1.5E-09	1.8E-09		
Lu-173	1.37 y	M	0.0005	2.0E-09	1.5E-09	0.0005	2.6E-10
		S	0.0005	2.3E-09	1.4E-09		
Lu-174	3.31 y	M	0.0005	4.0E-09	2.9E-09	0.0005	2.7E-10
		S	0.0005	3.9E-09	2.5E-09		
Lu-174m	142 d	M	0.0005	3.4E-09	2.4E-09	0.0005	5.3E-10
		S	0.0005	3.8E-09	2.6E-09		
Lu-176	3.60E10 y	M	0.0005	6.6E-08	4.6E-08	0.0005	1.8E-09
		S	0.0005	5.2E-08	3.0E-08		
Lu-176m	3.68 h	M	0.0005	1.1E-10	1.5E-10	0.0005	1.7E-10
		S	0.0005	1.2E-10	1.6E-10		
Lu-177	6.71 d	M	0.0005	1.0E-09	1.0E-09	0.0005	5.3E-10
		S	0.0005	1.1E-09	1.1E-09		
Lu-177m	160.9 d	M	0.0005	1.2E-08	1.0E-08	0.0005	1.7E-09
		S	0.0005	1.5E-08	1.2E-08		
Lu-178	28.4 m	M	0.0005	2.5E-11	3.9E-11	0.0005	4.7E-11
		S	0.0005	2.6E-11	4.1E-11		
Lu-178m	22.7 m	M	0.0005	3.3E-11	5.4E-11	0.0005	3.8E-11
		S	0.0005	3.5E-11	5.6E-11		
Lu-179	4.59 h	M	0.0005	1.1E-10	1.6E-10	0.0005	2.1E-10
		S	0.0005	1.2E-10	1.6E-10		
<b>Hafnium</b>							
Hf-170	16.01 h	F	0.002	1.7E-10	2.9E-10	0.002	4.8E-10
		M	0.002	3.2E-10	4.3E-10		
Hf-172	1.87 y	F	0.002	3.2E-08	3.7E-08	0.002	1.0E-09
		M	0.002	1.9E-08	1.3E-08		
Hf-173	24.0 h	F	0.002	7.9E-11	1.3E-10	0.002	2.3E-10
		M	0.002	1.6E-10	2.2E-10		
Hf-175	70 d	F	0.002	7.2E-10	8.7E-10	0.002	4.1E-10
		M	0.002	1.1E-09	8.8E-10		

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Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Hf-177m	51.4 m	F	0.002	4.7E-11	8.4E-11	0.002	8.1E-11
		M	0.002	9.2E-11	1.5E-10		
Hf-178m	31 y	F	0.002	2.6E-07	3.1E-07	0.002	4.7E-09
		M	0.002	1.1E-07	7.8E-08		
Hf-179m	25.1 d	F	0.002	1.1E-09	1.4E-09	0.002	1.2E-09
		M	0.002	3.6E-09	3.2E-09		
Hf-180m	5.5 h	F	0.002	6.4E-11	1.2E-10	0.002	1.7E-10
		M	0.002	1.4E-10	2.0E-10		
Hf-181	42.4 d	F	0.002	1.4E-09	1.8E-09	0.002	1.1E-09
		M	0.002	4.7E-09	4.1E-09		
Hf-182	9E6 y	F	0.002	3.0E-07	3.6E-07	0.002	3.0E-09
		M	0.002	1.2E-07	8.3E-08		
Hf-182m	61.5 m	F	0.002	2.3E-11	4.0E-11	0.002	4.2E-11
		M	0.002	4.7E-11	7.1E-11		
Hf-183	64 m	F	0.002	2.6E-11	4.4E-11	0.002	7.3E-11
		M	0.002	5.8E-11	8.3E-11		
Hf-184	4.12 h	F	0.002	1.3E-10	2.3E-10	0.002	5.2E-10
		M	0.002	3.3E-10	4.5E-10		
<b>Tantalum</b>							
Ta-172	36.8 m	M	0.001	3.4E-11	5.5E-11	0.001	5.3E-11
		S	0.001	3.6E-11	5.7E-11		
Ta-173	3.65 h	M	0.001	1.1E-10	1.6E-10	0.001	1.9E-10
		S	0.001	1.2E-10	1.6E-10		
Ta-174	1.2 h	M	0.001	4.2E-11	6.3E-11	0.001	5.7E-11
		S	0.001	4.4E-11	6.6E-11		
Ta-175	10.5 h	M	0.001	1.3E-10	2.0E-10	0.001	2.1E-10
		S	0.001	1.4E-10	2.0E-10		
Ta-176	8.08 h	M	0.001	2.0E-10	3.2E-10	0.001	3.1E-10
		S	0.001	2.1E-10	3.3E-10		
Ta-177	56.6 h	M	0.001	9.3E-11	1.2E-10	0.001	1.1E-10
		S	0.001	1.0E-10	1.3E-10		
Ta-178m	2.2 h	M	0.001	6.6E-11	1.0E-10	0.001	7.8E-11
		S	0.001	6.9E-11	1.1E-10		
Ta-179	664.9 d	M	0.001	2.0E-10	1.3E-10	0.001	6.5E-11
		S	0.001	5.2E-10	2.9E-10		
Ta-180	1.0E13 y	M	0.001	6.0E-09	4.6E-09	0.001	8.4E-10
		S	0.001	2.4E-08	1.4E-08		
Ta-180m	8.1 h	M	0.001	4.4E-11	5.8E-11	0.001	5.4E-11
		S	0.001	4.7E-11	6.2E-11		
Ta-182	115.0 d	M	0.001	7.2E-09	5.8E-09	0.001	1.5E-09
		S	0.001	9.7E-09	7.4E-09		
Ta-182m	15.84 m	M	0.001	2.1E-11	3.4E-11	0.001	1.2E-11
		S	0.001	2.2E-11	3.6E-11		
Ta-183	5.1 d	M	0.001	1.8E-09	1.8E-09	0.001	1.3E-09
		S	0.001	2.0E-09	2.0E-09		



Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_i$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_i$	$e$ (Sv/Bq)
Ta-184	8.7 h	M	0.001	4.1E-10	6.0E-10	0.001	6.8E-10
		S	0.001	4.4E-10	6.3E-10		
Ta-185	49 m	M	0.001	4.6E-11	6.8E-11	0.001	6.8E-11
		S	0.001	4.9E-11	7.2E-11		
Ta-186	10.5 m	M	0.001	1.8E-11	3.0E-11	0.001	3.3E-11
		S	0.001	1.9E-11	3.1E-11		
<b>Tungsten</b>							
W-176	2.3 h	F	0.3	4.4E-11	7.6E-11	0.3	1.0E-10
						0.01	1.1E-10
W-177	135 m	F	0.3	2.6E-11	4.6E-11	0.3	5.8E-11
						0.01	6.1E-11
W-178	21.7 d	F	0.3	7.6E-11	1.2E-10	0.3	2.2E-10
						0.01	2.5E-10
W-179	37.5 m	F	0.3	9.9E-13	1.8E-12	0.3	3.3E-12
						0.01	3.3E-12
W-181	121.2 d	F	0.3	2.8E-11	4.3E-11	0.3	7.6E-11
						0.01	8.2E-11
W-185	75.1 d	F	0.3	1.4E-10	2.2E-10	0.3	4.4E-10
						0.01	5.0E-10
W-187	23.9 h	F	0.3	2.0E-10	3.3E-10	0.3	6.3E-10
						0.01	7.1E-10
W-188	69.4 d	F	0.3	5.9E-10	8.4E-10	0.3	2.1E-09
						0.01	2.3E-09
<b>Rhenium</b>							
Re-177	14.0 m	F	0.8	1.0E-11	1.7E-11	0.8	2.2E-11
		M	0.8	1.4E-11	2.2E-11		
Re-178	13.2 m	F	0.8	1.1E-11	1.8E-11	0.8	2.5E-11
		M	0.8	1.5E-11	2.4E-11		
Re-181	20 h	F	0.8	1.9E-10	3.0E-10	0.8	4.2E-10
		M	0.8	2.5E-10	3.7E-10		
Re-182	64.0 h	F	0.8	6.8E-10	1.1E-09	0.8	1.4E-09
		M	0.8	1.3E-09	1.7E-09		
Re-182m	12.7 h	F	0.8	1.5E-10	2.4E-10	0.8	2.7E-10
		M	0.8	2.0E-10	3.0E-10		
Re-184	38.0 d	F	0.8	4.6E-10	7.0E-10	0.8	1.0E-09
		M	0.8	1.8E-09	1.8E-09		
Re-184m	165 d	F	0.8	6.1E-10	8.8E-10	0.8	1.5E-09
		M	0.8	6.1E-09	4.8E-09		
Re-186	90.64 h	F	0.8	5.3E-10	7.3E-10	0.8	1.5E-09
		M	0.8	1.1E-09	1.2E-09		
Re-186m	2.0E5 y	F	0.8	8.5E-10	1.2E-09	0.8	2.2E-09
		M	0.8	1.1E-08	7.9E-09		
Re-187	5E10 y	F	0.8	1.9E-12	2.6E-12	0.8	5.1E-12
		M	0.8	6.0E-12	4.6E-12		
Re-188	16.98 h	F	0.8	4.7E-10	6.6E-10	0.8	1.4E-09
		M	0.8	5.5E-10	7.4E-10		

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Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Re-188m	18.6 m	F	0.8	1.0E-11	1.6E-11	0.8	3.0E-11
		M	0.8	1.4E-11	2.0E-11		
Re-189	24.3 h	F	0.8	2.7E-10	4.3E-10	0.8	7.8E-10
		M	0.8	4.3E-10	6.0E-10		
<b>Osmium</b>							
Os-180	22 m	F	0.01	8.8E-12	1.6E-11	0.01	1.7E-11
		M	0.01	1.4E-11	2.4E-11		
		S	0.01	1.5E-11	2.5E-11		
Os-181	105 m	F	0.01	3.6E-11	6.4E-11	0.01	8.9E-11
		M	0.01	6.3E-11	9.6E-11		
		S	0.01	6.6E-11	1.0E-10		
Os-182	22 h	F	0.01	1.9E-10	3.2E-10	0.01	5.6E-10
		M	0.01	3.7E-10	5.0E-10		
		S	0.01	3.9E-10	5.2E-10		
Os-185	94 d	F	0.01	1.1E-09	1.4E-09	0.01	5.1E-10
		M	0.01	1.2E-09	1.0E-09		
		S	0.01	1.5E-09	1.1E-09		
Os-189m	6.0 h	F	0.01	2.7E-12	5.2E-12	0.01	1.8E-11
		M	0.01	5.1E-12	7.6E-12		
		S	0.01	5.4E-12	7.9E-12		
Os-191	15.4 d	F	0.01	2.5E-10	3.5E-10	0.01	5.7E-10
		M	0.01	1.5E-09	1.3E-09		
		S	0.01	1.8E-09	1.5E-09		
Os-191m	13.03 h	F	0.01	2.6E-11	4.1E-11	0.01	9.6E-11
		M	0.01	1.3E-10	1.3E-10		
		S	0.01	1.5E-10	1.4E-10		
Os-193	30.0 h	F	0.01	1.7E-10	2.8E-10	0.01	8.1E-10
		M	0.01	4.7E-10	6.4E-10		
		S	0.01	5.1E-10	6.8E-10		
Os-194	6.0 y	F	0.01	1.1E-08	1.3E-08	0.01	2.4E-09
		M	0.01	2.0E-08	1.3E-08		
		S	0.01	7.9E-08	4.2E-08		
<b>Iridium</b>							
Ir-182	15 m	F	0.01	1.5E-11	2.6E-11	0.01	4.8E-11
		M	0.01	2.4E-11	3.9E-11		
		S	0.01	2.5E-11	4.0E-11		
Ir-184	3.02 h	F	0.01	6.7E-11	1.2E-10	0.01	1.7E-10
		M	0.01	1.1E-10	1.8E-10		
		S	0.01	1.2E-10	1.9E-10		
Ir-185	14.0 h	F	0.01	8.8E-11	1.5E-10	0.01	2.6E-10
		M	0.01	1.8E-10	2.5E-10		
		S	0.01	1.9E-10	2.6E-10		
Ir-186	15.8 h	F	0.01	1.8E-10	3.3E-10	0.01	4.9E-10
		M	0.01	3.2E-10	4.8E-10		
		S	0.01	3.3E-10	5.0E-10		

Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_i$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_i$	$e$ (Sv/Bq)
Ir-186m	1.75 h	F	0.01	2.5E-11	4.5E-11	0.01	6.1E-11
		M	0.01	4.3E-11	6.9E-11		
		S	0.01	4.5E-11	7.1E-11		
Ir-187	10.5 h	F	0.01	4.0E-11	7.2E-11	0.01	1.2E-10
		M	0.01	7.5E-11	1.1E-10		
		S	0.01	7.9E-11	1.2E-10		
Ir-188	41.5 h	F	0.01	2.6E-10	4.4E-10	0.01	6.3E-10
		M	0.01	4.1E-10	6.0E-10		
		S	0.01	4.3E-10	6.2E-10		
Ir-189	13.3 d	F	0.01	1.1E-10	1.7E-10	0.01	2.4E-10
		M	0.01	4.8E-10	4.1E-10		
		S	0.01	5.5E-10	4.6E-10		
Ir-190	12.1 d	F	0.01	7.9E-10	1.2E-09	0.01	1.2E-09
		M	0.01	2.0E-09	2.3E-09		
		S	0.01	2.3E-09	2.5E-09		
Ir-190n	3.1 h	F	0.01	5.3E-11	9.7E-11	0.01	1.2E-10
		M	0.01	8.3E-11	1.4E-10		
		S	0.01	8.6E-11	1.4E-10		
Ir-190m	1.2 h	F	0.01	3.7E-12	5.6E-12	0.01	8.0E-12
		M	0.01	9.0E-12	1.0E-11		
		S	0.01	1.0E-11	1.1E-11		
Ir-192	74.02 d	F	0.01	1.8E-09	2.2E-09	0.01	1.4E-09
		M	0.01	4.9E-09	4.1E-09		
		S	0.01	6.2E-09	4.9E-09		
Ir-192m	241 y	F	0.01	4.8E-09	5.6E-09	0.01	3.1E-10
		M	0.01	5.4E-09	3.4E-09		
		S	0.01	3.6E-08	1.9E-08		
Ir-193m	11.9 d	F	0.01	1.0E-10	1.6E-10	0.01	2.7E-10
		M	0.01	1.0E-09	9.1E-10		
		S	0.01	1.2E-09	1.0E-09		
Ir-194	19.15 h	F	0.01	2.2E-10	3.6E-10	0.01	1.3E-09
		M	0.01	5.3E-10	7.1E-10		
		S	0.01	5.6E-10	7.5E-10		
Ir-194m	171 d	F	0.01	5.4E-09	6.5E-09	0.01	2.1E-09
		M	0.01	8.5E-09	6.5E-09		
		S	0.01	1.2E-08	8.2E-09		
Ir-195	2.5 h	F	0.01	2.6E-11	4.5E-11	0.01	1.0E-10
		M	0.01	6.7E-11	9.6E-11		
		S	0.01	7.2E-11	1.0E-10		
Ir-195m	3.8 h	F	0.01	6.5E-11	1.1E-10	0.01	2.1E-10
		M	0.01	1.6E-10	2.3E-10		
		S	0.01	1.7E-10	2.4E-10		
<b>Platinum</b>							
Pt-186	2.0 h	F	0.01	3.6E-11	6.6E-11	0.01	9.3E-11
Pt-188	10.2 d	F	0.01	4.3E-10	6.3E-10	0.01	7.6E-10
Pt-189	10.87 h	F	0.01	4.1E-11	7.3E-11	0.01	1.2E-10

(continued on next page)

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Pt-191	2.8 d	F	0.01	1.1E-10	1.9E-10	0.01	3.4E-10
Pt-193	50 y	F	0.01	2.1E-11	2.7E-11	0.01	3.1E-11
Pt-193m	4.33 d	F	0.01	1.3E-10	2.1E-10	0.01	4.5E-10
Pt-195m	4.02 d	F	0.01	1.9E-10	3.1E-10	0.01	6.3E-10
Pt-197	18.3 h	F	0.01	9.1E-11	1.6E-10	0.01	4.0E-10
Pt-197m	94.4 m	F	0.01	2.5E-11	4.3E-11	0.01	8.4E-11
Pt-199	30.8 m	F	0.01	1.3E-11	2.2E-11	0.01	3.9E-11
Pt-200	12.5 h	F	0.01	2.4E-10	4.0E-10	0.01	1.2E-09
<b>Gold</b>							
Au-193	17.65 h	F	0.1	3.9E-11	7.1E-11	0.1	1.3E-10
		M	0.1	1.1E-10	1.5E-10		
		S	0.1	1.2E-10	1.6E-10		
Au-194	39.5 h	F	0.1	1.5E-10	2.8E-10	0.1	4.2E-10
		M	0.1	2.4E-10	3.7E-10		
		S	0.1	2.5E-10	3.8E-10		
Au-195	183 d	F	0.1	7.1E-11	1.2E-10	0.1	2.5E-10
		M	0.1	1.0E-09	8.0E-10		
		S	0.1	1.6E-09	1.2E-09		
Au-198	2.696 d	F	0.1	2.3E-10	3.9E-10	0.1	1.0E-09
		M	0.1	7.6E-10	9.8E-10		
		S	0.1	8.4E-10	1.1E-09		
Au-198m	2.30 d	F	0.1	3.4E-10	5.9E-10	0.1	1.3E-09
		M	0.1	1.7E-09	2.0E-09		
		S	0.1	1.9E-09	1.9E-09		
Au-199	3.139 d	F	0.1	1.1E-10	1.9E-10	0.1	4.4E-10
		M	0.1	6.8E-10	6.8E-10		
		S	0.1	7.5E-10	7.6E-10		
Au-200	48.4 m	F	0.1	1.7E-11	3.0E-11	0.1	6.8E-11
		M	0.1	3.5E-11	5.3E-11		
		S	0.1	3.6E-11	5.6E-11		
Au-200m	18.7 h	F	0.1	3.2E-10	5.7E-10	0.1	1.1E-09
		M	0.1	6.9E-10	9.8E-10		
		S	0.1	7.3E-10	1.0E-09		
Au-201	26.4 m	F	0.1	9.2E-12	1.6E-11	0.1	2.4E-11
		M	0.1	1.7E-11	2.8E-11		
		S	0.1	1.8E-11	2.9E-11		
<b>Mercury</b>							
Hg-193	3.5 h	F <sup>‡</sup>	0.02	2.8E-11	5.0E-11	0.02 <sup>‡</sup>	8.2E-11
		M <sup>‡</sup>	0.02	7.5E-11	1.0E-10	1.0 <sup>§</sup>	3.1E-11
		F <sup>§</sup>	0.4	2.6E-11	4.7E-11	0.4 <sup>§</sup>	6.6E-11
Hg-193m	11.1 h	F <sup>‡</sup>	0.02	1.2E-10	2.3E-10	0.02 <sup>‡</sup>	4.0E-10
		M <sup>‡</sup>	0.02	2.6E-10	3.8E-10	1.0 <sup>§</sup>	1.3E-10
		F <sup>§</sup>	0.4	1.1E-10	2.0E-10	0.4 <sup>§</sup>	3.0E-10
Hg-194	260 y	F <sup>‡</sup>	0.02	1.3E-08	1.5E-08	0.02 <sup>‡</sup>	1.4E-09
		M <sup>‡</sup>	0.02	7.8E-09	5.3E-09	1.0 <sup>§</sup>	5.1E-08
		F <sup>§</sup>	0.4	1.5E-08	1.9E-08	0.4 <sup>§</sup>	2.1E-08

‡ Inorganic mercury.

§ Organic mercury.

Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	T <sub>½</sub>	Inhalation				Ingestion	
		Type	f <sub>i</sub>	e (Sv/Bq) (1 µm)	e (Sv/Bq) (5 µm)	f <sub>i</sub>	e (Sv/Bq)
Hg-195	9.9 h	F <sup>‡</sup>	0.02	2.7E-11	4.8E-11	0.02 <sup>‡</sup>	9.7E-11
		M <sup>‡</sup>	0.02	7.2E-11	9.2E-11	1.0 <sup>§</sup>	3.4E-11
		F <sup>§</sup>	0.4	2.4E-11	4.4E-11	0.4 <sup>§</sup>	7.5E-11
Hg-195m	41.6 h	F <sup>‡</sup>	0.02	1.5E-10	2.6E-10	0.02 <sup>‡</sup>	5.6E-10
		M <sup>‡</sup>	0.02	5.1E-10	6.5E-10	1.0 <sup>§</sup>	2.2E-10
		F <sup>§</sup>	0.4	1.3E-10	2.2E-10	0.4 <sup>§</sup>	4.1E-10
Hg-197	64.1 h	F <sup>‡</sup>	0.02	6.0E-11	1.0E-10	0.02 <sup>‡</sup>	2.3E-10
		M <sup>‡</sup>	0.02	2.9E-10	2.8E-10	1.0 <sup>§</sup>	9.9E-11
		F <sup>§</sup>	0.4	5.0E-11	8.5E-11	0.4 <sup>§</sup>	1.7E-10
Hg-197m	23.8 h	F <sup>‡</sup>	0.02	1.2E-10	2.1E-10	0.02 <sup>‡</sup>	4.7E-10
		M <sup>‡</sup>	0.02	5.1E-10	6.6E-10	1.0 <sup>§</sup>	1.5E-10
		F <sup>§</sup>	0.4	1.0E-10	1.8E-10	0.4 <sup>§</sup>	3.4E-10
Hg-199m	42.6 m	F <sup>‡</sup>	0.02	1.6E-11	2.7E-11	0.02 <sup>‡</sup>	3.1E-11
		M <sup>‡</sup>	0.02	3.3E-11	5.2E-11	1.0 <sup>§</sup>	2.8E-11
		F <sup>§</sup>	0.4	1.6E-11	2.7E-11	0.4 <sup>§</sup>	3.1E-11
Hg-203	46.60 d	F <sup>‡</sup>	0.02	4.7E-10	5.9E-10	0.02 <sup>‡</sup>	5.4E-10
		M <sup>‡</sup>	0.02	2.3E-09	1.9E-09	1.0 <sup>§</sup>	1.9E-09
		F <sup>§</sup>	0.4	5.7E-10	7.5E-10	0.4 <sup>§</sup>	1.1E-09
<b>Thallium</b>							
Tl-194	33 m	F	1.0	4.8E-12	8.9E-12	1.0	8.1E-12
Tl-194m	32.8 m	F	1.0	2.0E-11	3.6E-11	1.0	4.0E-11
Tl-195	1.16 h	F	1.0	1.6E-11	3.0E-11	1.0	2.7E-11
Tl-197	2.84 h	F	1.0	1.5E-11	2.7E-11	1.0	2.3E-11
Tl-198	5.3 h	F	1.0	6.6E-11	1.2E-10	1.0	7.3E-11
Tl-198m	1.87 h	F	1.0	4.0E-11	7.3E-11	1.0	5.4E-11
Tl-199	7.42 h	F	1.0	2.0E-11	3.7E-11	1.0	2.6E-11
Tl-200	26.1 h	F	1.0	1.4E-10	2.5E-10	1.0	2.0E-10
Tl-201	3.044 d	F	1.0	4.7E-11	7.6E-11	1.0	9.5E-11
Tl-202	12.23 d	F	1.0	2.0E-10	3.1E-10	1.0	4.5E-10
Tl-204	3.779 y	F	1.0	4.4E-10	6.2E-10	1.0	1.3E-09
<b>Lead</b>							
Pb-195m	15.8 m	F	0.2	1.7E-11	3.0E-11	0.2	2.9E-11
Pb-198	2.4 h	F	0.2	4.7E-11	8.7E-11	0.2	1.0E-10
Pb-199	90 m	F	0.2	2.6E-11	4.8E-11	0.2	5.4E-11
Pb-200	21.5 h	F	0.2	1.5E-10	2.6E-10	0.2	4.0E-10
Pb-201	9.4 h	F	0.2	6.5E-11	1.2E-10	0.2	1.6E-10
Pb-202	3E5 y	F	0.2	1.1E-08	1.4E-08	0.2	8.7E-09
Pb-202m	3.62 h	F	0.2	6.7E-11	1.2E-10	0.2	1.3E-10
Pb-203	52.05 h	F	0.2	9.1E-11	1.6E-10	0.2	2.4E-10
Pb-205	1.43E7 y	F	0.2	3.4E-10	4.1E-10	0.2	2.8E-10
Pb-209	3.253 h	F	0.2	1.8E-11	3.2E-11	0.2	5.7E-11
Pb-210	22.3 y	F	0.2	8.9E-07	1.1E-06	0.2	6.8E-07
Pb-211	36.1 m	F	0.2	3.9E-09	5.6E-09	0.2	1.8E-10

(continued on next page)

‡ Inorganic mercury.

§ Organic mercury.

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Pb-212	10.64 h	F	0.2	1.9E-08	3.3E-08	0.2	5.9E-09
Pb-214	26.8 m	F	0.2	2.9E-09	4.8E-09	0.2	1.4E-10
<b>Bismuth</b>							
Bi-200	36.4 m	F	0.05	2.4E-11	4.2E-11	0.05	5.1E-11
		M	0.05	3.4E-11	5.6E-11		
Bi-201	108 m	F	0.05	4.7E-11	8.3E-11	0.05	1.2E-10
		M	0.05	7.0E-11	1.1E-10		
Bi-202	1.67 h	F	0.05	4.6E-11	8.4E-11	0.05	8.9E-11
		M	0.05	5.8E-11	1.0E-10		
Bi-203	11.76 h	F	0.05	2.0E-10	3.6E-10	0.05	4.8E-10
		M	0.05	2.8E-10	4.5E-10		
Bi-205	15.31 d	F	0.05	4.0E-10	6.8E-10	0.05	9.0E-10
		M	0.05	9.2E-10	1.0E-09		
Bi-206	6.243 d	F	0.05	7.9E-10	1.3E-09	0.05	1.9E-09
		M	0.05	1.7E-09	2.1E-09		
Bi-207	38 y	F	0.05	5.2E-10	8.4E-10	0.05	1.3E-09
		M	0.05	5.2E-09	3.2E-09		
Bi-210	5.012 d	F	0.05	1.1E-09	1.4E-09	0.05	1.3E-09
		M	0.05	8.4E-08	6.0E-08		
Bi-210m	3.0E6 y	F	0.05	4.5E-08	5.3E-08	0.05	1.5E-08
		M	0.05	3.1E-06	2.1E-06		
Bi-212	60.55 m	F	0.05	9.3E-09	1.5E-08	0.05	2.6E-10
		M	0.05	3.0E-08	3.9E-08		
Bi-213	45.65 m	F	0.05	1.1E-08	1.8E-08	0.05	2.0E-10
		M	0.05	2.9E-08	4.1E-08		
Bi-214	19.9 m	F	0.05	7.2E-09	1.2E-08	0.05	1.1E-10
		M	0.05	1.4E-08	2.1E-08		
<b>Polonium</b>							
Po-203	36.7 m	F	0.1	2.5E-11	4.5E-11	0.1	5.2E-11
		M	0.1	3.6E-11	6.1E-11		
Po-205	1.80 h	F	0.1	3.5E-11	6.0E-11	0.1	5.9E-11
		M	0.1	6.4E-11	8.9E-11		
Po-207	350 m	F	0.1	6.3E-11	1.2E-10	0.1	1.4E-10
		M	0.1	8.4E-11	1.5E-10		
Po-210	138.38 d	F	0.1	6.0E-07	7.1E-07	0.1	2.4E-07
		M	0.1	3.0E-06	2.2E-06		
<b>Astatine</b>							
At-207	1.80 h	F	1.0	3.5E-10	4.4E-10	1.0	2.3E-10
		M	1.0	2.1E-09	1.9E-09		
At-211	7.214 h	F	1.0	1.6E-08	2.7E-08	1.0	1.1E-08
		M	1.0	9.8E-08	1.1E-07		
<b>Francium</b>							
Fr-222	14.4 m	F	1.0	1.4E-08	2.1E-08	1.0	7.1E-10
Fr-223	21.8 m	F	1.0	9.1E-10	1.3E-09	1.0	2.3E-09

Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	T <sub>1/2</sub>	Inhalation				Ingestion	
		Type	f <sub>1</sub>	e (Sv/Bq) (1 μm)	e (Sv/Bq) (5 μm)	f <sub>1</sub>	e (Sv/Bq)
<b>Radium</b>							
Ra-223	11.434 d	M	0.2	6.9E-06	5.7E-06	0.2	1.0E-07
Ra-224	3.66 d	M	0.2	2.9E-06	2.4E-06	0.2	6.5E-08
Ra-225	14.8 d	M	0.2	5.8E-06	4.8E-06	0.2	9.5E-08
Ra-226	1600 y	M	0.2	3.2E-06	2.2E-06	0.2	2.8E-07
Ra-227	42.2 m	M	0.2	2.8E-10	2.1E-10	0.2	8.4E-11
Ra-228	5.75 y	M	0.2	2.6E-06	1.7E-06	0.2	6.7E-07
<b>Actinium</b>							
Ac-224	2.9 h	F	0.0005	1.1E-08	1.3E-08	0.0005	7.0E-10
		M	0.0005	1.0E-07	8.9E-08		
		S	0.0005	1.2E-07	9.9E-08		
Ac-225	10.0 d	F	0.0005	8.7E-07	1.0E-06	0.0005	2.4E-08
		M	0.0005	6.9E-06	5.7E-06		
		S	0.0005	7.9E-06	6.5E-06		
Ac-226	29 h	F	0.0005	9.5E-08	2.2E-07	0.0005	1.0E-08
		M	0.0005	1.1E-06	9.2E-07		
		S	0.0005	1.2E-06	1.0E-06		
Ac-227	21.773 y	F	0.0005	5.4E-04	6.3E-04	0.0005	1.1E-06
		M	0.0005	2.1E-04	1.5E-04		
		S	0.0005	6.6E-05	4.7E-05		
Ac-228	6.13 h	F	0.0005	2.5E-08	2.9E-08	0.0005	4.3E-10
		M	0.0005	1.6E-08	1.2E-08		
		S	0.0005	1.4E-08	1.2E-08		
<b>Thorium</b>							
Th-226	30.9 m	M	0.0005	5.5E-08	7.4E-08	0.0005	3.5E-10
		S	0.0002	5.9E-08	7.8E-08		
Th-227	18.718 d	M	0.0005	7.8E-06	6.2E-06	0.0005	8.9E-09
		S	0.0002	9.6E-06	7.6E-06		
Th-228	1.9131 y	M	0.0005	3.0E-05	2.2E-05	0.0005	7.2E-08
		S	0.0002	3.7E-05	2.5E-05		
Th-229	7340 y	M	0.0005	9.9E-05	6.9E-05	0.0005	4.8E-07
		S	0.0002	6.5E-05	4.8E-05		
Th-230	7.7E4 y	M	0.0005	4.0E-05	2.8E-05	0.0005	2.1E-07
		S	0.0002	1.3E-05	7.2E-06		
Th-231	25.52 h	M	0.0005	2.9E-10	3.7E-10	0.0005	3.4E-10
		S	0.0002	3.2E-10	4.0E-10		
Th-232	1.405E1 y	M	0.0005	4.2E-05	2.9E-05	0.0005	2.2E-07
		S	0.0002	2.3E-05	1.2E-05		
Th-234	24.10 d	M	0.0005	6.3E-09	5.3E-09	0.0005	3.4E-09
		S	0.0002	7.3E-09	5.8E-09		
<b>Protactinium</b>							
Pa-227	38.3 m	M	0.0005	7.0E-08	9.0E-08	0.0005	4.5E-10
		S	0.0005	7.6E-08	9.7E-08		
Pa-228	22 h	M	0.0005	5.9E-08	4.6E-08	0.0005	7.8E-10
		S	0.0005	6.9E-08	5.1E-08		

(continued on next page)

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Pa-230	17.4 d	M	0.0005	5.6E-07	4.6E-07	0.0005	9.2E-10
		S	0.0005	7.1E-07	5.7E-07		
Pa-231	3.276E4 y	M	0.0005	1.3E-04	8.9E-05	0.0005	7.1E-07
		S	0.0005	3.2E-05	1.7E-05		
Pa-232	1.31 d	M	0.0005	9.5E-09	6.8E-09	0.0005	7.2E-10
		S	0.0005	3.2E-09	2.0E-09		
Pa-233	27.0 d	M	0.0005	3.1E-09	2.8E-09	0.0005	8.7E-10
		S	0.0005	3.7E-09	3.2E-09		
Pa-234	6.70 h	M	0.0005	3.8E-10	5.5E-10	0.0005	5.1E-10
		S	0.0005	4.0E-10	5.8E-10		
<b>Uranium</b>							
U-230	20.8 d	F	0.02	3.6E-07	4.2E-07	0.02	5.5E-08
		M	0.02	1.2E-05	1.0E-05	0.002	2.8E-08
		S	0.002	1.5E-05	1.2E-05		
U-231	4.2 d	F	0.02	6.7E-11	1.6E-10	0.02	2.8E-10
		M	0.02	4.3E-10	4.5E-10	0.002	2.8E-10
		S	0.002	4.8E-10	4.9E-10		
U-232	72 y	F	0.02	4.0E-06	4.7E-06	0.02	3.3E-07
		M	0.02	7.2E-06	4.8E-06	0.002	3.7E-08
		S	0.002	3.5E-05	2.6E-05		
U-233	1.585E5 y	F	0.02	5.7E-07	6.6E-07	0.02	5.0E-08
		M	0.02	3.2E-06	2.2E-06	0.002	8.5E-09
		S	0.002	8.7E-06	6.9E-06		
U-234	2.445E5 y	F	0.02	5.5E-07	6.4E-07	0.02	4.9E-08
		M	0.02	3.1E-06	2.1E-06	0.002	8.3E-09
		S	0.002	8.5E-06	6.8E-06		
U-235	703.8E6 y	F	0.02	5.1E-07	6.0E-07	0.02	4.6E-08
		M	0.02	2.8E-06	1.8E-06	0.002	8.3E-09
		S	0.002	7.7E-06	6.1E-06		
U-236	2.3415E7 y	F	0.02	5.2E-07	6.1E-07	0.02	4.6E-08
		M	0.02	2.9E-06	1.9E-06	0.002	7.9E-09
		S	0.002	7.9E-06	6.3E-06		
U-237	6.75 d	F	0.02	1.9E-10	3.3E-10	0.02	7.6E-10
		M	0.02	1.6E-09	1.5E-09	0.002	7.7E-10
		S	0.002	1.8E-09	1.7E-09		
U-238	4.468E9 y	F	0.02	4.9E-07	5.8E-07	0.02	4.4E-08
		M	0.02	2.6E-06	1.6E-06	0.002	7.6E-09
		S	0.002	7.3E-06	5.7E-06		
U-239	23.54 m	F	0.02	1.1E-11	1.8E-11	0.02	2.7E-11
		M	0.02	2.3E-11	3.3E-11	0.002	2.8E-11
		S	0.002	2.4E-11	3.5E-11		
U-240	14.1 h	F	0.02	2.1E-10	3.7E-10	0.02	1.1E-09
		M	0.02	5.3E-10	7.9E-10	0.002	1.1E-09
		S	0.002	5.7E-10	8.4E-10		



Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	T <sub>1/2</sub>	Inhalation				Ingestion	
		Type	f <sub>i</sub>	e (Sv/Bq) (1 μm)	e (Sv/Bq) (5 μm)	f <sub>i</sub>	e (Sv/Bq)
<b>Neptunium</b>							
Np-232	14.7 m	M	0.0005	4.7E-11	3.5E-11	0.0005	9.7E-12
Np-233	36.2 m	M	0.0005	1.7E-12	3.0E-12	0.0005	2.2E-12
Np-234	4.4 d	M	0.0005	5.4E-10	7.3E-10	0.0005	8.1E-10
Np-235	396.1 d	M	0.0005	4.0E-10	2.7E-10	0.0005	5.3E-11
Np-236	115E3 y	M	0.0005	3.0E-06	2.0E-06	0.0005	1.7E-08
Np-236m	22.5 h	M	0.0005	5.0E-09	3.6E-09	0.0005	1.9E-10
Np-237	2.14E6 y	M	0.0005	2.1E-05	1.5E-05	0.0005	1.1E-07
Np-238	2.117 d	M	0.0005	2.0E-09	1.7E-09	0.0005	9.1E-10
Np-239	2.355 d	M	0.0005	9.0E-10	1.1E-09	0.0005	8.0E-10
Np-240	65 m	M	0.0005	8.7E-11	1.3E-10	0.0005	8.2E-11
<b>Plutonium</b>							
Pu-234	8.8 h	M	0.0005	1.9E-08	1.6E-08	0.0005	1.6E-10
		S	0.00001	2.2E-08	1.8E-08	0.0001	1.6E-10
Pu-235	25.3 m	M	0.0005	1.5E-12	2.5E-12	0.0005	2.1E-12
		S	0.00001	1.6E-12	2.6E-12	0.0001	2.1E-12
Pu-236	2.851 y	M	0.0005	1.8E-05	1.3E-05	0.0005	8.6E-08
		S	0.00001	9.6E-06	7.4E-06	0.0001	2.1E-08
Pu-237	45.3 d	M	0.0005	3.3E-10	2.9E-10	0.0005	1.0E-10
		S	0.00001	3.6E-10	3.0E-10	0.0001	1.0E-10
Pu-238	87.74 y	M	0.0005	4.3E-05	3.0E-05	0.0005	2.3E-07
		S	0.00001	1.5E-05	1.1E-05	0.0001	4.9E-08
Pu-239	24065 y	M	0.0005	4.7E-05	3.2E-05	0.0005	2.5E-07
		S	0.00001	1.5E-05	8.3E-06	0.0001	5.3E-08
Pu-240	6537 y	M	0.0005	4.7E-05	3.2E-05	0.0005	2.5E-07
		S	0.00001	1.5E-05	8.3E-06	0.0001	5.3E-08
Pu-241	14.4 y	M	0.0005	8.5E-07	5.8E-07	0.0005	4.7E-09
		S	0.00001	1.6E-07	8.4E-08	0.0001	9.6E-10
Pu-242	3.763E5 y	M	0.0005	4.4E-05	3.1E-05	0.0005	2.4E-07
		S	0.00001	1.4E-05	7.7E-06	0.0001	5.0E-08
Pu-243	4.956 h	M	0.0005	8.2E-11	1.1E-10	0.0005	8.5E-11
		S	0.00001	8.5E-11	1.1E-10	0.0001	8.5E-11
Pu-244	8.26E7 y	M	0.0005	4.4E-05	3.0E-05	0.0005	2.4E-07
		S	0.00001	1.3E-05	7.4E-06	0.0001	5.2E-08
						1.0E-05	1.1E-08

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Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Pu-245	10.5 h	M	0.0005	4.5E-10	6.1E-10	0.0005	7.2E-10
		S	0.00001	4.8E-10	6.5E-10	0.0001	7.2E-10
Pu-246	10.85 d	M	0.0005	7.0E-09	6.5E-09	1.0E-05	7.2E-10
		S	0.00001	7.6E-09	7.0E-09	0.0001	3.3E-09
<b>Americium</b>							
Am-237	73.0 m	M	0.0005	2.5E-11	3.6E-11	0.0005	1.8E-11
Am-238	98 m	M	0.0005	8.5E-11	6.6E-11	0.0005	3.2E-11
Am-239	11.9 h	M	0.0005	2.2E-10	2.9E-10	0.0005	2.4E-10
Am-240	50.8 h	M	0.0005	4.4E-10	5.9E-10	0.0005	5.8E-10
Am-241	432.2 y	M	0.0005	3.9E-05	2.7E-05	0.0005	2.0E-07
Am-242	16.02 h	M	0.0005	1.6E-08	1.2E-08	0.0005	3.0E-10
Am-242m	152 y	M	0.0005	3.5E-05	2.4E-05	0.0005	1.9E-07
Am-243	7380 y	M	0.0005	3.9E-05	2.7E-05	0.0005	2.0E-07
Am-244	10.1 h	M	0.0005	1.9E-09	1.5E-09	0.0005	4.6E-10
Am-244m	26 m	M	0.0005	7.9E-11	6.2E-11	0.0005	2.9E-11
Am-245	2.05 h	M	0.0005	5.3E-11	7.6E-11	0.0005	6.2E-11
Am-246	39 m	M	0.0005	6.8E-11	1.1E-10	0.0005	5.8E-11
Am-246m	25.0 m	M	0.0005	2.3E-11	3.8E-11	0.0005	3.4E-11
<b>Curium</b>							
Cm-238	2.4 h	M	0.0005	4.1E-09	4.8E-09	0.0005	8.0E-11
Cm-240	27 d	M	0.0005	2.9E-06	2.3E-06	0.0005	7.6E-09
Cm-241	32.8 d	M	0.0005	3.4E-08	2.6E-08	0.0005	9.1E-10
Cm-242	162.8 d	M	0.0005	4.8E-06	3.7E-06	0.0005	1.2E-08
Cm-243	28.5 y	M	0.0005	2.9E-05	2.0E-05	0.0005	1.5E-07
Cm-244	18.11 y	M	0.0005	2.5E-05	1.7E-05	0.0005	1.2E-07
Cm-245	8500 y	M	0.0005	4.0E-05	2.7E-05	0.0005	2.1E-07
Cm-246	4730 y	M	0.0005	4.0E-05	2.7E-05	0.0005	2.1E-07
Cm-247	1.56E7 y	M	0.0005	3.6E-05	2.5E-05	0.0005	1.9E-07
Cm-248	3.39E5 y	M	0.0005	1.4E-04	9.5E-05	0.0005	7.7E-07
Cm-249	64.15 m	M	0.0005	3.2E-11	5.1E-11	0.0005	3.1E-11
Cm-250	6900 y	M	0.0005	7.9E-04	5.4E-04	0.0005	4.4E-06
<b>Berkelium</b>							
Bk-245	4.94 d	M	0.0005	2.0E-09	1.8E-09	0.0005	5.7E-10
Bk-246	1.83 d	M	0.0005	3.4E-10	4.6E-10	0.0005	4.8E-10
Bk-247	1380 y	M	0.0005	6.5E-05	4.5E-05	0.0005	3.5E-07
Bk-249	320 d	M	0.0005	1.5E-07	1.0E-07	0.0005	9.7E-10
Bk-250	3.222 h	M	0.0005	9.6E-10	7.1E-10	0.0005	1.4E-10
<b>Californium</b>							
Cf-244	19.4 m	M	0.0005	1.3E-08	1.8E-08	0.0005	7.0E-11
Cf-246	35.7 h	M	0.0005	4.2E-07	3.5E-07	0.0005	3.3E-09
Cf-248	333.5 d	M	0.0005	8.2E-06	6.1E-06	0.0005	2.8E-08
Cf-249	350.6 y	M	0.0005	6.6E-05	4.5E-05	0.0005	3.5E-07
Cf-250	13.08 y	M	0.0005	3.2E-05	2.2E-05	0.0005	1.6E-07
Cf-251	898 y	M	0.0005	6.7E-05	4.6E-05	0.0005	3.6E-07

Compendium of Dose Coefficients based on ICRP Publication 60

Table A.1. (continued)

Nuclide	$T_{1/2}$	Inhalation				Ingestion	
		Type	$f_1$	$e$ (Sv/Bq) (1 $\mu\text{m}$ )	$e$ (Sv/Bq) (5 $\mu\text{m}$ )	$f_1$	$e$ (Sv/Bq)
Cf-252	2.638 y	M	0.0005	1.8E-05	1.3E-05	0.0005	9.0E-08
Cf-253	17.81 d	M	0.0005	1.2E-06	1.0E-06	0.0005	1.4E-09
Cf-254	60.5 d	M	0.0005	3.7E-05	2.2E-05	0.0005	4.0E-07
<b>Einsteinium</b>							
Es-250	2.1 h	M	0.0005	5.9E-10	4.2E-10	0.0005	2.1E-11
Es-251	33 h	M	0.0005	2.0E-09	1.7E-09	0.0005	1.7E-10
Es-253	20.47 d	M	0.0005	2.5E-06	2.1E-06	0.0005	6.1E-09
Es-254	275.7 d	M	0.0005	8.0E-06	6.0E-06	0.0005	2.8E-08
Es-254m	39.3 h	M	0.0005	4.4E-07	3.7E-07	0.0005	4.2E-09
<b>Fermium</b>							
Fm-252	22.7 h	M	0.0005	3.0E-07	2.6E-07	0.0005	2.7E-09
Fm-253	3.00 d	M	0.0005	3.7E-07	3.0E-07	0.0005	9.1E-10
Fm-254	3.240 h	M	0.0005	5.6E-08	7.7E-08	0.0005	4.4E-10
Fm-255	20.07 h	M	0.0005	2.5E-07	2.6E-07	0.0005	2.5E-09
Fm-257	100.5 d	M	0.0005	6.6E-06	5.2E-06	0.0005	1.5E-08
<b>Mendelevium</b>							
Md-257	5.2 h	M	0.0005	2.3E-08	2.0E-08	0.0005	1.2E-10
Md-258	55 d	M	0.0005	5.5E-06	4.4E-06	0.0005	1.3E-08



## ANNEX B. EFFECTIVE DOSE COEFFICIENTS FOR INHALATION OF SOLUBLE OR REACTIVE GASES FOR WORKERS

Table B.1. Effective dose coefficients ( $e$ ) for inhalation of soluble or reactive gases for workers.

Nuclide/chemical form	$T_{1/2}$	$e$ (Sv/Bq)
<b>Hydrogen</b>		
H-3 Organically bound tritium	12.35 y	4.1E-11
Tritium gas		1.8E-15*
Tritiated methane		1.8E-13
Tritiated water		1.8E-11 <sup>†</sup>
<b>Carbon</b>		
C-11 CO <sub>2</sub>	20.38 m	2.2E-12
CO		1.2E-12
Methane		2.7E-14
Organic gases/vapours		3.2E-12
C-14 CO <sub>2</sub>	5730 y	6.5E-12
CO		8.0E-13
Methane		2.9E-12
Organic gases/vapours		5.8E-10
<b>Sulphur</b>		
S-35 dioxide	87.44 d	1.2E-10
<b>Nickel</b>		
Ni-56 carbonyl	6.10 d	1.2E-09
Ni-57 carbonyl	36.08 h	5.6E-10
Ni-59 carbonyl	7.5E4 y	8.3E-10
Ni-63 carbonyl	96 y	2.0E-09
Ni-65 carbonyl	2.520 h	3.6E-10
Ni-66 carbonyl	54.6 h	1.6E-09
<b>Ruthenium</b>		
Ru-94 tetroxide	51.8 m	5.6E-11
Ru-97 tetroxide	2.9 d	1.2E-10
Ru-103 tetroxide	39.28 d	1.1E-09
Ru-105 tetroxide	4.44 h	1.8E-10
Ru-106 tetroxide	368.2 d	1.8E-08
<b>Tellurium</b>		
Te-116 vapour	2.49 h	8.7E-11
Te-121 vapour	17 d	5.1E-10
Te-121m vapour	154 d	5.5E-09
Te-123 vapour	1E13 y	1.2E-08
Te-123m vapour	119.7 d	2.9E-09
Te-125m vapour	58 d	1.5E-09
Te-127 vapour	9.35 h	7.7E-11
Te-127m vapour	109 d	4.6E-09
Te-129 vapour	69.6 m	3.7E-11

*(continued on next page)*

\*Irradiation from gas within the lungs may increase this value by approximately 20%.

<sup>†</sup>Dose from activity absorbed through the skin is not included here.

Table B.1. (*continued*)

Nuclide/chemical form	$T_{1/2}$	$e$ (Sv/Bq)
Te-129m vapour	33.6 d	3.7E-09
Te-131 vapour	25.0 m	6.8E-11
Te-131m vapour	30 h	2.4E-09
Te-132 vapour	78.2 h	5.1E-09
Te-133 vapour	12.45 m	5.6E-11
Te-133m vapour	55.4 m	2.2E-10
Te-134 vapour	41.8 m	8.4E-11
<b>Iodine</b>		
I-120 CH <sub>3</sub> I	81.0 m	2.0E-10
I <sub>2</sub>		3.0E-10
I-120m CH <sub>3</sub> I	53 m	1.0E-10
I <sub>2</sub>		1.8E-10
I-121 CH <sub>3</sub> I	2.12 h	5.6E-11
I <sub>2</sub>		8.6E-11
I-123 CH <sub>3</sub> I	13.2 h	1.5E-10
I <sub>2</sub>		2.1E-10
I-124 CH <sub>3</sub> I	4.18 d	9.2E-09
I <sub>2</sub>		1.2E-08
I-125 CH <sub>3</sub> I	60.14 d	1.1E-08
I <sub>2</sub>		1.4E-08
I-126 CH <sub>3</sub> I	13.02 d	2.0E-08
I <sub>2</sub>		2.6E-08
I-128 CH <sub>3</sub> I	24.99 m	1.3E-11
I <sub>2</sub>		6.5E-11
I-129 CH <sub>3</sub> I	1.57E7 y	7.4E-08
I <sub>2</sub>		9.6E-08
I-130 CH <sub>3</sub> I	12.36 h	1.4E-09
I <sub>2</sub>		1.9E-09
I-131 CH <sub>3</sub> I	8.04 d	1.5E-08
I <sub>2</sub>		2.0E-08
I-132 CH <sub>3</sub> I	2.30 h	1.9E-10
I <sub>2</sub>		3.1E-10
I-132m CH <sub>3</sub> I	83.6 m	1.6E-10
I <sub>2</sub>		2.7E-10
I-133 CH <sub>3</sub> I	20.8 h	3.1E-09
I <sub>2</sub>		4.0E-09
I-134 CH <sub>3</sub> I	52.6 m	5.0E-11
I <sub>2</sub>		1.5E-10
I-135 CH <sub>3</sub> I	6.61 h	6.8E-10
I <sub>2</sub>		9.2E-10
<b>Mercury</b>		
Hg-193 vapour	3.5 h	1.1E-09
Hg-193m vapour	11.1 h	3.1E-09
Hg-194 vapour	260 y	4.0E-08
Hg-195 vapour	9.9 h	1.4E-09
Hg-195m vapour	41.6 h	8.2E-09
Hg-197 vapour	64.1 h	4.4E-09
Hg-197m vapour	23.8 h	5.8E-09
Hg-199m vapour	42.6 m	1.8E-10
Hg-203 vapour	46.60 d	7.0E-09

**ANNEX C. EFFECTIVE DOSE RATES FOR EXPOSURE OF WORKERS OR  
ADULT MEMBERS OF THE PUBLIC TO INERT GASES**

Table C.1. Effective dose rate coefficients ( $\dot{e}$ ) for exposure of workers or adult members of the public to airborne concentration of inert gases.

Nuclide	$T_{1/2}$	$\dot{e}$ (Sv/day per Bq/m <sup>3</sup> )
<b>Argon</b>		
Ar-37	35.02 d	4.1E-15
Ar-39	269 y	1.1E-11
Ar-41	1.827 h	5.3E-09
<b>Krypton</b>		
Kr-74	11.50 m	4.5E-09
Kr-76	14.8 h	1.6E-09
Kr-77	74.7 m	3.9E-09
Kr-79	35.04 h	9.7E-10
Kr-81	2.1E5 y	2.1E-11
Kr-81m	13 s	4.8E-10
Kr-83m	1.83 h	2.1E-13
Kr-85	10.72 y	2.2E-11
Kr-85m	4.48 h	5.9E-10
Kr-87	76.3 m	3.4E-09
Kr-88	2.84 h	8.4E-09
<b>Xenon</b>		
Xe-120	40 m	1.5E-09
Xe-121	40.1 m	7.5E-09
Xe-122	20.1 h	1.9E-10
Xe-123	2.08 h	2.4E-09
Xe-125	17.0 h	9.3E-10
Xe-127	36.41 d	9.7E-10
Xe-129m	8.0 d	8.1E-11
Xe-131m	11.9 d	3.2E-11
Xe-133	5.245 d	1.2E-10
Xe-133m	2.188 d	1.1E-10
Xe-135	9.09 h	9.6E-10
Xe-135m	15.29 m	1.6E-09
Xe-138	14.17 m	4.7E-09





**ANNEX D. COMPOUNDS AND  $f_1$  VALUES USED FOR THE CALCULATION OF INGESTION DOSE COEFFICIENTS FOR WORKERS**

Table D.1. Compounds and  $f_1$  values used for the calculation of ingestion dose coefficients for workers.

Element	$f_1$	Compound
Hydrogen	1.0	Tritiated water
	1.0	Organically bound tritium
Beryllium	0.005	All compounds
Carbon	1.0	Labelled organic compounds
Fluorine	1.0	All compounds
Sodium	1.0	All compounds
Magnesium	0.5	All compounds
Aluminium	0.01	All compounds
Silicon	0.01	All compounds
Phosphorus	0.8	All compounds
Sulphur	0.8	Inorganic compounds
	0.1	Elemental sulphur
	1.0	Sulphur in food
Chlorine	1.0	All compounds
Potassium	1.0	All compounds
Calcium	0.3	All compounds
Scandium	1.0E-04	All compounds
Titanium	0.01	All compounds
Vanadium	0.01	All compounds
Chromium	0.1	Hexavalent compounds
	0.01	Trivalent compounds
Manganese	0.1	All compounds
Iron	0.1	All compounds
Cobalt	0.1	Unspecified compounds
	0.05	Oxides, hydroxides, and inorganic compounds
Nickel	0.05	All compounds
Copper	0.5	All compounds
Zinc	0.5	All compounds
Gallium	0.001	All compounds
Germanium	1.0	All compounds
Arsenic	0.5	All compounds
Selenium	0.8	Unspecified compounds
	0.05	Elemental selenium and selenides
Bromine	1.0	All compounds
Rubidium	1.0	All compounds
Strontium	0.3	Unspecified compounds
	0.01	Strontium titanate
Yttrium	1.0E-04	All compounds
Zirconium	0.002	All compounds
Niobium	0.01	All compounds

*(continued on next page)*

Table D.1. (continued)

Element	$f_1$	Compound
Molybdenum	0.8	Unspecified compounds
	0.05	Molybdenum sulphide
Technetium	0.8	All compounds
Ruthenium	0.05	All compounds
Rhodium	0.05	All compounds
Palladium	0.005	All compounds
Silver	0.05	All compounds
Cadmium	0.05	All inorganic compounds
Indium	0.02	All compounds
Tin	0.02	All compounds
Antimony	0.1	All compounds
Tellurium	0.3	All compounds
Iodine	1.0	All compounds
Caesium	1.0	All compounds
Barium	0.1	All compounds
Lanthanum	5.0E-04	All compounds
Cerium	5.0E-04	All compounds
Praseodymium	5.0E-04	All compounds
Neodymium	5.0E-04	All compounds
Promethium	5.0E-04	All compounds
Samarium	5.0E-04	All compounds
Europium	5.0E-04	All compounds
Gadolinium	5.0E-04	All compounds
Terbium	5.0E-04	All compounds
Dysprosium	5.0E-04	All compounds
Holmium	5.0E-04	All compounds
Erbium	5.0E-04	All compounds
Thulium	5.0E-04	All compounds
Ytterbium	5.0E-04	All compounds
Lutetium	5.0E-04	All compounds
Hafnium	0.002	All compounds
Tantalum	0.001	All compounds
Tungsten	0.3	Unspecified compounds
	0.01	Tungstic acid
Rhenium	0.8	All compounds
Osmium	0.01	All compounds
Iridium	0.01	All compounds
Platinum	0.01	All compounds
Gold	0.1	All compounds
Mercury	0.02	All inorganic compounds
	1.0	Methyl mercury
	0.4	Other organic compounds
Thallium	1	All compounds
Lead	0.2	All compounds
Bismuth	0.05	All compounds
Polonium	0.1	All compounds
Astatine	1.0	All compounds
Francium	1.0	All compounds
Radium	0.2	All compounds

Compendium of Dose Coefficients based on ICRP Publication 60

Table D.1. (continued)

Element	$f_1$	Compound
Actinium	5.0E-04	All compounds
Thorium	5.0E-04	Unspecified compounds
	2.0E-04	Oxides and hydroxides
Protactinium	5.0E-04	All compounds
Uranium	0.02	Unspecified compounds
	0.002	Most tetravalent compounds (e.g. UO <sub>2</sub> , U <sub>3</sub> O <sub>8</sub> , UF <sub>4</sub> )
Neptunium	5.0E-04	All compounds
Plutonium	5.0E-04	Unspecified compounds
	1.0E-04	Nitrates
	1.0E-05	Insoluble oxides
Americium	5.0E-04	All compounds
Curium	5.0E-04	All compounds
Berkelium	5.0E-04	All compounds
Californium	5.0E-04	All compounds
Einsteinium	5.0E-04	All compounds
Fermium	5.0E-04	All compounds
Mendelevium	5.0E-04	All compounds



**ANNEX E. COMPOUNDS, LUNG CLEARANCE TYPES, AND  $f_1$  VALUES  
USED FOR THE CALCULATION OF INHALATION DOSE COEFFICIENTS  
FOR WORKERS**

Table E.1. Classification of inhaled particulate matter in the workplace.

Element	Type	$f_1$	Compounds
Beryllium	M	0.005	Unspecified compounds
	S	0.005	Oxides, halides, and nitrates
Fluorine	F	1.0	Determined by combining cations
	M	1.0	Determined by combining cations
	S	1.0	Determined by combining cations
Sodium	F	1.0	All compounds
Magnesium	F	0.5	Unspecified compounds
	M	0.5	Oxides, hydroxides, carbides, halides, and nitrates
Aluminium	F	0.01	Unspecified compounds
	M	0.01	Oxides, hydroxides, carbides, halides, nitrates, and metallic aluminium
Silicon	F	0.01	Unspecified compounds
	M	0.01	Oxides, hydroxides, carbides, and nitrates
	S	0.01	Aluminosilicate glass aerosol
Phosphorus	F	0.8	Unspecified compounds
	M	0.8	Some phosphates: determined by combining cations
Sulphur	F	0.8	Sulphides and sulphates: determined by combining cations
	M	0.8	Elemental sulphur. Sulphides and sulphates: determined by combining cations
	F	1.0	Determined by combining cations
Chlorine	M	1.0	Determined by combining cations
	F	1.0	All compounds
Potassium	F	1.0	All compounds
Calcium	M	0.3	All compounds
Scandium	S	1.0E-04	All compounds
Titanium	F	0.01	Unspecified compounds
	M	0.01	Oxides, hydroxides, carbides, halides, and nitrates
	S	0.01	Strontium titanate (SrTiO <sub>3</sub> )
Vanadium	F	0.01	Unspecified compounds
	M	0.01	Oxides, hydroxides, carbides, and halides
Chromium	F	0.1	Unspecified compounds
	M	0.1	Halides and nitrates
	S	0.1	Oxides and hydroxides
Manganese	F	0.1	Unspecified compounds
	M	0.1	Oxides, hydroxides, halides, and nitrates
Iron	F	0.1	Unspecified compounds
	M	0.1	Oxides, hydroxides, and halides
Cobalt	M	0.1	Unspecified compounds
	S	0.05	Oxides, hydroxides, halides, and nitrates
Nickel	F	0.05	Unspecified compounds

*(continued on next page)*

Table E.1. (continued)

Element	Type	$f_1$	Compounds
Copper	M	0.05	Oxides, hydroxides, and carbides
	F	0.5	Unspecified inorganic compounds
	M	0.5	Sulphides, halides, and nitrates
Zinc	S	0.5	Oxides and hydroxides
	S	0.5	All compounds
Gallium	F	0.001	Unspecified compounds
	M	0.001	Oxides, hydroxides, carbides, halides, and nitrates
Germanium	F	1.0	Unspecified compounds
	M	1.0	Oxides, sulphides, and halides
Arsenic	M	0.5	All compounds
Selenium	F	0.8	Unspecified inorganic compounds
	M	0.8	Elemental selenium, oxides, hydroxides, and carbides
Bromine	F	1.0	Determined by combining cations
	M	1.0	Determined by combining cations
Rubidium	F	1.0	All compounds
Strontium	F	0.3	Unspecified compounds
	S	0.01	Strontium titanate ( $\text{SrTiO}_3$ )
Yttrium	M	1.0E-04	Unspecified compounds
	S	1.0E-04	Oxides and hydroxides
Zirconium	F	0.002	Unspecified compounds
	M	0.002	Oxides, hydroxides, halides, and nitrates
	S	0.002	Zirconium carbide
Niobium	M	0.01	Unspecified compounds
	S	0.01	Oxides and hydroxides
Molybdenum	F	0.8	Unspecified compounds
	S	0.05	Molybdenum sulphide, oxides, and hydroxides
Technetium	F	0.8	Unspecified compounds
	M	0.8	Oxides, hydroxides, halides, and nitrates
Ruthenium	F	0.05	Unspecified compounds
	M	0.05	Halides
	S	0.05	Oxides and hydroxides
Rhodium	F	0.05	Unspecified compounds
	M	0.05	Halides
	S	0.05	Oxides and hydroxides
Palladium	F	0.005	Unspecified compounds
	M	0.005	Nitrates and halides
	S	0.005	Oxides and hydroxides
Silver	F	0.05	Unspecified compounds and metallic silver
	M	0.05	Nitrates and sulphides
Cadmium	S	0.05	Oxides, hydroxides, and carbides
	F	0.05	Unspecified compounds
	M	0.05	Sulphides, halides, and nitrates
Indium	S	0.05	Oxides and hydroxides
	F	0.02	Unspecified compounds
Tin	M	0.02	Oxides, hydroxides, halides, and nitrates
	F	0.02	Unspecified compounds
	M	0.02	Stannic phosphate, sulphides, oxides, hydroxides, halides, and nitrates

Compendium of Dose Coefficients based on ICRP Publication 60

Table E.1. (continued)

Element	Type	$f_1$	Compounds
Antimony	F	0.1	Unspecified compounds
	M	0.01	Oxides, hydroxides, halides, sulphides, sulphates, and nitrates
Tellurium	F	0.3	Unspecified compounds
	M	0.3	Oxides, hydroxides, and nitrates
Iodine	F	1.0	All compounds
Caesium	F	1.0	All compounds
Barium	F	0.1	All compounds
Lanthanum	F	5.0E-04	Unspecified compounds
	M	5.0E-04	Oxides and hydroxides
Cerium	M	5.0E-04	Unspecified compounds
	S	5.0E-04	Oxides, hydroxides, and fluorides
Praseodymium	M	5.0E-04	Unspecified compounds
	S	5.0E-04	Oxides, hydroxides, carbides, and fluorides
Neodymium	M	5.0E-04	Unspecified compounds
	S	5.0E-04	Oxides, hydroxides, carbides, and fluorides
Promethium	M	5.0E-04	Unspecified compounds
	S	5.0E-04	Oxides, hydroxides, carbides, and fluorides
Samarium	M	5.0E-04	All compounds
Europium	M	5.0E-04	All compounds
Gadolinium	F	5.0E-04	Unspecified compounds
	M	5.0E-04	Oxides, hydroxides, and fluorides
Terbium	M	5.0E-04	All compounds
Dysprosium	M	5.0E-04	All compounds
Holmium	M	5.0E-04	Unspecified compounds
Erbium	M	5.0E-04	All compounds
Thulium	M	5.0E-04	All compounds
Ytterbium	M	5.0E-04	Unspecified compounds
	S	5.0E-04	Oxides, hydroxides, and fluorides
Lutetium	M	5.0E-04	Unspecified compounds
	S	5.0E-04	Oxides, hydroxides, and fluorides
Hafnium	F	0.002	Unspecified compounds
	M	0.002	Oxides, hydroxides, halides, carbides, and nitrates
Tantalum	M	0.001	Unspecified compounds
	S	0.001	Elemental tantalum, oxides, hydroxides, halides, carbides, nitrates, and nitrides
Tungsten	F	0.3	All compounds
Rhenium	F	0.8	Unspecified compounds
	M	0.8	Oxides, hydroxides, halides, and nitrates
Osmium	F	0.01	Unspecified compounds
	M	0.01	Halides and nitrates
Iridium	S	0.01	Oxides and hydroxides
	F	0.01	Unspecified compounds
Platinum	M	0.01	Metallic iridium, halides, and nitrates
	S	0.01	Oxides and hydroxides
Gold	F	0.01	All compounds
Gold	F	0.1	Unspecified compounds
	M	0.1	Halides and nitrates
	S	0.1	Oxides and hydroxides

(continued on next page)

Table E.1. (continued)

Element	Type	$f_1$	Compounds
Mercury	F	0.02	Sulphates
	M	0.02	Oxides, hydroxides, halides, nitrates, and sulphides
	F	0.4	All organic compounds
Thallium	F	1.0	All compounds
Lead	F	0.2	All compounds
Bismuth	F	0.05	Bismuth nitrate
	M	0.05	Unspecified compounds
Polonium	F	0.1	Unspecified compounds
	M	0.1	Oxides, hydroxides, and nitrates
Astatine	F	1.0	Determined by combining cations
	M	1.0	Determined by combining cations
Francium	F	1.0	All compounds
Radium	M	0.2	All compounds
Actinium	F	5.0E-04	Unspecified compounds
	M	5.0E-04	Halides and nitrates
	S	5.0E-04	Oxides and hydroxides
Thorium	M	5.0E-04	Unspecified compounds
	S	2.0E-04	Oxides and hydroxides
Protactinium	M	5.0E-04	Unspecified compounds
	S	5.0E-04	Oxides and hydroxides
Uranium	F	0.02	Most hexavalent compounds [e.g. UF <sub>6</sub> , UO <sub>2</sub> F <sub>2</sub> , UO <sub>2</sub> (NO <sub>3</sub> ) <sub>2</sub> ]
	M	0.02	Less-soluble compounds (e.g. UO <sub>3</sub> , UF <sub>4</sub> , UCl <sub>4</sub> , most other hexavalent compounds)
	S	0.002	Highly insoluble compounds (e.g. UO <sub>2</sub> , U <sub>3</sub> O <sub>8</sub> )
Neptunium	M	5.0E-04	All compounds
Plutonium	M	5.0E-04	Unspecified compounds
	S	1.0E-05	Insoluble oxides
Americium	M	5.0E-04	All compounds
Curium	M	5.0E-04	All compounds
Berkelium	M	5.0E-04	All compounds
Californium	M	5.0E-04	All compounds
Einsteinium	M	5.0E-04	All compounds
Fermium	M	5.0E-04	All compounds
Mendelevium	M	5.0E-04	All compounds



## ANNEX F. EFFECTIVE DOSE COEFFICIENTS FOR INGESTION OF RADIONUCLIDES FOR MEMBERS OF THE PUBLIC

Table F.1. Effective dose coefficients ( $e$ ) for ingestion of radionuclides for members of the public to 70 years of age.

Nuclide	$T_{1/2}$	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)					
		$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult	
<b>Hydrogen</b>										
H-3	12.35 y	1.0*	1.2E-10	1.0	1.2E-10	7.3E-11	5.7E-11	4.2E-11	4.2E-11	
		1.0 <sup>†</sup>	6.4E-11	1.0	4.8E-11	3.1E-11	2.3E-11	1.8E-11	1.8E-11	
<b>Beryllium</b>										
Be-7	53.3 d	0.02	4.8E-10	0.005	1.3E-10	7.7E-11	5.3E-11	3.5E-11	2.8E-11	
Be-10	1.6E6 y	0.02	4.4E-08	0.005	8.0E-09	4.1E-09	2.4E-09	1.4E-09	1.1E-09	
<b>Carbon</b>										
C-11	20.38 m	1.0	2.6E-10	1.0	1.5E-10	7.3E-11	4.3E-11	3.0E-11	2.4E-11	
C-14	5730 y	1.0	1.4E-09	1.0	1.6E-09	9.9E-10	8.0E-10	5.7E-10	5.8E-10	
<b>Fluorine</b>										
F-18	109.77 m	1.0	7.2E-10	1.0	3.0E-10	1.5E-10	9.1E-11	6.2E-11	4.9E-11	
<b>Sodium</b>										
Na-22	2.602 y	1.0	2.1E-08	1.0	1.5E-08	8.4E-09	5.5E-09	3.7E-09	3.2E-09	
Na-24	15.00 h	1.0	2.5E-09	1.0	2.3E-09	1.2E-09	7.7E-10	5.2E-10	4.3E-10	
<b>Magnesium</b>										
Mg-28	20.91 h	1.0	3.2E-08	0.5	1.4E-08	7.4E-09	4.5E-09	2.7E-09	2.2E-09	
<b>Aluminium</b>										
Al-26	7.16E5 y	0.02	6.4E-08	0.01	2.1E-08	1.1E-08	7.1E-09	4.3E-09	3.5E-09	
<b>Silicon</b>										
Si-31	157.3 m	0.02	1.9E-09	0.01	1.0E-09	5.1E-10	3.0E-10	1.8E-10	1.6E-10	
Si-32	450 y	0.02	2.3E-09	0.01	4.1E-09	2.0E-09	1.2E-09	7.0E-10	5.6E-10	
<b>Phosphorus</b>										
P-32	14.29 d	1.0	9.1E-08	0.8	1.9E-08	9.4E-09	5.3E-09	3.1E-09	2.4E-09	
P-33	25.4 d	1.0	1.7E-09	0.8	1.8E-09	9.1E-10	5.3E-10	3.1E-10	2.4E-10	
<b>Sulphur</b>										
S-35	87.44 d	1.0 <sup>‡</sup>	7.7E-09	1.0	5.4E-09	2.7E-09	1.6E-09	9.5E-10	7.7E-10	
		1.0 <sup>§</sup>	1.3E-09	1.0	8.7E-10	4.4E-10	2.7E-10	1.6E-10	1.3E-10	
<b>Chlorine</b>										
Cl-36	3.01E5 y	1.0	8.8E-09	1.0	6.3E-09	3.2E-09	1.9E-09	1.2E-09	9.3E-10	
Cl-38	37.21 m	1.0	8.4E-09	1.0	7.7E-10	3.8E-10	2.2E-10	1.5E-10	1.2E-10	
Cl-39	55.6 m	1.0	1.7E-10	1.0	5.5E-10	2.7E-10	1.6E-10	1.1E-10	8.5E-11	
<b>Potassium</b>										
K-40	1.28E9 y	1.0	5.2E-08	1.0	4.2E-08	2.1E-08	1.3E-08	7.6E-09	6.2E-09	
K-42	12.36 h	1.0	2.1E-09	1.0	3.0E-09	1.5E-09	8.6E-10	5.4E-10	4.3E-10	
K-43	22.6 h	1.0	1.3E-09	1.0	1.4E-09	7.6E-10	4.7E-10	3.0E-10	2.5E-10	
K-44	22.13 m	1.0	5.0E-09	1.0	5.5E-10	2.7E-10	1.6E-10	1.1E-10	8.4E-11	
K-45	20 m	1.0	3.2E-10	1.0	3.5E-10	1.7E-10	9.9E-11	6.8E-11	5.4E-11	
<b>Calcium</b>										
Ca-41	1.4E5 y	0.6	3.2E-09	0.4 <sup>¶</sup>	5.2E-10	3.9E-10	4.8E-10	5.0E-10	1.9E-10	
Ca-45	163 d	0.6	4.1E-08	0.4 <sup>¶</sup>	4.9E-09	2.6E-09	1.8E-09	1.3E-09	7.1E-10	
Ca-47	4.53 d	0.6	3.3E-08	0.4 <sup>¶</sup>	9.3E-09	4.9E-09	3.0E-09	1.8E-09	1.6E-09	

(continued on next page)

<sup>†</sup> Tritiated water.

\* Organically bound tritium.

<sup>§</sup> Inorganic sulphur.

<sup>‡</sup> Organic sulphur.

<sup>¶</sup> For the adult,  $f_1$  is 0.3.

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Table F.1. (continued)

Nuclide	$T_{1/2}$	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)					
		$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult	
<b>Scandium</b>										
Sc-43	3.891 h	0.001	1.8E-09	0.0001	1.2E-09	6.1E-10	3.7E-10	2.3E-10	1.9E-10	
Sc-44	3.927 h	0.001	2.5E-09	0.0001	2.2E-09	1.2E-09	7.1E-10	4.4E-10	3.5E-10	
Sc-44m	58.6 h	0.001	9.4E-08	0.0001	1.6E-08	8.3E-09	5.1E-09	3.1E-09	2.4E-09	
Sc-46	83.83 d	0.001	1.1E-08	0.0001	7.9E-09	4.4E-09	2.9E-09	1.8E-09	1.5E-09	
Sc-47	3.351 d	0.001	5.1E-09	0.0001	3.9E-09	2.0E-09	1.2E-09	6.8E-10	5.4E-10	
Sc-48	43.7 h	0.001	1.3E-08	0.0001	9.3E-09	5.1E-09	3.3E-09	2.1E-09	1.7E-09	
Sc-49	57.4 m	0.001	4.0E-09	0.0001	5.7E-10	2.8E-10	1.6E-10	1.0E-10	8.2E-11	
<b>Titanium</b>										
Ti-44	47.3 y	0.02	2.5E-08	0.01	3.1E-08	1.7E-08	1.1E-08	6.9E-09	5.8E-09	
Ti-45	3.08 h	0.02	8.6E-09	0.01	9.8E-10	5.0E-10	3.1E-10	1.9E-10	1.5E-10	
<b>Vanadium</b>										
V-47	32.6 m	0.02	2.3E-10	0.01	4.1E-10	2.0E-10	1.2E-10	8.0E-11	6.3E-11	
V-48	16.238 d	0.02	1.5E-08	0.01	1.1E-08	5.9E-09	3.9E-09	2.5E-09	2.0E-09	
V-49	330 d	0.02	3.2E-10	0.01	1.4E-10	6.9E-11	4.0E-11	2.3E-11	1.8E-11	
<b>Chromium</b>										
Cr-48	22.96 h	0.2	3.4E-09	0.1	9.9E-10	5.7E-10	3.8E-10	2.5E-10	2.0E-10	
		0.02	1.4E-09	0.01	9.9E-10	5.7E-10	3.8E-10	2.5E-10	2.0E-10	
Cr-49	42.09 m	0.2	3.8E-10	0.1	3.9E-10	2.0E-10	1.1E-10	7.7E-11	6.1E-11	
		0.02	6.8E-10	0.01	3.9E-10	2.0E-10	1.1E-10	7.7E-11	6.1E-11	
Cr-51	27.704 d	0.2	8.5E-10	0.1	2.3E-10	1.2E-10	7.8E-11	4.8E-11	3.8E-11	
		0.02	3.3E-10	0.01	2.2E-10	1.2E-10	7.5E-11	4.6E-11	3.7E-11	
<b>Manganese</b>										
Mn-51	46.2 m	0.2	3.1E-09	0.1	6.1E-10	3.0E-10	1.8E-10	1.2E-10	9.3E-11	
Mn-52	5.591 d	0.2	4.2E-08	0.1	8.8E-09	5.1E-09	3.4E-09	2.2E-09	1.8E-09	
Mn-52m	21.1 m	0.2	3.8E-10	0.1	4.4E-10	2.2E-10	1.3E-10	8.8E-11	6.9E-11	
Mn-53	3.7E6 y	0.2	3.1E-10	0.1	2.2E-10	1.1E-10	6.5E-11	3.7E-11	3.0E-11	
Mn-54	312.5 d	0.2	4.4E-09	0.1	3.1E-09	1.9E-09	1.3E-09	8.7E-10	7.1E-10	
Mn-56	2.5785 h	0.2	1.7E-09	0.1	1.7E-09	8.5E-10	5.1E-10	3.2E-10	2.5E-10	
<b>Iron</b>										
Fe-52	8.275 h	0.6	9.3E-08	0.2**	9.1E-09	4.6E-09	2.8E-09	1.7E-09	1.4E-09	
Fe-55	2.7 y	0.6	2.6E-09	0.2**	2.4E-09	1.7E-09	1.1E-09	7.7E-10	3.3E-10	
Fe-59	44.529 d	0.6	3.9E-08	0.2**	1.3E-08	7.5E-09	4.7E-09	3.1E-09	1.8E-09	
Fe-60	1E5 y	0.6	6.9E-07	0.2**	2.7E-07	2.7E-07	2.5E-07	2.3E-07	1.1E-07	
<b>Cobalt</b>										
Co-55	17.54 h	0.6	1.0E-09	0.3**	5.5E-09	2.9E-09	1.8E-09	1.1E-09	1.0E-09	
Co-56	78.76 d	0.6	2.5E-08	0.3**	1.5E-08	8.8E-09	5.8E-09	3.8E-09	2.5E-09	
Co-57	270.9 d	0.6	2.9E-09	0.3**	1.6E-09	8.9E-10	5.8E-10	3.7E-10	2.1E-10	
Co-58	70.80 d	0.6	6.3E-09	0.3**	4.4E-09	2.6E-09	1.7E-09	1.1E-09	7.4E-10	
Co-58m	9.15 h	0.6	4.0E-10	0.3**	1.5E-10	7.8E-11	4.7E-11	2.8E-11	2.4E-11	
Co-60	5.271 y	0.6	5.4E-08	0.3**	2.7E-08	1.7E-08	1.1E-08	7.9E-09	3.4E-09	
Co-60m	10.47 m	0.6	2.2E-11	0.3**	1.2E-11	5.7E-12	3.2E-12	2.2E-12	1.7E-12	
Co-61	1.65 h	0.6	3.2E-10	0.3**	5.1E-10	2.5E-10	1.4E-10	9.2E-11	7.4E-11	
Co-62m	13.91 m	0.6	2.3E-10	0.3**	3.0E-10	1.5E-10	8.7E-11	6.0E-11	4.7E-11	
<b>Nickel</b>										
Ni-56	6.10 d	0.1	1.3E-09	0.05	4.0E-09	2.3E-09	1.6E-09	1.1E-09	8.6E-10	
Ni-57	36.08 h	0.1	7.8E-09	0.05	4.9E-09	2.7E-09	1.7E-09	1.1E-09	8.7E-10	
Ni-59	7.5E4 y	0.1	3.4E-10	0.05	3.4E-10	1.9E-10	1.1E-10	7.3E-11	6.3E-11	
Ni-63	96 y	0.1	8.6E-09	0.05	8.4E-10	4.6E-10	2.8E-10	1.8E-10	1.5E-10	
Ni-65	2.520 h	0.1	4.1E-09	0.05	1.3E-09	6.3E-10	3.8E-10	2.3E-10	1.8E-10	
Ni-66	54.6 h	0.1	3.3E-08	0.05	2.2E-08	1.1E-08	6.6E-09	3.7E-09	3.0E-09	

\*\* For the adult,  $f_1$  is 0.1.

Compendium of Dose Coefficients based on ICRP Publication 60

Table F.1. (continued)

Nuclide	T <sub>½</sub>	Infant		f <sub>i</sub> ≥1 year	e (Sv/Bq)				
		f <sub>i</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
<b>Copper</b>									
Cu-60	23.2 m	1.0	7.0E-10	0.5	4.2E-10	2.2E-10	1.3E-10	8.9E-11	7.0E-11
Cu-61	3.408 h	1.0	2.1E-10	0.5	7.5E-10	3.9E-10	2.3E-10	1.5E-10	1.2E-10
Cu-64	12.701 h	1.0	2.2E-10	0.5	8.3E-10	4.2E-10	2.5E-10	1.5E-10	1.2E-10
Cu-67	61.86 h	1.0	1.1E-09	0.5	2.4E-09	1.2E-09	7.2E-10	4.2E-10	3.4E-10
<b>Zinc</b>									
Zn-62	9.26 h	1.0	1.2E-09	0.5	6.5E-09	3.3E-09	2.0E-09	1.2E-09	9.4E-10
Zn-63	38.1 m	1.0	6.7E-10	0.5	5.2E-10	2.6E-10	1.5E-10	1.0E-10	7.9E-11
Zn-65	243.9 d	1.0	4.6E-08	0.5	1.6E-08	9.7E-09	6.4E-09	4.5E-09	3.9E-09
Zn-69	57 m	1.0	2.5E-10	0.5	2.2E-10	1.1E-10	6.0E-11	3.9E-11	3.1E-11
Zn-69m	13.76 h	1.0	7.3E-09	0.5	2.3E-09	1.2E-09	7.0E-10	4.1E-10	3.3E-10
Zn-71m	3.92 h	1.0	4.4E-09	0.5	1.5E-09	7.8E-10	4.8E-10	3.0E-10	2.4E-10
Zn-72	46.5 h	1.0	6.7E-09	0.5	8.6E-09	4.5E-09	2.8E-09	1.7E-09	1.4E-09
<b>Gallium</b>									
Ga-65	15.2 m	0.01	1.3E-10	0.001	2.4E-10	1.2E-10	6.9E-11	4.7E-11	3.7E-11
Ga-66	9.40 h	0.01	4.2E-08	0.001	7.9E-09	4.0E-09	2.5E-09	1.5E-09	1.2E-09
Ga-67	78.26 h	0.01	8.8E-09	0.001	1.2E-09	6.4E-10	4.0E-10	2.4E-10	1.9E-10
Ga-68	68.0 m	0.01	3.2E-09	0.001	6.7E-10	3.4E-10	2.0E-10	1.3E-10	1.0E-10
Ga-70	21.15 m	0.01	1.9E-10	0.001	2.2E-10	1.0E-10	5.9E-11	4.0E-11	3.1E-11
Ga-72	14.1 h	0.01	6.0E-08	0.001	6.8E-09	3.6E-09	2.2E-09	1.4E-09	1.1E-09
Ga-73	4.91 h	0.01	4.0E-09	0.001	1.9E-09	9.3E-10	5.5E-10	3.3E-10	2.6E-10
<b>Germanium</b>									
Ge-66	2.27 h	1.0	3.3E-10	1.0	5.3E-10	2.9E-10	1.9E-10	1.3E-10	1.0E-10
Ge-67	18.7 m	1.0	3.7E-10	1.0	4.2E-10	2.1E-10	1.2E-10	8.2E-11	6.5E-11
Ge-68	288 d	1.0	2.2E-08	1.0	8.0E-09	4.2E-09	2.6E-09	1.6E-09	1.3E-09
Ge-69	39.05 h	1.0	6.0E-09	1.0	1.3E-09	7.1E-10	4.6E-10	3.0E-10	2.4E-10
Ge-71	11.8 d	1.0	2.2E-10	1.0	7.8E-11	4.0E-11	2.4E-11	1.5E-11	1.2E-11
Ge-75	82.78 m	1.0	4.5E-10	1.0	3.1E-10	1.5E-10	8.7E-11	5.9E-11	4.6E-11
Ge-77	11.30 h	1.0	8.0E-09	1.0	1.8E-09	9.9E-10	6.2E-10	4.1E-10	3.3E-10
Ge-78	87 m	1.0	3.2E-09	1.0	7.0E-10	3.6E-10	2.2E-10	1.5E-10	1.2E-10
<b>Arsenic</b>									
As-69	15.2 m	1.0	2.6E-10	0.5	3.7E-10	1.8E-10	1.1E-10	7.2E-11	5.7E-11
As-70	52.6 m	1.0	1.2E-09	0.5	7.8E-10	4.1E-10	2.5E-10	1.7E-10	1.3E-10
As-71	64.8 h	1.0	1.8E-09	0.5	2.8E-09	1.5E-09	9.3E-10	5.7E-10	4.6E-10
As-72	26.0 h	1.0	3.1E-08	0.5	1.2E-08	6.3E-09	3.8E-09	2.3E-09	1.8E-09
As-73	80.30 d	1.0	8.6E-09	0.5	1.9E-09	9.3E-10	5.6E-10	3.2E-10	2.6E-10
As-74	17.76 d	1.0	4.0E-08	0.5	8.2E-09	4.3E-09	2.6E-09	1.6E-09	1.3E-09
As-76	26.32 h	1.0	2.0E-08	0.5	1.1E-08	5.8E-09	3.4E-09	2.0E-09	1.6E-09
As-77	38.8 h	1.0	5.7E-09	0.5	2.9E-09	1.5E-09	8.7E-10	5.0E-10	4.0E-10
As-78	90.7 m	1.0	2.0E-09	0.5	1.4E-09	7.0E-10	4.1E-10	2.7E-10	2.1E-10
<b>Selenium</b>									
Se-70	41.0 m	1.0	2.0E-09	0.8	7.1E-10	3.6E-10	2.2E-10	1.5E-10	1.2E-10
Se-73	7.15 h	1.0	6.6E-09	0.8	1.4E-09	7.4E-10	4.8E-10	2.5E-10	2.1E-10
Se-73m	39 m	1.0	5.6E-10	0.8	1.8E-10	9.5E-11	5.9E-11	3.5E-11	2.8E-11
Se-75	119.8 d	1.0	2.0E-08	0.8	1.3E-08	8.3E-09	6.0E-09	3.1E-09	2.6E-09
Se-79	65000 y	1.0	1.1E-08	0.8	2.8E-08	1.9E-08	1.4E-08	4.1E-09	2.9E-09
Se-81	18.5 m	1.0	7.4E-10	0.8	1.9E-10	9.0E-11	5.1E-11	3.4E-11	2.7E-11
Se-81m	57.25 m	1.0	6.0E-10	0.8	3.7E-10	1.8E-10	1.1E-10	6.7E-11	5.3E-11
Se-83	22.5 m	1.0	5.6E-10	0.8	2.9E-10	1.5E-10	8.7E-11	5.9E-11	4.7E-11
<b>Bromine</b>									
Br-74	25.3 m	1.0	8.0E-10	1.0	5.2E-10	2.6E-10	1.5E-10	1.1E-10	8.4E-11
Br-74m	41.5 m	1.0	1.5E-09	1.0	8.5E-10	4.3E-10	2.5E-10	1.7E-10	1.4E-10
Br-75	98 m	1.0	1.5E-10	1.0	4.9E-10	2.5E-10	1.5E-10	9.9E-11	7.9E-11
Br-76	16.2 h	1.0	2.2E-09	1.0	2.7E-09	1.4E-09	8.7E-10	5.6E-10	4.6E-10
Br-77	56 h	1.0	5.3E-10	1.0	4.4E-10	2.5E-10	1.7E-10	1.1E-10	9.6E-11

(continued on next page)

Table F.1. (continued)

Nuclide	$T_{1/2}$	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
		$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Br-80	17.4 m	1.0	8.9E-10	1.0	2.1E-10	1.0E-10	5.8E-11	3.9E-11	3.1E-11
Br-80m	4.42 h	1.0	4.4E-09	1.0	8.0E-10	3.9E-10	2.3E-10	1.4E-10	1.1E-10
Br-82	35.30 h	1.0	3.7E-09	1.0	2.6E-09	1.5E-09	9.5E-10	6.4E-10	5.4E-10
Br-83	2.39 h	1.0	8.3E-10	1.0	3.0E-10	1.4E-10	8.3E-11	5.5E-11	4.3E-11
Br-84	31.80 m	1.0	6.0E-09	1.0	5.8E-10	2.8E-10	1.6E-10	1.1E-10	8.8E-11
<b>Rubidium</b>									
Rb-79	22.9 m	1.0	3.7E-10	1.0	3.2E-10	1.6E-10	9.2E-11	6.3E-11	5.0E-11
Rb-81	4.58 h	1.0	2.4E-10	1.0	3.2E-10	1.6E-10	1.0E-10	6.7E-11	5.4E-11
Rb-81m	32 m	1.0	2.1E-10	1.0	6.2E-11	3.1E-11	1.8E-11	1.2E-11	9.7E-12
Rb-82m	6.2 h	1.0	6.7E-10	1.0	5.9E-10	3.4E-10	2.2E-10	1.5E-10	1.3E-10
Rb-83	86.2 d	1.0	1.1E-08	1.0	8.4E-09	4.9E-09	3.2E-09	2.2E-09	1.9E-09
Rb-84	32.77 d	1.0	2.0E-08	1.0	1.4E-08	7.9E-09	5.0E-09	3.3E-09	2.8E-09
Rb-86	18.66 d	1.0	2.1E-08	1.0	2.0E-08	9.9E-09	5.9E-09	3.5E-09	2.8E-09
Rb-87	4.7E10 y	1.0	1.5E-08	1.0	1.0E-08	5.2E-09	3.1E-09	1.8E-09	1.5E-09
Rb-88	17.8 m	1.0	2.1E-09	1.0	6.2E-10	3.0E-10	1.7E-10	1.2E-10	9.0E-11
Rb-89	15.2 m	1.0	3.4E-10	1.0	3.0E-10	1.5E-10	8.6E-11	5.9E-11	4.7E-11
<b>Strontium</b>									
Sr-80	100 m	0.6	1.7E-09	0.4 <sup>*</sup>	2.3E-09	1.1E-09	6.5E-10	4.2E-10	3.4E-10
Sr-81	25.5 m	0.6	3.4E-10	0.4 <sup>*</sup>	4.9E-10	2.4E-10	1.4E-10	9.6E-11	7.7E-11
Sr-82	25.0 d	0.6	1.2E-08	0.4 <sup>*</sup>	4.1E-08	2.1E-08	1.3E-08	8.7E-09	6.1E-09
Sr-83	32.4 h	0.6	8.4E-09	0.4 <sup>*</sup>	2.7E-09	1.4E-09	9.1E-10	5.7E-10	4.9E-10
Sr-85	64.84 d	0.6	9.7E-09	0.4 <sup>*</sup>	3.1E-09	1.7E-09	1.5E-09	1.3E-09	5.6E-10
Sr-85m	69.5 m	0.6	1.5E-11	0.4 <sup>*</sup>	3.0E-11	1.7E-11	1.1E-11	7.8E-12	6.1E-12
Sr-87m	2.805 h	0.6	3.4E-10	0.4 <sup>*</sup>	1.7E-10	9.0E-11	5.6E-11	3.6E-11	3.0E-11
Sr-89	50.5 d	0.6	2.6E-08	0.4 <sup>*</sup>	1.8E-08	8.9E-09	5.8E-09	4.0E-09	2.6E-09
Sr-90	29.12 y	0.6	1.3E-07	0.4 <sup>*</sup>	7.3E-08	4.7E-08	6.0E-08	8.0E-08	2.8E-08
Sr-91	9.5 h	0.6	4.2E-09	0.4 <sup>*</sup>	4.0E-09	2.1E-09	1.2E-09	7.4E-10	6.5E-10
Sr-92	2.71 h	0.6	2.4E-09	0.4 <sup>*</sup>	2.7E-09	1.4E-09	8.2E-10	4.8E-10	4.3E-10
<b>Yttrium</b>									
Y-86	14.74 h	0.001	9.6E-09	0.0001	5.2E-09	2.9E-09	1.9E-09	1.2E-09	9.6E-10
Y-86m	48 m	0.001	5.5E-10	0.0001	3.1E-10	1.7E-10	1.1E-10	7.1E-11	5.6E-11
Y-87	80.3 h	0.001	3.6E-09	0.0001	3.2E-09	1.8E-09	1.1E-09	7.0E-10	5.5E-10
Y-88	106.64 d	0.001	1.1E-09	0.0001	6.0E-09	3.5E-09	2.4E-09	1.6E-09	1.3E-09
Y-90	64.0 h	0.001	1.1E-08	0.0001	2.0E-08	1.0E-08	5.9E-09	3.3E-09	2.7E-09
Y-90m	3.19 h	0.001	6.8E-09	0.0001	1.2E-09	6.1E-10	3.7E-10	2.2E-10	1.7E-10
Y-91	58.51 d	0.001	1.8E-08	0.0001	1.8E-08	8.8E-09	5.2E-09	2.9E-09	2.4E-09
Y-91m	49.71 m	0.001	1.2E-11	0.0001	6.0E-11	3.3E-11	2.1E-11	1.4E-11	1.1E-11
Y-92	3.54 h	0.001	2.9E-09	0.0001	3.6E-09	1.8E-09	1.0E-09	6.2E-10	4.9E-10
Y-93	10.1 h	0.001	1.4E-08	0.0001	8.5E-09	4.3E-09	2.5E-09	1.4E-09	1.2E-09
Y-94	19.1 m	0.001	1.9E-10	0.0001	5.5E-10	2.7E-10	1.5E-10	1.0E-10	8.1E-11
Y-95	10.7 m	0.001	5.7E-10	0.0001	3.1E-10	1.5E-10	8.7E-11	5.9E-11	4.6E-11
<b>Zirconium</b>									
Zr-86	16.5 h	0.02	6.9E-09	0.01	4.8E-09	2.7E-09	1.7E-09	1.1E-09	8.6E-10
Zr-88	83.4 d	0.02	9.8E-09	0.01	2.0E-09	1.2E-09	8.0E-10	5.4E-10	4.5E-10
Zr-89	78.43 h	0.02	6.5E-09	0.01	4.5E-09	2.5E-09	1.6E-09	9.9E-10	7.9E-10
Zr-93	1.53E6 y	0.02	5.2E-09	0.01	7.6E-10	5.1E-10	5.8E-10	8.6E-10	1.1E-09
Zr-95	63.98 d	0.02	9.5E-09	0.01	5.6E-09	3.0E-09	1.9E-09	1.2E-09	9.5E-10
Zr-97	16.90 h	0.02	4.2E-08	0.01	1.4E-08	7.3E-09	4.4E-09	2.6E-09	2.1E-09
<b>Niobium</b>									
Nb-88	14.3 m	0.02	3.7E-10	0.01	3.8E-10	1.9E-10	1.1E-10	7.9E-11	6.3E-11
Nb-89	122 m	0.02	1.0E-09	0.01	2.0E-09	1.0E-09	6.0E-10	3.4E-10	2.7E-10
Nb-89m	66 m	0.02	8.5E-09	0.01	8.7E-10	4.4E-10	2.7E-10	1.8E-10	1.4E-10
Nb-90	14.60 h	0.02	1.1E-08	0.01	7.2E-09	3.9E-09	2.5E-09	1.6E-09	1.2E-09
Nb-93m	13.6 y	0.02	4.5E-09	0.01	9.1E-10	4.6E-10	2.7E-10	1.5E-10	1.2E-10
Nb-94	2.03E4 y	0.02	3.5E-08	0.01	9.7E-09	5.3E-09	3.4E-09	2.1E-09	1.7E-09
Nb-95	35.15 d	0.02	6.6E-09	0.01	3.2E-09	1.8E-09	1.1E-09	7.4E-10	5.8E-10

<sup>\*</sup>For the adult,  $f_1$  is 0.3.

Compendium of Dose Coefficients based on ICRP Publication 60

Table F.1. (continued)

Nuclide	T <sub>1/2</sub>	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
		f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Nb-95m	86.6 h	0.02	7.4E-09	0.01	4.1E-09	2.1E-09	1.2E-09	7.1E-10	5.6E-10
Nb-96	23.35 h	0.02	8.2E-09	0.01	6.3E-09	3.4E-09	2.2E-09	1.4E-09	1.1E-09
Nb-97	72.1 m	0.02	2.7E-10	0.01	4.5E-10	2.3E-10	1.3E-10	8.7E-11	6.8E-11
Nb-98	51.5 m	0.02	7.2E-09	0.01	7.1E-10	3.6E-10	2.2E-10	1.4E-10	1.1E-10
<b>Molybdenum</b>									
Mo-90	5.67 h	1.0	1.7E-09	1.0	1.2E-09	6.3E-10	4.0E-10	2.7E-10	2.2E-10
Mo-93	3.5E3 y	1.0	2.9E-09	1.0	6.9E-09	5.0E-09	4.0E-09	3.4E-09	3.1E-09
Mo-93m	6.85 h	1.0	6.0E-10	1.0	5.4E-10	3.1E-10	2.0E-10	1.4E-10	1.1E-10
Mo-99	66.0 h	1.0	2.5E-09	1.0	3.5E-09	1.8E-09	1.1E-09	7.6E-10	6.0E-10
Mo-101	14.62 m	1.0	2.8E-10	1.0	2.7E-10	1.3E-10	7.6E-11	5.2E-11	4.1E-11
<b>Technetium</b>									
Tc-93	2.75 h	1.0	1.7E-10	0.5	2.5E-10	1.5E-10	9.8E-11	6.8E-11	5.5E-11
Tc-93m	43.5 m	1.0	4.0E-10	0.5	1.3E-10	7.3E-11	4.6E-11	3.2E-11	2.5E-11
Tc-94	293 m	1.0	4.2E-09	0.5	1.0E-09	5.8E-10	3.7E-10	2.5E-10	2.0E-10
Tc-94m	52 m	1.0	1.3E-09	0.5	6.5E-10	3.3E-10	1.9E-10	1.3E-10	1.0E-10
Tc-95	20.0 h	1.0	4.9E-10	0.5	8.7E-10	5.0E-10	3.3E-10	2.3E-10	1.8E-10
Tc-95m	61 d	1.0	1.7E-09	0.5	2.8E-09	1.6E-09	1.0E-09	7.0E-10	5.6E-10
Tc-96	4.28 d	1.0	3.7E-09	0.5	5.1E-09	3.0E-09	2.0E-09	1.4E-09	1.1E-09
Tc-96m	51.5 m	1.0	2.0E-10	0.5	6.5E-11	3.6E-11	2.3E-11	1.6E-11	1.2E-11
Tc-97	2.6E6 y	1.0	1.9E-10	0.5	4.9E-10	2.4E-10	1.4E-10	8.8E-11	6.8E-11
Tc-97m	87 d	1.0	7.7E-09	0.5	4.1E-09	2.0E-09	1.1E-09	7.0E-10	5.5E-10
Tc-98	4.2E6 y	1.0	4.3E-08	0.5	1.2E-08	6.1E-09	3.7E-09	2.5E-09	2.0E-09
Tc-99	2.13E5 y	1.0	8.0E-08	0.5	4.8E-09	2.3E-09	1.3E-09	8.2E-10	6.4E-10
Tc-99m	6.02 h	1.0	3.0E-10	0.5	1.3E-10	7.2E-11	4.3E-11	2.8E-11	2.2E-11
Tc-101	14.2 m	1.0	6.4E-10	0.5	1.3E-10	6.1E-11	3.5E-11	2.4E-11	1.9E-11
Tc-104	18.2 m	1.0	4.0E-09	0.5	5.3E-10	2.6E-10	1.5E-10	1.0E-10	8.0E-11
<b>Ruthenium</b>									
Ru-94	51.8 m	0.1	6.3E-10	0.05	5.9E-10	3.1E-10	1.9E-10	1.2E-10	9.4E-11
Ru-97	2.9 d	0.1	1.2E-09	0.05	8.5E-10	4.7E-10	3.0E-10	1.9E-10	1.5E-10
Ru-103	39.28 d	0.1	1.1E-09	0.05	4.6E-09	2.4E-09	1.5E-09	9.2E-10	7.3E-10
Ru-105	4.44 h	0.1	1.7E-09	0.05	1.8E-09	9.1E-10	5.5E-10	3.3E-10	2.6E-10
Ru-106	368.2 d	0.1	2.4E-08	0.05	4.9E-08	2.5E-08	1.5E-08	8.6E-09	7.0E-09
<b>Rhodium</b>									
Rh-99	16 d	0.1	8.2E-09	0.05	2.9E-09	1.6E-09	1.0E-09	6.5E-10	5.1E-10
Rh-99m	4.7 h	0.1	8.9E-10	0.05	3.5E-10	2.0E-10	1.3E-10	8.3E-11	6.6E-11
Rh-100	20.8 h	0.1	8.9E-09	0.05	3.6E-09	2.0E-09	1.4E-09	8.8E-10	7.1E-10
Rh-101	3.2 y	0.1	2.9E-09	0.05	2.8E-09	1.6E-09	1.0E-09	6.7E-10	5.5E-10
Rh-101m	4.34 d	0.1	2.7E-09	0.05	1.2E-09	6.8E-10	4.4E-10	2.8E-10	2.2E-10
Rh-102	2.9 y	0.1	1.9E-08	0.05	1.0E-08	6.4E-09	4.3E-09	3.0E-09	2.6E-09
Rh-102m	207 d	0.1	3.2E-08	0.05	7.4E-09	3.9E-09	2.4E-09	1.4E-09	1.2E-09
Rh-103m	56.12 m	0.1	1.7E-11	0.05	2.7E-11	1.3E-11	7.4E-12	4.8E-12	3.8E-12
Rh-105	35.36 h	0.1	9.0E-09	0.05	2.7E-09	1.3E-09	8.0E-10	4.6E-10	3.7E-10
Rh-106m	132 m	0.1	2.4E-09	0.05	9.7E-10	5.3E-10	3.3E-10	2.0E-10	1.6E-10
Rh-107	21.7 m	0.1	4.9E-10	0.05	1.6E-10	7.9E-11	4.5E-11	3.1E-11	2.4E-11
<b>Palladium</b>									
Pd-100	3.63 d	0.05	1.4E-09	0.005	5.2E-09	2.9E-09	1.9E-09	1.2E-09	9.4E-10
Pd-101	8.27 h	0.05	8.2E-10	0.005	5.7E-10	3.1E-10	1.9E-10	1.2E-10	9.4E-11
Pd-103	16.96 d	0.05	3.2E-09	0.005	1.4E-09	7.2E-10	4.3E-10	2.4E-10	1.9E-10
Pd-107	6.5E6 y	0.05	1.4E-10	0.005	2.8E-10	1.4E-10	8.1E-11	4.6E-11	3.7E-11
Pd-109	13.427 h	0.05	1.3E-09	0.005	4.1E-09	2.0E-09	1.2E-09	6.8E-10	5.5E-10
<b>Silver</b>									
Ag-102	12.9 m	0.1	2.2E-10	0.05	2.4E-10	1.2E-10	7.3E-11	5.0E-11	4.0E-11
Ag-103	65.7 m	0.1	3.5E-10	0.05	2.7E-10	1.4E-10	8.3E-11	5.5E-11	4.3E-11
Ag-104	69.2 m	0.1	1.3E-10	0.05	2.9E-10	1.7E-10	1.1E-10	7.5E-11	6.0E-11
Ag-104m	33.5 m	0.1	3.6E-10	0.05	3.3E-10	1.7E-10	1.0E-10	6.8E-11	5.4E-11

(continued on next page)

Table F.1. (continued)

Nuclide	$T_{1/2}$	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
		$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Ag-105	41.0 d	0.1	1.9E-09	0.05	2.5E-09	1.4E-09	9.1E-10	5.9E-10	4.7E-10
Ag-106	23.96 m	0.1	1.7E-10	0.05	2.1E-10	1.0E-10	6.0E-11	4.1E-11	3.2E-11
Ag-106m	8.41 d	0.1	3.7E-09	0.05	6.9E-09	4.1E-09	2.8E-09	1.8E-09	1.5E-09
Ag-108m	127 y	0.1	1.1E-08	0.05	1.1E-08	6.5E-09	4.3E-09	2.8E-09	2.3E-09
Ag-110m	249.9 d	0.1	1.4E-08	0.05	1.4E-08	7.8E-09	5.2E-09	3.4E-09	2.8E-09
Ag-111	7.45 d	0.1	4.4E-08	0.05	9.3E-09	4.6E-09	2.7E-09	1.6E-09	1.3E-09
Ag-112	3.12 h	0.1	8.9E-09	0.05	3.0E-09	1.5E-09	8.9E-10	5.4E-10	4.3E-10
Ag-115	20.0 m	0.1	1.2E-10	0.05	4.1E-10	2.0E-10	1.2E-10	7.7E-11	6.0E-11
<b>Cadmium</b>									
Cd-104	57.7 m	0.1	8.2E-10	0.05	2.9E-10	1.7E-10	1.1E-10	7.2E-11	5.4E-11
Cd-107	6.49 h	0.1	1.1E-10	0.05	4.6E-10	2.3E-10	1.3E-10	7.8E-11	6.2E-11
Cd-109	464 d	0.1	7.1E-08	0.05	9.5E-09	5.5E-09	3.5E-09	2.4E-09	2.0E-09
Cd-113	9.3E15 y	0.1	1.0E-07	0.05	4.8E-08	3.7E-08	3.0E-08	2.6E-08	2.5E-08
Cd-113m	13.6 y	0.1	2.2E-07	0.05	5.6E-08	3.9E-08	2.9E-08	2.4E-08	2.3E-08
Cd-115	53.46 h	0.1	4.4E-08	0.05	9.7E-09	4.9E-09	2.9E-09	1.7E-09	1.4E-09
Cd-115m	44.6 d	0.1	3.1E-08	0.05	1.9E-08	9.7E-09	6.9E-09	4.1E-09	3.3E-09
Cd-117	2.49 h	0.1	1.9E-09	0.05	1.9E-09	9.5E-10	5.7E-10	3.5E-10	2.8E-10
Cd-117m	3.36 h	0.1	2.6E-09	0.05	1.7E-09	9.0E-10	5.6E-10	3.5E-10	2.8E-10
<b>Indium</b>									
In-109	4.2 h	0.04	8.2E-10	0.02	3.6E-10	2.0E-10	1.3E-10	8.2E-11	6.6E-11
In-110	4.9 h	0.04	4.5E-09	0.02	1.1E-09	6.5E-10	4.4E-10	3.0E-10	2.4E-10
In-110m	69.1 m	0.04	6.1E-09	0.02	6.4E-10	3.2E-10	1.9E-10	1.3E-10	1.0E-10
In-111	2.83 d	0.04	2.4E-09	0.02	1.7E-09	9.1E-10	5.9E-10	3.7E-10	2.9E-10
In-112	14.4 m	0.04	2.2E-10	0.02	6.7E-11	3.3E-11	1.9E-11	1.3E-11	1.0E-11
In-113m	1.658 h	0.04	1.0E-10	0.02	1.8E-10	9.3E-11	6.2E-11	3.6E-11	2.8E-11
In-114m	49.51 d	0.04	2.6E-08	0.02	3.1E-08	1.5E-08	9.0E-09	5.2E-09	4.1E-09
In-115	5.1E15 y	0.04	2.3E-07	0.02	6.4E-08	4.8E-08	4.3E-08	3.6E-08	3.2E-08
In-115m	4.486 h	0.04	2.6E-10	0.02	6.0E-10	3.0E-10	1.8E-10	1.1E-10	8.6E-11
In-116m	54.15 m	0.04	7.8E-10	0.02	3.6E-10	1.9E-10	1.2E-10	8.0E-11	6.4E-11
In-117	43.8 m	0.04	1.3E-10	0.02	1.9E-10	9.7E-11	5.8E-11	3.9E-11	3.1E-11
In-117m	116.5 m	0.04	2.4E-09	0.02	8.6E-10	4.3E-10	2.5E-10	1.6E-10	1.2E-10
In-119m	18.0 m	0.04	4.9E-10	0.02	3.2E-10	1.6E-10	8.8E-11	6.0E-11	4.7E-11
<b>Tin</b>									
Sn-110	4.0 h	0.04	2.5E-09	0.02	2.3E-09	1.2E-09	7.4E-10	4.4E-10	3.5E-10
Sn-111	35.3 m	0.04	1.5E-10	0.02	1.5E-10	7.4E-11	4.4E-11	3.0E-11	2.3E-11
Sn-113	115.1 d	0.04	5.8E-09	0.02	5.0E-09	2.6E-09	1.6E-09	9.2E-10	7.3E-10
Sn-117m	13.61 d	0.04	1.7E-09	0.02	5.0E-09	2.5E-09	1.5E-09	8.8E-10	7.1E-10
Sn-119m	293.0 d	0.04	1.1E-09	0.02	2.5E-09	1.3E-09	7.5E-10	4.3E-10	3.4E-10
Sn-121	27.06 h	0.04	4.6E-09	0.02	1.7E-09	8.4E-10	5.0E-10	2.8E-10	2.3E-10
Sn-121m	55 y	0.04	4.6E-09	0.02	2.7E-09	1.4E-09	8.2E-10	4.7E-10	3.8E-10
Sn-123	129.2 d	0.04	5.5E-08	0.02	1.6E-08	7.8E-09	4.6E-09	2.6E-09	2.1E-09
Sn-123m	40.08 m	0.04	3.7E-10	0.02	2.6E-10	1.3E-10	7.3E-11	4.9E-11	3.8E-11
Sn-125	9.64 d	0.04	3.5E-08	0.02	2.2E-08	1.1E-08	6.7E-09	3.8E-09	3.1E-09
Sn-126	1.0E5 y	0.04	9.0E-08	0.02	3.0E-08	1.6E-08	9.8E-09	5.9E-09	4.7E-09
Sn-127	2.10 h	0.04	1.0E-09	0.02	1.3E-09	6.6E-10	4.0E-10	2.5E-10	2.0E-10
Sn-128	59.1 m	0.04	9.6E-09	0.02	9.7E-10	4.9E-10	3.0E-10	1.9E-10	1.5E-10
<b>Antimony</b>									
Sb-115	31.8 m	0.2	1.5E-10	0.1	1.5E-10	7.5E-11	4.5E-11	3.1E-11	2.4E-11
Sb-116	15.8 m	0.2	2.7E-10	0.1	1.6E-10	8.0E-11	4.8E-11	3.3E-11	2.6E-11
Sb-116m	60.3 m	0.2	1.0E-10	0.1	3.3E-10	1.9E-10	1.2E-10	8.3E-11	6.7E-11
Sb-117	2.80 h	0.2	1.6E-10	0.1	1.0E-10	5.6E-11	3.5E-11	2.2E-11	1.8E-11
Sb-118m	5.00 h	0.2	3.3E-09	0.1	1.0E-09	5.8E-10	3.9E-10	2.6E-10	2.1E-10
Sb-119	38.1 h	0.2	2.4E-10	0.1	5.8E-10	3.0E-10	1.8E-10	1.0E-10	8.0E-11
Sb-120m	5.76 d	0.2	2.1E-09	0.1	6.0E-09	3.5E-09	2.3E-09	1.6E-09	1.2E-09
Sb-120	15.89 m	0.2	5.7E-10	0.1	9.4E-11	4.6E-11	2.7E-11	1.8E-11	1.4E-11
Sb-122	2.70 d	0.2	6.8E-08	0.1	1.2E-08	6.1E-09	3.7E-09	2.1E-09	1.7E-09
Sb-124	60.20 d	0.2	4.5E-08	0.1	1.6E-08	8.4E-09	5.2E-09	3.2E-09	2.5E-09

Compendium of Dose Coefficients based on ICRP Publication 60

Table F.1. (continued)

Nuclide	T <sub>1/2</sub>	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
		f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Sb-124n	20.2 m	0.2	5.5E-11	0.1	4.9E-11	2.5E-11	1.5E-11	1.0E-11	8.0E-12
Sb-125	2.77 y	0.2	3.1E-08	0.1	6.1E-09	3.4E-09	2.1E-09	1.4E-09	1.1E-09
Sb-126	12.4 d	0.2	3.0E-08	0.1	1.4E-08	7.6E-09	4.9E-09	3.1E-09	2.4E-09
Sb-126m	19.0 m	0.2	2.9E-10	0.1	2.2E-10	1.1E-10	6.6E-11	4.5E-11	3.6E-11
Sb-127	3.85 d	0.2	8.7E-08	0.1	1.2E-08	5.9E-09	3.6E-09	2.1E-09	1.7E-09
Sb-128	9.01 h	0.2	7.3E-09	0.1	4.5E-09	2.4E-09	1.5E-09	9.5E-10	7.6E-10
Sb-128m	10.4 m	0.2	1.7E-10	0.1	2.1E-10	1.0E-10	6.0E-11	4.1E-11	3.3E-11
Sb-129	4.32 h	0.2	2.3E-09	0.1	2.8E-09	1.5E-09	8.8E-10	5.3E-10	4.2E-10
Sb-130	40 m	0.2	7.1E-10	0.1	5.4E-10	2.8E-10	1.7E-10	1.2E-10	9.1E-11
Sb-131	23 m	0.2	3.1E-09	0.1	7.3E-10	3.9E-10	2.1E-10	1.4E-10	1.0E-10
<b>Tellurium</b>									
Te-116	2.49 h	0.6	2.4E-09	0.3	1.0E-09	5.5E-10	3.4E-10	2.1E-10	1.7E-10
Te-121	17 d	0.6	2.1E-09	0.3	2.0E-09	1.2E-09	8.0E-10	5.4E-10	4.3E-10
Te-121m	154 d	0.6	1.7E-08	0.3	1.2E-08	6.9E-09	4.2E-09	2.8E-09	2.3E-09
Te-123	1E13 y	0.6	6.0E-08	0.3	9.3E-09	6.9E-09	5.4E-09	4.7E-09	4.4E-09
Te-123m	119.7 d	0.6	3.9E-08	0.3	8.8E-09	4.9E-09	2.8E-09	1.7E-09	1.4E-09
Te-125m	58 d	0.6	1.3E-08	0.3	6.3E-09	3.3E-09	1.9E-09	1.1E-09	8.7E-10
Te-127	9.35 h	0.6	1.5E-09	0.3	1.2E-09	6.2E-10	3.6E-10	2.1E-10	1.7E-10
Te-127m	109 d	0.6	2.1E-08	0.3	1.8E-08	9.5E-09	5.2E-09	3.0E-09	2.3E-09
Te-129	69.6 m	0.6	1.5E-10	0.3	4.4E-10	2.1E-10	1.2E-10	8.0E-11	6.3E-11
Te-129m	33.6 d	0.6	4.4E-08	0.3	2.4E-08	1.2E-08	6.6E-09	3.9E-09	3.0E-09
Te-131	25.0 m	0.6	1.0E-10	0.3	6.6E-10	3.5E-10	1.9E-10	1.2E-10	8.7E-11
Te-131m	30 h	0.6	1.0E-08	0.3	1.4E-08	7.8E-09	4.3E-09	2.7E-09	1.9E-09
Te-132	78.2 h	0.6	3.8E-08	0.3	3.0E-08	1.6E-08	8.3E-09	5.3E-09	3.8E-09
Te-133	12.45 m	0.6	1.4E-10	0.3	6.3E-10	3.3E-10	1.6E-10	1.1E-10	7.2E-11
Te-133m	55.4 m	0.6	1.1E-09	0.3	2.4E-09	1.3E-09	6.3E-10	4.1E-10	2.8E-10
Te-134	41.8 m	0.6	1.1E-09	0.3	7.5E-10	3.9E-10	2.2E-10	1.4E-10	1.1E-10
<b>Iodine</b>									
I-120	81.0 m	1.0	2.9E-09	1.0	2.8E-09	1.4E-09	7.2E-10	4.8E-10	3.4E-10
I-120m	53 m	1.0	2.3E-09	1.0	1.5E-09	7.8E-10	4.2E-10	2.9E-10	2.1E-10
I-121	2.12 h	1.0	4.2E-10	1.0	5.3E-10	3.1E-10	1.7E-10	1.2E-10	8.2E-11
I-123	13.2 h	1.0	5.2E-09	1.0	1.9E-09	1.1E-09	4.9E-10	3.3E-10	2.1E-10
I-124	4.18 d	1.0	6.2E-07	1.0	1.1E-07	6.3E-08	3.1E-08	2.0E-08	1.3E-08
I-125	60.14 d	1.0	1.2E-08	1.0	5.7E-08	4.1E-08	3.1E-08	2.2E-08	1.5E-08
I-126	13.02 d	1.0	5.1E-07	1.0	2.1E-07	1.3E-07	6.8E-08	4.5E-08	2.9E-08
I-128	24.99 m	1.0	1.7E-10	1.0	3.3E-10	1.6E-10	8.9E-11	6.0E-11	4.6E-11
I-129	1.57E7 y	1.0	2.8E-07	1.0	2.2E-07	1.7E-07	1.9E-07	1.4E-07	1.1E-07
I-130	12.36 h	1.0	5.1E-08	1.0	1.8E-08	9.8E-09	4.6E-09	3.0E-09	2.0E-09
I-131	8.04 d	1.0	4.8E-07	1.0	1.8E-07	1.0E-07	5.2E-08	3.4E-08	2.2E-08
I-132	2.30 h	1.0	2.0E-09	1.0	2.4E-09	1.3E-09	6.2E-10	4.1E-10	2.9E-10
I-132m	83.6 m	1.0	1.4E-09	1.0	2.0E-09	1.1E-09	5.0E-10	3.3E-10	2.2E-10
I-133	20.8 h	1.0	3.9E-08	1.0	4.4E-08	2.3E-08	1.0E-08	6.8E-09	4.3E-09
I-134	52.6 m	1.0	1.1E-09	1.0	7.5E-10	3.9E-10	2.1E-10	1.4E-10	1.1E-10
I-135	6.61 h	1.0	3.0E-08	1.0	8.9E-09	4.7E-09	2.2E-09	1.4E-09	9.3E-10
<b>Caesium</b>									
Cs-125	45 m	1.0	5.9E-10	1.0	2.2E-10	1.1E-10	6.5E-11	4.4E-11	3.5E-11
Cs-127	6.25 h	1.0	1.8E-10	1.0	1.2E-10	6.6E-11	4.2E-11	2.9E-11	2.4E-11
Cs-129	32.06 h	1.0	4.4E-10	1.0	3.0E-10	1.7E-10	1.1E-10	7.2E-11	6.0E-11
Cs-130	29.9 m	1.0	2.3E-10	1.0	1.8E-10	9.0E-11	5.2E-11	3.6E-11	2.8E-11
Cs-131	9.69 d	1.0	4.6E-10	1.0	2.9E-10	1.6E-10	1.0E-10	6.9E-11	5.8E-11
Cs-132	6.475 d	1.0	2.7E-09	1.0	1.8E-09	1.1E-09	7.7E-10	5.7E-10	5.0E-10
Cs-134	2.062 y	1.0	2.6E-08	1.0	1.6E-08	1.3E-08	1.4E-08	1.9E-08	1.9E-08
Cs-134m	2.90 h	1.0	4.1E-10	1.0	1.2E-10	5.9E-11	3.5E-11	2.5E-11	2.0E-11
Cs-135	2.3E6 y	1.0	3.1E-09	1.0	2.3E-09	1.7E-09	1.7E-09	2.0E-09	2.0E-09
Cs-135m	53 m	1.0	5.3E-10	1.0	8.6E-11	4.9E-11	3.2E-11	2.3E-11	1.9E-11
Cs-136	13.1 d	1.0	1.5E-08	1.0	9.5E-09	6.1E-09	4.4E-09	3.4E-09	3.0E-09

(continued on next page)

Table F.1. (continued)

Nuclide	$T_{1/2}$	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
		$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Cs-137	30.0 y	1.0	1.1E-08	1.0	1.2E-08	9.6E-09	1.0E-08	1.3E-08	1.3E-08
Cs-138	32.2 m	1.0	8.1E-09	1.0	5.9E-10	2.9E-10	1.7E-10	1.2E-10	9.2E-11
<b>Barium</b>									
Ba-126	96.5 m	0.6	9.7E-09	0.3 <sup>††</sup>	1.7E-09	8.5E-10	5.0E-10	3.1E-10	2.6E-10
Ba-128	2.43 d	0.6	1.0E-08	0.3 <sup>††</sup>	1.7E-08	9.0E-09	5.2E-09	3.0E-09	2.7E-09
Ba-131	11.8 d	0.6	2.2E-09	0.3 <sup>††</sup>	2.6E-09	1.4E-09	9.4E-10	6.2E-10	4.5E-10
Ba-131m	14.6 m	0.6	2.8E-11	0.3 <sup>††</sup>	3.2E-11	1.6E-11	9.3E-12	6.3E-12	4.9E-12
Ba-133	10.74 y	0.6	1.2E-08	0.3 <sup>††</sup>	6.2E-09	3.9E-09	4.6E-09	7.3E-09	1.5E-09
Ba-133m	38.9 h	0.6	1.2E-09	0.3 <sup>††</sup>	3.6E-09	1.8E-09	1.1E-09	5.9E-10	5.4E-10
Ba-135m	28.7 h	0.6	8.3E-09	0.3 <sup>††</sup>	2.9E-09	1.5E-09	8.5E-10	4.7E-10	4.3E-10
Ba-139	82.7 m	0.6	1.4E-09	0.3 <sup>††</sup>	8.4E-10	4.1E-10	2.4E-10	1.5E-10	1.2E-10
Ba-140	12.74 d	0.6	8.2E-08	0.3 <sup>††</sup>	1.8E-08	9.2E-09	5.8E-09	3.7E-09	2.6E-09
Ba-141	18.27 m	0.6	1.6E-10	0.3 <sup>††</sup>	4.7E-10	2.3E-10	1.3E-10	8.6E-11	7.0E-11
Ba-142	10.6 m	0.6	2.6E-10	0.3 <sup>††</sup>	2.2E-10	1.1E-10	6.6E-11	4.3E-11	3.5E-11
<b>Lanthanum</b>									
La-131	59 m	0.005	2.5E-10	0.0005	2.1E-10	1.1E-10	6.6E-11	4.4E-11	3.5E-11
La-132	4.8 h	0.005	2.8E-09	0.0005	2.4E-09	1.3E-09	7.8E-10	4.8E-10	3.9E-10
La-135	19.5 h	0.005	1.8E-10	0.0005	1.9E-10	1.0E-10	6.4E-11	3.9E-11	3.0E-11
La-137	6E4 y	0.005	4.1E-09	0.0005	4.5E-10	2.5E-10	1.6E-10	1.0E-10	8.1E-11
La-138	1.35E11 y	0.005	1.3E-08	0.0005	4.6E-09	2.7E-09	1.9E-09	1.3E-09	1.1E-09
La-140	40.272 h	0.005	9.0E-08	0.0005	1.3E-08	6.8E-09	4.2E-09	2.5E-09	2.0E-09
La-141	3.93 h	0.005	5.3E-09	0.0005	2.6E-09	1.3E-09	7.6E-10	4.5E-10	3.6E-10
La-142	92.5 m	0.005	1.9E-09	0.0005	1.1E-09	5.8E-10	3.5E-10	2.3E-10	1.8E-10
La-143	14.23 m	0.005	1.9E-10	0.0005	3.9E-10	1.9E-10	1.1E-10	7.1E-11	5.6E-11
<b>Cerium</b>									
Ce-134	72.0 h	0.005	3.8E-08	0.0005	1.8E-08	9.1E-09	5.5E-09	3.2E-09	2.5E-09
Ce-135	17.6 h	0.005	5.0E-09	0.0005	4.7E-09	2.6E-09	1.6E-09	1.0E-09	7.9E-10
Ce-137	9.0 h	0.005	9.6E-10	0.0005	1.7E-10	8.8E-11	5.4E-11	3.2E-11	2.5E-11
Ce-137m	34.4 h	0.005	3.1E-09	0.0005	3.9E-09	2.0E-09	1.2E-09	6.8E-10	5.4E-10
Ce-139	137.66 d	0.005	2.6E-09	0.0005	1.6E-09	8.6E-10	5.4E-10	3.3E-10	2.6E-10
Ce-141	32.501 d	0.005	7.1E-09	0.0005	5.1E-09	2.6E-09	1.5E-09	8.8E-10	7.1E-10
Ce-143	33.0 h	0.005	1.2E-08	0.0005	8.0E-09	4.1E-09	2.4E-09	1.4E-09	1.1E-09
Ce-144	284.3 d	0.005	9.6E-08	0.0005	3.9E-08	1.9E-08	1.1E-08	6.5E-09	5.2E-09
<b>Praseodymium</b>									
Pr-136	13.1 m	0.005	1.7E-10	0.0005	2.1E-10	1.0E-10	6.1E-11	4.2E-11	3.3E-11
Pr-137	76.6 m	0.005	2.1E-10	0.0005	2.5E-10	1.3E-10	7.7E-11	5.0E-11	4.0E-11
Pr-138m	2.1 h	0.005	1.0E-09	0.0005	7.4E-10	4.1E-10	2.6E-10	1.6E-10	1.3E-10
Pr-139	4.51 h	0.005	1.2E-10	0.0005	2.0E-10	1.1E-10	6.5E-11	4.0E-11	3.1E-11
Pr-142	19.13 h	0.005	1.5E-08	0.0005	9.8E-09	4.9E-09	2.9E-09	1.6E-09	1.3E-09
Pr-142m	14.6 m	0.005	2.0E-10	0.0005	1.2E-10	6.2E-11	3.7E-11	2.1E-11	1.7E-11
Pr-143	13.56 d	0.005	1.4E-08	0.0005	8.7E-09	4.3E-09	2.6E-09	1.5E-09	1.2E-09
Pr-144	17.28 m	0.005	3.4E-10	0.0005	3.5E-10	1.7E-10	9.5E-11	6.5E-11	5.0E-11
Pr-145	5.98 h	0.005	2.7E-09	0.0005	2.9E-09	1.4E-09	8.5E-10	4.9E-10	3.9E-10
Pr-147	13.6 m	0.005	8.9E-10	0.0005	2.2E-10	1.1E-10	6.1E-11	4.2E-11	3.3E-11
<b>Neodymium</b>									
Nd-136	50.65 m	0.005	6.0E-09	0.0005	6.1E-10	3.1E-10	1.9E-10	1.2E-10	9.9E-11
Nd-138	5.04 h	0.005	1.2E-09	0.0005	4.5E-09	2.3E-09	1.3E-09	8.0E-10	6.4E-10
Nd-139	29.7 m	0.005	9.1E-10	0.0005	1.2E-10	6.3E-11	3.7E-11	2.5E-11	2.0E-11
Nd-139m	5.5 h	0.005	2.1E-09	0.0005	1.4E-09	7.8E-10	5.0E-10	3.1E-10	2.5E-10
Nd-141	2.49 h	0.005	7.8E-11	0.0005	5.0E-11	2.7E-11	1.6E-11	1.0E-11	8.3E-12
Nd-147	10.98 d	0.005	9.2E-08	0.0005	7.8E-09	3.9E-09	2.3E-09	1.3E-09	1.1E-09
Nd-149	1.73 h	0.005	2.4E-09	0.0005	8.7E-10	4.3E-10	2.6E-10	1.6E-10	1.2E-10
Nd-151	12.44 m	0.005	8.4E-10	0.0005	2.0E-10	9.7E-11	5.7E-11	3.8E-11	3.0E-11
<b>Promethium</b>									
Pm-141	20.90 m	0.005	1.2E-10	0.0005	2.4E-10	1.2E-10	6.8E-11	4.6E-11	3.6E-11
Pm-143	265 d	0.005	5.9E-09	0.0005	1.2E-09	6.7E-10	4.4E-10	2.9E-10	2.3E-10

†† For the adult,  $f_1$  is 0.2.



Compendium of Dose Coefficients based on ICRP Publication 60

Table F.1. (continued)

Nuclide	T <sub>1/2</sub>	Infant		f <sub>1</sub> ≥ 1 year	e (Sv/Bq)				
		f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Pm-144	363 d	0.005	3.6E-09	0.0005	4.7E-09	2.7E-09	1.8E-09	1.2E-09	9.7E-10
Pm-145	17.7 y	0.005	3.5E-09	0.0005	6.8E-10	3.7E-10	2.3E-10	1.4E-10	1.1E-10
Pm-146	2020 d	0.005	3.0E-08	0.0005	5.1E-09	2.8E-09	1.8E-09	1.1E-09	9.0E-10
Pm-147	2.6234 y	0.005	2.6E-09	0.0005	1.9E-09	9.6E-10	5.7E-10	3.2E-10	2.6E-10
Pm-148	5.37 d	0.005	3.0E-08	0.0005	1.9E-08	9.7E-09	5.8E-09	3.3E-09	2.7E-09
Pm-148m	41.3 d	0.005	1.5E-08	0.0005	1.0E-08	5.5E-09	3.5E-09	2.2E-09	1.7E-09
Pm-149	53.08 h	0.005	6.2E-08	0.0005	7.4E-09	3.7E-09	2.2E-09	1.2E-09	9.9E-10
Pm-150	2.68 h	0.005	1.8E-09	0.0005	1.7E-09	8.7E-10	5.2E-10	3.2E-10	2.6E-10
Pm-151	28.40 h	0.005	1.0E-09	0.0005	5.1E-09	2.6E-09	1.6E-09	9.1E-10	7.3E-10
<b>Samarium</b>									
Sm-141	10.2 m	0.005	1.5E-10	0.0005	2.5E-10	1.3E-10	7.3E-11	5.0E-11	3.9E-11
Sm-141m	22.6 m	0.005	4.0E-10	0.0005	4.0E-10	2.0E-10	1.2E-10	8.2E-11	6.5E-11
Sm-142	72.49 m	0.005	4.2E-09	0.0005	1.3E-09	6.2E-10	3.6E-10	2.4E-10	1.9E-10
Sm-145	340 d	0.005	2.4E-09	0.0005	1.4E-09	7.3E-10	4.5E-10	2.7E-10	2.1E-10
Sm-146	1.03E8 y	0.005	2.5E-06	0.0005	1.5E-07	1.0E-07	7.0E-08	5.8E-08	5.4E-08
Sm-147	1.06E11 y	0.005	1.4E-06	0.0005	1.4E-07	9.2E-08	6.4E-08	5.2E-08	4.9E-08
Sm-151	90 y	0.005	1.5E-09	0.0005	6.4E-10	3.3E-10	2.0E-10	1.2E-10	9.8E-11
Sm-153	46.7 h	0.005	3.4E-09	0.0005	5.4E-09	2.7E-09	1.6E-09	9.2E-10	7.4E-10
Sm-155	22.1 m	0.005	1.6E-10	0.0005	2.0E-10	9.7E-11	5.5E-11	3.7E-11	2.9E-11
Sm-156	9.4 h	0.005	4.8E-09	0.0005	1.8E-09	9.0E-10	5.4E-10	3.1E-10	2.5E-10
<b>Europium</b>									
Eu-145	5.94 d	0.005	7.1E-09	0.0005	3.7E-09	2.1E-09	1.4E-09	9.4E-10	7.5E-10
Eu-146	4.61 d	0.005	1.5E-09	0.0005	6.2E-09	3.6E-09	2.4E-09	1.6E-09	1.3E-09
Eu-147	24 d	0.005	3.7E-09	0.0005	2.5E-09	1.4E-09	8.9E-10	5.6E-10	4.4E-10
Eu-148	54.5 d	0.005	1.5E-09	0.0005	6.0E-09	3.5E-09	2.4E-09	1.6E-09	1.3E-09
Eu-149	93.1 d	0.005	8.7E-10	0.0005	6.3E-10	3.4E-10	2.1E-10	1.3E-10	1.0E-10
Eu-150	34.2 y	0.005	1.3E-08	0.0005	5.7E-09	3.4E-09	2.3E-09	1.5E-09	1.3E-09
Eu-150m	12.62 h	0.005	1.4E-09	0.0005	2.8E-09	1.4E-09	8.2E-10	4.7E-10	3.8E-10
Eu-152	13.33 y	0.005	6.6E-08	0.0005	7.4E-09	4.1E-09	2.6E-09	1.7E-09	1.4E-09
Eu-152m	9.32 h	0.005	6.7E-09	0.0005	3.6E-09	1.8E-09	1.1E-09	6.2E-10	5.0E-10
Eu-154	8.8 y	0.005	5.5E-08	0.0005	1.2E-08	6.5E-09	4.1E-09	2.5E-09	2.0E-09
Eu-155	4.96 y	0.005	2.3E-09	0.0005	2.2E-09	1.1E-09	6.8E-10	4.0E-10	3.2E-10
Eu-156	15.19 d	0.005	7.2E-08	0.0005	1.5E-08	7.5E-09	4.6E-09	2.7E-09	2.2E-09
Eu-157	15.15 h	0.005	8.7E-09	0.0005	4.3E-09	2.2E-09	1.3E-09	7.5E-10	6.0E-10
Eu-158	45.9 m	0.005	2.1E-09	0.0005	6.2E-10	3.1E-10	1.8E-10	1.2E-10	9.4E-11
<b>Gadolinium</b>									
Gd-145	22.9 m	0.005	3.5E-10	0.0005	2.6E-10	1.3E-10	8.1E-11	5.6E-11	4.4E-11
Gd-146	48.3 d	0.005	8.4E-09	0.0005	6.0E-09	3.2E-09	2.0E-09	1.2E-09	9.6E-10
Gd-147	38.1 h	0.005	5.5E-09	0.0005	3.2E-09	1.8E-09	1.2E-09	7.7E-10	6.1E-10
Gd-148	93 y	0.005	2.7E-06	0.0005	1.6E-07	1.1E-07	7.3E-08	5.9E-08	5.6E-08
Gd-149	9.4 d	0.005	2.0E-09	0.0005	2.7E-09	1.5E-09	9.3E-10	5.7E-10	4.5E-10
Gd-151	120 d	0.005	8.1E-09	0.0005	1.3E-09	6.8E-10	4.2E-10	2.4E-10	2.0E-10
Gd-152	1.08E14 y	0.005	1.2E-06	0.0005	1.2E-07	7.7E-08	5.3E-08	4.3E-08	4.1E-08
Gd-153	242 d	0.005	1.9E-09	0.0005	1.8E-09	9.4E-10	5.8E-10	3.4E-10	2.7E-10
Gd-159	18.56 h	0.005	1.7E-09	0.0005	3.6E-09	1.8E-09	1.1E-09	6.2E-10	4.9E-10
<b>Terbium</b>									
Tb-147	1.65 h	0.005	1.5E-09	0.0005	1.0E-09	5.4E-10	3.3E-10	2.0E-10	1.6E-10
Tb-149	4.15 h	0.005	2.4E-09	0.0005	1.5E-09	8.0E-10	5.0E-10	3.1E-10	2.5E-10
Tb-150	3.27 h	0.005	1.5E-09	0.0005	1.6E-09	8.3E-10	5.1E-10	3.2E-10	2.5E-10
Tb-151	17.6 h	0.005	2.7E-09	0.0005	1.9E-09	1.0E-09	6.7E-10	4.2E-10	3.4E-10
Tb-153	2.34 d	0.005	1.3E-09	0.0005	1.5E-09	8.2E-10	5.1E-10	3.1E-10	2.5E-10
Tb-154	21.4 h	0.005	6.7E-09	0.0005	3.4E-09	1.9E-09	1.3E-09	8.1E-10	6.5E-10
Tb-155	5.32 d	0.005	9.9E-09	0.0005	1.3E-09	6.8E-10	4.3E-10	2.6E-10	2.1E-10
Tb-156	5.34 d	0.005	9.0E-09	0.0005	6.3E-09	3.5E-09	2.3E-09	1.5E-09	1.2E-09
Tb-156n	5.0 h	0.005	3.0E-10	0.0005	5.2E-10	2.7E-10	1.7E-10	1.0E-10	8.1E-11
Tb-156m	24.4 h	0.005	9.5E-09	0.0005	1.0E-09	5.6E-10	3.5E-10	2.2E-10	1.7E-10

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Table F.1. (continued)

Nuclide	$T_{1/2}$	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
		$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Tb-157	150 y	0.005	2.9E-10	0.0005	2.2E-10	1.1E-10	6.8E-11	4.1E-11	3.4E-11
Tb-158	150 y	0.005	4.3E-08	0.0005	5.9E-09	3.3E-09	2.1E-09	1.4E-09	1.1E-09
Tb-160	72.3 d	0.005	9.6E-08	0.0005	1.0E-08	5.4E-09	3.3E-09	2.0E-09	1.6E-09
Tb-161	6.91 d	0.005	2.3E-09	0.0005	5.3E-09	2.7E-09	1.6E-09	9.0E-10	7.2E-10
<b>Dysprosium</b>									
Dy-155	10.0 h	0.005	1.7E-10	0.0005	6.8E-10	3.8E-10	2.5E-10	1.6E-10	1.3E-10
Dy-157	8.1 h	0.005	7.4E-10	0.0005	3.1E-10	1.8E-10	1.2E-10	7.7E-11	6.1E-11
Dy-159	144.4 d	0.005	6.0E-09	0.0005	6.4E-10	3.4E-10	2.1E-10	1.3E-10	1.0E-10
Dy-165	2.334 h	0.005	2.3E-09	0.0005	7.9E-10	3.9E-10	2.3E-10	1.4E-10	1.1E-10
Dy-166	81.6 h	0.005	3.9E-08	0.0005	1.2E-08	6.0E-09	3.6E-09	2.0E-09	1.6E-09
<b>Holmium</b>									
Ho-155	48 m	0.005	2.8E-10	0.0005	2.3E-10	1.2E-10	7.1E-11	4.7E-11	3.7E-11
Ho-157	12.6 m	0.005	6.8E-11	0.0005	3.6E-11	1.9E-11	1.2E-11	8.1E-12	6.5E-12
Ho-159	33 m	0.005	9.1E-11	0.0005	4.3E-11	2.3E-11	1.4E-11	9.9E-12	7.9E-12
Ho-161	2.5 h	0.005	7.4E-10	0.0005	8.1E-11	4.2E-11	2.5E-11	1.6E-11	1.3E-11
Ho-162	15 m	0.005	2.5E-11	0.0005	2.0E-11	1.0E-11	6.0E-12	4.2E-12	3.3E-12
Ho-162m	68 m	0.005	2.4E-10	0.0005	1.5E-10	7.9E-11	4.9E-11	3.3E-11	2.6E-11
Ho-164	29 m	0.005	9.2E-10	0.0005	6.5E-11	3.2E-11	1.8E-11	1.2E-11	9.5E-12
Ho-164m	37.5 m	0.005	2.0E-10	0.0005	1.1E-10	5.5E-11	3.2E-11	2.1E-11	1.6E-11
Ho-166	26.80 h	0.005	1.6E-08	0.0005	1.0E-08	5.2E-09	3.1E-09	1.7E-09	1.4E-09
Ho-166m	1.20E3 y	0.005	1.6E-08	0.0005	9.3E-09	5.3E-09	3.5E-09	2.4E-09	2.0E-09
Ho-167	3.1 h	0.005	3.8E-10	0.0005	5.5E-10	2.8E-10	1.7E-10	1.0E-10	8.3E-11
<b>Erbium</b>									
Er-161	3.24 h	0.005	9.5E-10	0.0005	4.4E-10	2.4E-10	1.6E-10	1.0E-10	8.0E-11
Er-165	10.36 h	0.005	1.7E-10	0.0005	1.1E-10	6.2E-11	3.9E-11	2.4E-11	1.9E-11
Er-169	9.3 d	0.005	2.4E-09	0.0005	2.8E-09	1.4E-09	8.2E-10	4.7E-10	3.7E-10
Er-171	7.52 h	0.005	7.0E-09	0.0005	2.5E-09	1.3E-09	7.6E-10	4.5E-10	3.6E-10
Er-172	49.3 h	0.005	2.0E-08	0.0005	6.8E-09	3.5E-09	2.1E-09	1.3E-09	1.0E-09
<b>Thulium</b>									
Tm-162	21.7 m	0.005	2.9E-10	0.0005	1.7E-10	8.7E-11	5.2E-11	3.6E-11	2.9E-11
Tm-166	7.70 h	0.005	3.1E-09	0.0005	1.5E-09	8.3E-10	5.5E-10	3.5E-10	2.8E-10
Tm-167	9.24 d	0.005	1.0E-09	0.0005	3.9E-09	2.0E-09	1.2E-09	7.0E-10	5.6E-10
Tm-170	128.6 d	0.005	6.6E-08	0.0005	9.8E-09	4.9E-09	2.9E-09	1.6E-09	1.3E-09
Tm-171	1.92 y	0.005	1.5E-09	0.0005	7.8E-10	3.9E-10	2.3E-10	1.3E-10	1.1E-10
Tm-172	63.6 h	0.005	2.9E-08	0.0005	1.2E-08	6.1E-09	3.7E-09	2.1E-09	1.7E-09
Tm-173	8.24 h	0.005	7.3E-09	0.0005	2.1E-09	1.1E-09	6.5E-10	3.8E-10	3.1E-10
Tm-175	15.2 m	0.005	1.1E-10	0.0005	1.7E-10	8.6E-11	5.0E-11	3.4E-11	2.7E-11
<b>Ytterbium</b>									
Yb-162	18.9 m	0.005	2.2E-10	0.0005	1.3E-10	6.9E-11	4.2E-11	2.9E-11	2.3E-11
Yb-166	56.7 h	0.005	6.7E-09	0.0005	5.4E-09	2.9E-09	1.9E-09	1.2E-09	9.5E-10
Yb-167	17.5 m	0.005	4.0E-11	0.0005	4.1E-11	2.1E-11	1.2E-11	8.4E-12	6.7E-12
Yb-169	32.01 d	0.005	2.1E-09	0.0005	4.6E-09	2.4E-09	1.5E-09	8.8E-10	7.1E-10
Yb-175	4.19 d	0.005	2.0E-09	0.0005	3.2E-09	1.6E-09	9.5E-10	5.4E-10	4.4E-10
Yb-177	1.9 h	0.005	1.0E-09	0.0005	6.8E-10	3.4E-10	2.0E-10	1.1E-10	8.8E-11
Yb-178	74 m	0.005	6.4E-09	0.0005	8.4E-10	4.2E-10	2.4E-10	1.5E-10	1.2E-10
<b>Lutetium</b>									
Lu-169	34.06 h	0.005	4.5E-09	0.0005	2.4E-09	1.4E-09	8.9E-10	5.7E-10	4.6E-10
Lu-170	2.00 d	0.005	9.4E-09	0.0005	5.2E-09	2.9E-09	1.9E-09	1.2E-09	9.9E-10
Lu-171	8.22 d	0.005	4.9E-09	0.0005	4.0E-09	2.2E-09	1.4E-09	8.5E-10	6.7E-10
Lu-172	6.70 d	0.005	1.0E-08	0.0005	7.0E-09	3.9E-09	2.5E-09	1.6E-09	1.3E-09
Lu-173	1.37 y	0.005	2.7E-09	0.0005	1.6E-09	8.6E-10	5.3E-10	3.2E-10	2.6E-10
Lu-174	3.31 y	0.005	2.2E-09	0.0005	1.7E-09	9.1E-10	5.6E-10	3.3E-10	2.7E-10
Lu-174m	142 d	0.005	8.2E-09	0.0005	3.8E-09	1.9E-09	1.1E-09	6.6E-10	5.3E-10
Lu-176	3.60E10 y	0.005	2.4E-08	0.0005	1.1E-08	5.7E-09	3.5E-09	2.2E-09	1.8E-09
Lu-176m	3.68 h	0.005	2.0E-09	0.0005	1.2E-09	6.0E-10	3.5E-10	2.1E-10	1.7E-10
Lu-177	6.71 d	0.005	2.1E-09	0.0005	3.9E-09	2.0E-09	1.2E-09	6.6E-10	5.3E-10

Compendium of Dose Coefficients based on ICRP Publication 60

Table F.1. (continued)

Nuclide	$T_{1/2}$	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
		$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Lu-177m	160.9 d	0.005	9.7E-08	0.0005	1.1E-08	5.8E-09	3.6E-09	2.1E-09	1.7E-09
Lu-178	28.4 m	0.005	2.9E-10	0.0005	3.3E-10	1.6E-10	9.0E-11	6.1E-11	4.7E-11
Lu-178m	22.7 m	0.005	1.3E-10	0.0005	2.4E-10	1.2E-10	7.1E-11	4.9E-11	3.8E-11
Lu-179	4.59 h	0.005	4.4E-09	0.0005	1.5E-09	7.5E-10	4.4E-10	2.6E-10	2.1E-10
<b>Hafnium</b>									
Hf-170	16.01 h	0.02	3.9E-09	0.002	2.7E-09	1.5E-09	9.5E-10	6.0E-10	4.8E-10
Hf-172	1.87 y	0.02	6.9E-08	0.002	6.1E-09	3.3E-09	2.0E-09	1.3E-09	1.0E-09
Hf-173	24.0 h	0.02	1.9E-09	0.002	1.3E-09	7.2E-10	4.6E-10	2.8E-10	2.3E-10
Hf-175	70 d	0.02	4.8E-09	0.002	2.4E-09	1.3E-09	8.4E-10	5.2E-10	4.1E-10
Hf-177m	51.4 m	0.02	7.8E-10	0.002	4.7E-10	2.5E-10	1.5E-10	1.0E-10	8.1E-11
Hf-178m	31 y	0.02	3.0E-08	0.002	1.9E-08	1.1E-08	7.8E-09	5.5E-09	4.7E-09
Hf-179m	25.1 d	0.02	7.2E-08	0.002	7.8E-09	4.1E-09	2.6E-09	1.6E-09	1.2E-09
Hf-180m	5.5 h	0.02	1.4E-09	0.002	9.7E-10	5.3E-10	3.3E-10	2.1E-10	1.7E-10
Hf-181	42.4 d	0.02	5.2E-08	0.002	7.4E-09	3.8E-09	2.3E-09	1.4E-09	1.1E-09
Hf-182	9E6 y	0.02	2.6E-08	0.002	7.9E-09	5.4E-09	4.0E-09	3.3E-09	3.0E-09
Hf-182m	61.5 m	0.02	3.1E-10	0.002	2.5E-10	1.3E-10	7.8E-11	5.2E-11	4.2E-11
Hf-183	64 m	0.02	3.1E-10	0.002	4.8E-10	2.4E-10	1.4E-10	9.3E-11	7.3E-11
Hf-184	4.12 h	0.02	1.5E-09	0.002	3.6E-09	1.8E-09	1.1E-09	6.6E-10	5.2E-10
<b>Tantalum</b>									
Ta-172	36.8 m	0.01	3.5E-10	0.001	3.2E-10	1.6E-10	9.8E-11	6.6E-11	5.3E-11
Ta-173	3.65 h	0.01	8.0E-09	0.001	1.3E-09	6.5E-10	3.9E-10	2.4E-10	1.9E-10
Ta-174	1.2 h	0.01	2.2E-10	0.001	3.7E-10	1.9E-10	1.1E-10	7.2E-11	5.7E-11
Ta-175	10.5 h	0.01	2.6E-09	0.001	1.1E-09	6.2E-10	4.0E-10	2.6E-10	2.1E-10
Ta-176	8.08 h	0.01	3.4E-09	0.001	1.7E-09	9.2E-10	6.1E-10	3.9E-10	3.1E-10
Ta-177	56.6 h	0.01	4.0E-09	0.001	6.9E-10	3.6E-10	2.2E-10	1.3E-10	1.1E-10
Ta-178m	2.2 h	0.01	7.3E-10	0.001	4.5E-10	2.4E-10	1.5E-10	9.1E-11	7.2E-11
Ta-179	664.9 d	0.01	5.2E-10	0.001	4.1E-10	2.2E-10	1.3E-10	8.1E-11	6.5E-11
Ta-180	1.0E13 y	0.01	7.1E-09	0.001	5.3E-09	2.8E-09	1.7E-09	1.1E-09	8.4E-10
Ta-180m	8.1 h	0.01	1.8E-10	0.001	3.7E-10	1.9E-10	1.1E-10	6.7E-11	5.4E-11
Ta-182	115.0 d	0.01	1.4E-08	0.001	9.4E-09	5.0E-09	3.1E-09	1.9E-09	1.5E-09
Ta-182m	15.84 m	0.01	3.4E-10	0.001	7.5E-11	3.7E-11	2.1E-11	1.5E-11	1.2E-11
Ta-183	5.1 d	0.01	2.4E-08	0.001	9.3E-09	4.7E-09	2.8E-09	1.6E-09	1.3E-09
Ta-184	8.7 h	0.01	3.7E-09	0.001	4.4E-09	2.3E-09	1.4E-09	8.5E-10	6.8E-10
Ta-185	49 m	0.01	6.3E-10	0.001	4.6E-10	2.3E-10	1.3E-10	8.6E-11	6.8E-11
Ta-186	10.5 m	0.01	1.8E-10	0.001	2.1E-10	1.1E-10	6.1E-11	4.2E-11	3.3E-11
<b>Tungsten</b>									
W-176	2.3 h	0.6	1.8E-10	0.3	5.5E-10	3.0E-10	2.0E-10	1.3E-10	1.0E-10
W-177	135 m	0.6	7.4E-10	0.3	3.2E-10	1.7E-10	1.1E-10	7.2E-11	5.8E-11
W-178	21.7 d	0.6	1.8E-09	0.3	1.4E-09	7.3E-10	4.5E-10	2.7E-10	2.2E-10
W-179	37.5 m	0.6	2.4E-11	0.3	2.0E-11	1.0E-11	6.2E-12	4.2E-12	3.3E-12
W-181	121.2 d	0.6	1.3E-10	0.3	4.7E-10	2.5E-10	1.6E-10	9.5E-11	7.6E-11
W-185	75.1 d	0.6	6.4E-09	0.3	3.3E-09	1.6E-09	9.7E-10	5.5E-10	4.4E-10
W-187	23.9 h	0.6	2.5E-09	0.3	4.3E-09	2.2E-09	1.3E-09	7.8E-10	6.3E-10
W-188	69.4 d	0.6	2.1E-08	0.3	1.5E-08	7.7E-09	4.6E-09	2.6E-09	2.1E-09
<b>Rhenium</b>									
Re-177	14.0 m	1.0	1.5E-10	0.8	1.4E-10	7.2E-11	4.1E-11	2.8E-11	2.2E-11
Re-178	13.2 m	1.0	1.9E-10	0.8	1.6E-10	7.9E-11	4.6E-11	3.1E-11	2.5E-11
Re-181	20 h	1.0	6.2E-09	0.8	2.8E-09	1.4E-09	8.2E-10	5.4E-10	4.2E-10
Re-182	64.0 h	1.0	2.4E-08	0.8	8.9E-09	4.7E-09	2.8E-09	1.8E-09	1.4E-09
Re-182m	12.7 h	1.0	5.4E-09	0.8	1.7E-09	8.9E-10	5.2E-10	3.5E-10	2.7E-10
Re-184	38.0 d	1.0	2.9E-09	0.8	5.6E-09	3.0E-09	1.8E-09	1.3E-09	1.0E-09
Re-184m	165 d	1.0	2.7E-08	0.8	9.8E-09	4.9E-09	2.8E-09	1.9E-09	1.5E-09
Re-186	90.64 h	1.0	1.9E-08	0.8	1.1E-08	5.5E-09	3.0E-09	1.9E-09	1.5E-09
Re-186m	2.0E5 y	1.0	2.0E-08	0.8	1.6E-08	7.6E-09	4.4E-09	2.8E-09	2.2E-09
Re-187	5E10 y	1.0	5.8E-11	0.8	3.8E-11	1.8E-11	1.0E-11	6.6E-12	5.1E-12
Re-188	16.98 h	1.0	1.7E-08	0.8	1.1E-08	5.4E-09	2.9E-09	1.8E-09	1.4E-09

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Table F.1. (continued)

Nuclide	T <sub>½</sub>	Infant		f <sub>1</sub>	e (Sv/Bq)					
		f <sub>1</sub>	e (Sv/Bq)	≥1 year	1 year	5 years	10 years	15 years	Adult	
Re-188m	18.6 m	1.0	2.8E-10	0.8	2.3E-10	1.1E-10	6.1E-11	4.0E-11	3.0E-11	
Re-189	24.3 h	1.0	7.8E-09	0.8	6.2E-09	3.0E-09	1.6E-09	1.0E-09	7.8E-10	
<b>Osmium</b>										
Os-180	22 m	0.02	1.6E-10	0.01	9.8E-11	5.1E-11	3.2E-11	2.2E-11	1.7E-11	
Os-181	105 m	0.02	9.6E-10	0.01	5.0E-10	2.7E-10	1.7E-10	1.1E-10	8.9E-11	
Os-182	22 h	0.02	4.6E-09	0.01	3.2E-09	1.7E-09	1.1E-09	7.0E-10	5.6E-10	
Os-185	94 d	0.02	1.8E-09	0.01	2.6E-09	1.5E-09	9.8E-10	6.5E-10	5.1E-10	
Os-189m	6.0 h	0.02	2.1E-10	0.01	1.3E-10	6.5E-11	3.8E-11	2.2E-11	1.8E-11	
Os-191	15.4 d	0.02	1.3E-09	0.01	4.1E-09	2.1E-09	1.2E-09	7.0E-10	5.7E-10	
Os-191m	13.03 h	0.02	7.1E-09	0.01	7.1E-10	3.5E-10	2.1E-10	1.2E-10	9.6E-11	
Os-193	30.0 h	0.02	4.3E-09	0.01	6.0E-09	3.0E-09	1.8E-09	1.0E-09	8.1E-10	
Os-194	6.0 y	0.02	3.9E-08	0.01	1.7E-08	8.8E-09	5.2E-09	3.0E-09	2.4E-09	
<b>Iridium</b>										
Ir-182	15 m	0.02	1.3E-10	0.01	3.0E-10	1.5E-10	8.9E-11	6.0E-11	4.8E-11	
Ir-184	3.02 h	0.02	1.5E-09	0.01	9.7E-10	5.2E-10	3.3E-10	2.1E-10	1.7E-10	
Ir-185	14.0 h	0.02	1.4E-09	0.01	1.6E-09	8.6E-10	5.3E-10	3.3E-10	2.6E-10	
Ir-186	15.8 h	0.02	4.8E-09	0.01	2.7E-09	1.5E-09	9.6E-10	6.1E-10	4.9E-10	
Ir-186m	1.75 h	0.02	5.8E-10	0.01	3.6E-10	2.1E-10	1.3E-10	7.7E-11	6.1E-11	
Ir-187	10.5 h	0.02	8.1E-09	0.01	7.3E-10	3.9E-10	2.5E-10	1.5E-10	1.2E-10	
Ir-188	41.5 h	0.02	6.6E-09	0.01	3.3E-09	1.8E-09	1.2E-09	7.9E-10	6.3E-10	
Ir-189	13.3 d	0.02	9.5E-09	0.01	1.7E-09	8.6E-10	5.2E-10	3.0E-10	2.4E-10	
Ir-190	12.1 d	0.02	1.0E-08	0.01	7.1E-09	3.9E-09	2.5E-09	1.6E-09	1.2E-09	
Ir-190n	3.1 h	0.02	1.4E-10	0.01	6.4E-10	3.5E-10	2.3E-10	1.5E-10	1.2E-10	
Ir-190m	1.2 h	0.02	4.9E-11	0.01	5.0E-11	2.6E-11	1.6E-11	1.0E-11	8.0E-12	
Ir-192	74.02 d	0.02	1.3E-08	0.01	8.7E-09	4.6E-09	2.8E-09	1.7E-09	1.4E-09	
Ir-192m	241 y	0.02	2.8E-09	0.01	1.4E-09	8.3E-10	5.5E-10	3.7E-10	3.1E-10	
Ir-193m	11.9 d	0.02	2.2E-09	0.01	2.0E-09	1.0E-09	6.0E-10	3.4E-10	2.7E-10	
Ir-194	19.15 h	0.02	5.5E-08	0.01	9.8E-09	4.9E-09	2.9E-09	1.7E-09	1.3E-09	
Ir-194m	171 d	0.02	4.7E-08	0.01	1.1E-08	6.4E-09	4.1E-09	2.6E-09	2.1E-09	
Ir-195	2.5 h	0.02	6.2E-09	0.01	7.3E-10	3.6E-10	2.1E-10	1.3E-10	1.0E-10	
Ir-195m	3.8 h	0.02	5.3E-09	0.01	1.5E-09	7.3E-10	4.3E-10	2.6E-10	2.1E-10	
<b>Platinum</b>										
Pt-186	2.0 h	0.02	1.8E-10	0.01	5.3E-10	2.9E-10	1.8E-10	1.2E-10	9.3E-11	
Pt-188	10.2 d	0.02	5.7E-09	0.01	4.5E-09	2.4E-09	1.5E-09	9.5E-10	7.6E-10	
Pt-189	10.87 h	0.02	8.1E-09	0.01	7.4E-10	3.9E-10	2.5E-10	1.5E-10	1.2E-10	
Pt-191	2.8 d	0.02	1.1E-09	0.01	2.1E-09	1.1E-09	6.9E-10	4.2E-10	3.4E-10	
Pt-193	50 y	0.02	1.7E-10	0.01	2.4E-10	1.2E-10	6.9E-11	3.9E-11	3.1E-11	
Pt-193m	4.33 d	0.02	4.2E-09	0.01	3.4E-09	1.7E-09	9.9E-10	5.6E-10	4.5E-10	
Pt-195m	4.02 d	0.02	9.1E-09	0.01	4.6E-09	2.3E-09	1.4E-09	7.9E-10	6.3E-10	
Pt-197	18.3 h	0.02	2.7E-09	0.01	3.0E-09	1.5E-09	8.8E-10	5.1E-10	4.0E-10	
Pt-197m	94.4 m	0.02	7.0E-09	0.01	6.1E-10	3.0E-10	1.8E-10	1.1E-10	8.4E-11	
Pt-199	30.8 m	0.02	4.7E-10	0.01	2.7E-10	1.3E-10	7.5E-11	5.0E-11	3.9E-11	
Pt-200	12.5 h	0.02	1.4E-08	0.01	8.8E-09	4.4E-09	2.6E-09	1.5E-09	1.2E-09	
<b>Gold</b>										
Au-193	17.65 h	0.2	8.2E-09	0.1	8.8E-10	4.6E-10	2.8E-10	1.7E-10	1.3E-10	
Au-194	39.5 h	0.2	5.9E-09	0.1	2.2E-09	1.2E-09	8.1E-10	5.3E-10	4.2E-10	
Au-195	183 d	0.2	2.4E-09	0.1	1.7E-09	8.9E-10	5.4E-10	3.2E-10	2.5E-10	
Au-198	2.696 d	0.2	5.0E-08	0.1	7.2E-09	3.7E-09	2.2E-09	1.3E-09	1.0E-09	
Au-198m	2.30 d	0.2	8.2E-08	0.1	8.5E-09	4.4E-09	2.7E-09	1.6E-09	1.3E-09	
Au-199	3.139 d	0.2	2.5E-09	0.1	3.1E-09	1.6E-09	9.5E-10	5.5E-10	4.4E-10	
Au-200	48.4 m	0.2	9.3E-10	0.1	4.7E-10	2.3E-10	1.3E-10	8.7E-11	6.8E-11	
Au-200m	18.7 h	0.2	8.2E-09	0.1	6.6E-09	3.5E-09	2.2E-09	1.3E-09	1.1E-09	
Au-201	26.4 m	0.2	1.1E-10	0.1	1.7E-10	8.2E-11	4.6E-11	3.1E-11	2.4E-11	
<b>Mercury</b>										
Hg-193	3.5 h	0.04 <sup>**</sup>	3.5E-10	0.02	5.5E-10	2.8E-10	1.7E-10	1.0E-10	8.2E-11	
		1.0 <sup>**</sup>	3.3E-10	1.0	1.9E-10	9.8E-11	5.8E-11	3.9E-11	3.1E-11	

\*\* Inorganic mercury.

\*\* Methyl mercury.

Compendium of Dose Coefficients based on ICRP Publication 60

Table F.1. (continued)

Nuclide	T <sub>1/2</sub>	Infant		f <sub>1</sub> ≥ 1 year	e (Sv/Bq)				
		f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Hg-193m	11.1 h	0.8 <sup>**</sup>	4.7E-10	0.4	4.4E-10	2.2E-10	1.4E-10	8.3E-11	6.6E-11
		0.04 <sup>‡‡</sup>	2.6E-09	0.02	2.4E-09	1.3E-09	8.1E-10	5.0E-10	4.0E-10
		1.0 <sup>§§</sup>	1.1E-09	1.0	6.8E-10	3.7E-10	2.3E-10	1.5E-10	1.3E-10
Hg-194	260 y	0.8 <sup>**</sup>	1.6E-09	0.4	1.8E-09	9.5E-10	6.0E-10	3.7E-10	3.0E-10
		0.04 <sup>‡‡</sup>	6.2E-09	0.02	3.6E-09	2.6E-09	1.9E-09	1.5E-09	1.4E-09
		1.0 <sup>§§</sup>	1.3E-07	1.0	1.2E-07	8.4E-08	6.6E-08	5.5E-08	5.1E-08
Hg-195	9.9 h	0.8 <sup>**</sup>	1.1E-07	0.4	4.8E-08	3.5E-08	2.7E-08	2.3E-08	2.1E-08
		0.04 <sup>‡‡</sup>	5.5E-10	0.02	6.3E-10	3.3E-10	2.0E-10	1.2E-10	9.7E-11
		1.0 <sup>§§</sup>	3.0E-10	1.0	2.0E-10	1.0E-10	6.4E-11	4.2E-11	3.4E-11
Hg-195m	41.6 h	0.8 <sup>**</sup>	4.6E-10	0.4	4.8E-10	2.5E-10	1.5E-10	9.3E-11	7.5E-11
		0.04 <sup>‡‡</sup>	1.8E-09	0.02	3.8E-09	2.0E-09	1.2E-09	7.0E-10	5.6E-10
		1.0 <sup>§§</sup>	2.1E-09	1.0	1.3E-09	6.8E-10	4.2E-10	2.7E-10	2.2E-10
Hg-197	64.1 h	0.8 <sup>**</sup>	2.6E-09	0.4	2.8E-09	1.4E-09	8.7E-10	5.1E-10	4.1E-10
		0.04 <sup>‡‡</sup>	6.5E-09	0.02	1.6E-09	8.3E-10	5.0E-10	2.9E-10	2.3E-10
		1.0 <sup>§§</sup>	9.7E-10	1.0	6.2E-10	3.1E-10	1.9E-10	1.2E-10	9.9E-11
Hg-197m	23.8 h	0.8 <sup>**</sup>	1.3E-09	0.4	1.2E-09	6.1E-10	3.7E-10	2.2E-10	1.7E-10
		0.04 <sup>‡‡</sup>	7.2E-09	0.02	3.4E-09	1.7E-09	1.0E-09	5.9E-10	4.7E-10
		1.0 <sup>§§</sup>	1.5E-09	1.0	9.5E-10	4.8E-10	2.9E-10	1.8E-10	1.5E-10
Hg-199m	42.6 m	0.8 <sup>**</sup>	2.2E-09	0.4	2.5E-09	1.2E-09	7.3E-10	4.2E-10	3.4E-10
		0.04 <sup>‡‡</sup>	5.7E-10	0.02	2.1E-10	1.0E-10	5.9E-11	3.9E-11	3.1E-11
		1.0 <sup>§§</sup>	3.4E-10	1.0	1.9E-10	9.3E-11	5.3E-11	3.6E-11	2.8E-11
Hg-203	46.60 d	0.8 <sup>**</sup>	3.6E-10	0.4	2.1E-10	1.0E-10	5.8E-11	3.9E-11	3.1E-11
		0.04 <sup>‡‡</sup>	6.5E-09	0.02	3.6E-09	1.8E-09	1.1E-09	6.7E-10	5.4E-10
		1.0 <sup>§§</sup>	1.5E-08	1.0	1.1E-08	5.7E-09	3.6E-09	2.3E-09	1.9E-09
		0.8 <sup>**</sup>	1.3E-08	0.4	6.4E-09	3.4E-09	2.1E-09	1.3E-09	1.1E-09
<b>Thallium</b>									
Tl-194	33 m	1.0	1.1E-11	1.0	3.9E-11	2.2E-11	1.4E-11	1.0E-11	8.1E-12
Tl-194m	32.8 m	1.0	6.8E-10	1.0	2.2E-10	1.2E-10	7.0E-11	4.9E-11	4.0E-11
Tl-195	1.16 h	1.0	8.3E-10	1.0	1.4E-10	7.5E-11	4.7E-11	3.3E-11	2.7E-11
Tl-197	2.84 h	1.0	9.1E-10	1.0	1.3E-10	6.7E-11	4.2E-11	2.8E-11	2.3E-11
Tl-198	5.3 h	1.0	3.7E-10	1.0	3.3E-10	1.9E-10	1.2E-10	8.7E-11	7.3E-11
Tl-198m	1.87 h	1.0	1.8E-10	1.0	3.0E-10	1.6E-10	9.7E-11	6.7E-11	5.4E-11
Tl-199	7.42 h	1.0	1.3E-10	1.0	1.5E-10	7.7E-11	4.8E-11	3.2E-11	2.6E-11
Tl-200	26.1 h	1.0	1.3E-09	1.0	9.1E-10	5.3E-10	3.5E-10	2.4E-10	2.0E-10
Tl-201	3.044 d	1.0	5.4E-10	1.0	5.5E-10	2.9E-10	1.8E-10	1.2E-10	9.5E-11
Tl-202	12.23 d	1.0	2.9E-09	1.0	2.1E-09	1.2E-09	7.9E-10	5.4E-10	4.5E-10
Tl-204	3.779 y	1.0	7.3E-08	1.0	8.5E-09	4.2E-09	2.5E-09	1.5E-09	1.2E-09
<b>Lead</b>									
Pb-195m	15.8 m	0.6	3.6E-10	0.4 <sup>††</sup>	1.6E-10	8.4E-11	5.2E-11	3.5E-11	2.9E-11
Pb-198	2.4 h	0.6	1.9E-10	0.4 <sup>††</sup>	4.8E-10	2.7E-10	1.7E-10	1.1E-10	1.0E-10
Pb-199	90 m	0.6	9.5E-10	0.4 <sup>††</sup>	2.6E-10	1.5E-10	9.4E-11	6.3E-11	5.4E-11
Pb-200	21.5 h	0.6	9.5E-09	0.4 <sup>††</sup>	2.0E-09	1.1E-09	7.0E-10	4.4E-10	4.0E-10
Pb-201	9.4 h	0.6	2.4E-10	0.4 <sup>††</sup>	7.8E-10	4.3E-10	2.7E-10	1.8E-10	1.6E-10
Pb-202	3E5 y	0.6	4.4E-08	0.4 <sup>††</sup>	1.6E-08	1.3E-08	1.9E-08	2.7E-08	8.8E-09
Pb-202m	3.62 h	0.6	2.6E-10	0.4 <sup>††</sup>	6.1E-10	3.5E-10	2.3E-10	1.5E-10	1.3E-10
Pb-203	52.05 h	0.6	5.6E-09	0.4 <sup>††</sup>	1.3E-09	6.8E-10	4.3E-10	2.7E-10	2.4E-10
Pb-205	1.43E7 y	0.6	6.1E-09	0.4 <sup>††</sup>	9.9E-10	6.2E-10	6.1E-10	6.5E-10	2.8E-10
Pb-209	3.253 h	0.6	1.7E-10	0.4 <sup>††</sup>	3.8E-10	1.9E-10	1.1E-10	6.6E-11	5.7E-11
Pb-210	22.3 y	0.6	2.4E-06	0.4 <sup>††</sup>	3.6E-06	2.2E-06	1.9E-06	1.9E-06	6.9E-07
Pb-211	36.1 m	0.6	7.1E-09	0.4 <sup>††</sup>	1.4E-09	7.1E-10	4.1E-10	2.7E-10	1.8E-10
Pb-212	10.64 h	0.6	6.5E-07	0.4 <sup>††</sup>	6.3E-08	3.3E-08	2.0E-08	1.3E-08	6.0E-09
Pb-214	26.8 m	0.6	1.7E-09	0.4 <sup>††</sup>	1.0E-09	5.2E-10	3.1E-10	2.0E-10	1.4E-10

(continued on next page)

\*\* Other organic forms.

§§ Methyl mercury.

‡‡ Inorganic mercury.

†† For the adult, f<sub>1</sub> is 0.2.

Table F.1. (continued)

Nuclide	$T_{1/2}$	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
		$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
<b>Bismuth</b>									
Bi-200	36.4 m	0.1	6.2E-10	0.05	2.7E-10	1.5E-10	9.5E-11	6.4E-11	5.1E-11
Bi-201	108 m	0.1	1.0E-09	0.05	6.7E-10	3.6E-10	2.2E-10	1.4E-10	1.2E-10
Bi-202	1.67 h	0.1	1.4E-10	0.05	4.4E-10	2.5E-10	1.6E-10	1.1E-10	8.9E-11
Bi-203	11.76 h	0.1	6.5E-09	0.05	2.5E-09	1.4E-09	9.3E-10	6.0E-10	4.8E-10
Bi-205	15.31 d	0.1	1.1E-09	0.05	4.5E-09	2.6E-09	1.7E-09	1.1E-09	9.0E-10
Bi-206	6.243 d	0.1	2.4E-08	0.05	1.0E-08	5.7E-09	3.7E-09	2.4E-09	1.9E-09
Bi-207	38 y	0.1	1.0E-08	0.05	7.1E-09	3.9E-09	2.5E-09	1.6E-09	1.3E-09
Bi-210	5.012 d	0.1	4.5E-08	0.05	9.7E-09	4.8E-09	2.9E-09	1.6E-09	1.3E-09
Bi-210m	3.0E6 y	0.1	2.1E-07	0.05	9.1E-08	4.7E-08	3.0E-08	1.9E-08	1.5E-08
Bi-212	60.55 m	0.1	2.2E-09	0.05	1.8E-09	8.7E-10	5.0E-10	3.3E-10	2.6E-10
Bi-213	45.65 m	0.1	1.5E-09	0.05	1.4E-09	6.7E-10	3.9E-10	2.5E-10	2.0E-10
Bi-214	19.9 m	0.1	3.4E-09	0.05	7.4E-10	3.6E-10	2.1E-10	1.4E-10	1.1E-10
<b>Polonium</b>									
Po-203	36.7 m	1.0	1.9E-10	0.5	2.4E-10	1.3E-10	8.5E-11	5.8E-11	4.6E-11
Po-205	1.80 h	1.0	2.5E-10	0.5	2.8E-10	1.6E-10	1.1E-10	7.2E-11	5.8E-11
Po-207	350 m	1.0	3.4E-10	0.5	5.7E-10	3.2E-10	2.1E-10	1.4E-10	1.1E-10
Po-210	138.38 d	1.0	5.6E-05	0.5	8.8E-06	4.4E-06	2.6E-06	1.6E-06	1.2E-06
<b>Astatine</b>									
At-207	1.80 h	1.0	2.5E-09	1.0	1.6E-09	8.0E-10	4.8E-10	2.9E-10	2.4E-10
At-211	7.214 h	1.0	1.2E-07	1.0	7.8E-08	3.8E-08	2.3E-08	1.3E-08	1.1E-08
<b>Francium</b>									
Fr-222	14.4 m	1.0	4.2E-09	1.0	3.9E-09	2.0E-09	1.3E-09	8.5E-10	7.2E-10
Fr-223	21.8 m	1.0	2.6E-08	1.0	1.7E-08	8.3E-09	5.0E-09	2.9E-09	2.4E-09
<b>Radium</b>									
Ra-223	11.434 d	0.6	3.3E-06	0.3 <sup>††</sup>	1.1E-06	5.7E-07	4.5E-07	3.7E-07	1.0E-07
Ra-224	3.66 d	0.6	2.7E-06	0.3 <sup>††</sup>	6.6E-07	3.5E-07	2.6E-07	2.0E-07	6.5E-08
Ra-225	14.8 d	0.6	2.1E-06	0.3 <sup>††</sup>	1.2E-06	6.1E-07	5.0E-07	4.4E-07	9.9E-08
Ra-226	1600 y	0.6	5.7E-06	0.3 <sup>††</sup>	9.6E-07	6.2E-07	8.0E-07	1.5E-06	2.8E-07
Ra-227	42.2 m	0.6	9.1E-09	0.3 <sup>††</sup>	4.3E-10	2.5E-10	1.7E-10	1.3E-10	8.1E-11
Ra-228	5.75 y	0.6	3.0E-05	0.3 <sup>††</sup>	5.7E-06	3.4E-06	3.9E-06	5.3E-06	6.9E-07
<b>Actinium</b>									
Ac-224	2.9 h	0.005	1.0E-08	0.0005	5.2E-09	2.6E-09	1.5E-09	8.8E-10	7.0E-10
Ac-225	10.0 d	0.005	2.6E-07	0.0005	1.8E-07	9.1E-08	5.4E-08	3.0E-08	2.4E-08
Ac-226	29 h	0.005	1.4E-07	0.0005	7.6E-08	3.8E-08	2.3E-08	1.3E-08	1.0E-08
Ac-227	21.773 y	0.005	4.3E-05	0.0005	3.1E-06	2.2E-06	1.5E-06	1.2E-06	1.1E-06
Ac-228	6.13 h	0.005	1.4E-09	0.0005	2.8E-09	1.4E-09	8.7E-10	5.3E-10	4.3E-10
<b>Thorium</b>									
Th-226	30.9 m	0.005	1.4E-09	0.0005	2.4E-09	1.2E-09	6.7E-10	4.5E-10	3.5E-10
Th-227	18.718 d	0.005	1.0E-07	0.0005	7.0E-08	3.6E-08	2.3E-08	1.5E-08	8.8E-09
Th-228	1.9131 y	0.005	3.7E-06	0.0005	3.7E-07	2.2E-07	1.4E-07	9.4E-08	7.2E-08
Th-229	7340 y	0.005	2.1E-05	0.0005	1.0E-06	7.8E-07	6.2E-07	5.3E-07	4.9E-07
Th-230	7.7E4 y	0.005	4.1E-06	0.0005	4.1E-07	3.1E-07	2.4E-07	2.2E-07	2.1E-07
Th-231	25.52 h	0.005	7.9E-09	0.0005	2.5E-09	1.2E-09	7.4E-10	4.2E-10	3.4E-10
Th-232	1.405E1 y	0.005	1.6E-06	0.0005	4.5E-07	3.5E-07	2.9E-07	2.5E-07	2.3E-07
Th-234	24.10 d	0.005	6.0E-08	0.0005	2.5E-08	1.3E-08	7.4E-09	4.2E-09	3.4E-09
<b>Protactinium</b>									
Pa-227	38.3 m	0.005	2.8E-09	0.0005	3.2E-09	1.5E-09	8.7E-10	5.8E-10	4.5E-10
Pa-228	22 h	0.005	3.2E-08	0.0005	4.8E-09	2.6E-09	1.6E-09	9.7E-10	7.8E-10
Pa-230	17.4 d	0.005	4.6E-08	0.0005	5.7E-09	3.1E-09	1.9E-09	1.1E-09	9.2E-10
Pa-231	3.276E4 y	0.005	1.3E-05	0.0005	1.3E-06	1.1E-06	9.2E-07	8.0E-07	7.1E-07
Pa-232	1.31 d	0.005	3.2E-09	0.0005	4.3E-09	2.3E-09	1.4E-09	8.9E-10	7.2E-10
Pa-233	27.0 d	0.005	1.7E-09	0.0005	6.2E-09	3.2E-09	1.9E-09	1.1E-09	8.7E-10
Pa-234	6.70 h	0.005	3.0E-09	0.0005	3.2E-09	1.7E-09	1.0E-09	6.4E-10	5.1E-10

†† For the adult,  $f_1$  is 0.2.

Compendium of Dose Coefficients based on ICRP Publication 60

Table F.1. (continued)

Nuclide	$T_{1/2}$	Infant		$f_1$	$e$ (Sv/Bq)				
		$f_1$	$e$ (Sv/Bq)		$\geq 1$ year	1 year	5 years	10 years	15 years
<b>Uranium</b>									
U-230	20.8 d	0.04	9.9E-07	0.02	3.0E-07	1.5E-07	1.0E-07	6.6E-08	5.6E-08
U-231	4.2 d	0.04	5.1E-09	0.02	2.0E-09	1.0E-09	6.1E-10	3.6E-10	2.8E-10
U-232	72 y	0.04	7.5E-06	0.02	8.2E-07	5.8E-07	5.7E-07	6.4E-07	3.3E-07
U-233	1.585E5 y	0.04	1.8E-07	0.02	1.4E-07	9.2E-08	7.8E-08	7.8E-08	5.1E-08
U-234	2.445E5 y	0.04	1.7E-07	0.02	1.3E-07	8.8E-08	7.4E-08	7.4E-08	4.9E-08
U-235	703.8E6 y	0.04	1.5E-07	0.02	1.3E-07	8.5E-08	7.1E-08	7.0E-08	4.7E-08
U-236	2.3415E7 y	0.04	1.5E-07	0.02	1.3E-07	8.4E-08	7.0E-08	7.0E-08	4.7E-08
U-237	6.75 d	0.04	1.3E-09	0.02	5.4E-09	2.8E-09	1.6E-09	9.5E-10	7.6E-10
U-238	4.468E9 y	0.04	1.4E-07	0.02	1.2E-07	8.0E-08	6.8E-08	6.7E-08	4.5E-08
U-239	23.54 m	0.04	1.4E-10	0.02	1.9E-10	9.3E-11	5.4E-11	3.5E-11	2.7E-11
U-240	14.1 h	0.04	9.3E-08	0.02	8.1E-09	4.1E-09	2.4E-09	1.4E-09	1.1E-09
<b>Neptunium</b>									
Np-232	14.7 m	0.005	1.7E-11	0.0005	5.1E-11	2.7E-11	1.7E-11	1.2E-11	9.7E-12
Np-233	36.2 m	0.005	2.1E-11	0.0005	1.3E-11	6.6E-12	4.0E-12	2.8E-12	2.2E-12
Np-234	4.4 d	0.005	6.2E-09	0.0005	4.4E-09	2.4E-09	1.6E-09	1.0E-09	8.1E-10
Np-235	396.1 d	0.005	1.1E-10	0.0005	4.1E-10	2.0E-10	1.2E-10	6.8E-11	5.3E-11
Np-236	115E3 y	0.005	1.5E-07	0.0005	2.4E-08	1.8E-08	1.8E-08	1.8E-08	1.7E-08
Np-236m	22.5 h	0.005	7.5E-09	0.0005	1.3E-09	6.6E-10	4.0E-10	2.4E-10	1.9E-10
Np-237	2.14E6 y	0.005	2.0E-06	0.0005	2.1E-07	1.4E-07	1.1E-07	1.1E-07	1.1E-07
Np-238	2.117 d	0.005	2.5E-09	0.0005	6.2E-09	3.2E-09	1.9E-09	1.1E-09	9.1E-10
Np-239	2.355 d	0.005	8.9E-09	0.0005	5.7E-09	2.9E-09	1.7E-09	1.0E-09	8.0E-10
Np-240	65 m	0.005	4.7E-10	0.0005	5.2E-10	2.6E-10	1.6E-10	1.0E-10	8.2E-11
<b>Plutonium</b>									
Pu-234	8.8 h	0.005	1.1E-09	0.0005	1.1E-09	5.5E-10	3.3E-10	2.0E-10	1.6E-10
Pu-235	25.3 m	0.005	1.2E-11	0.0005	1.3E-11	6.5E-12	3.9E-12	2.7E-12	2.1E-12
Pu-236	2.851 y	0.005	2.1E-06	0.0005	2.2E-07	1.4E-07	1.0E-07	8.5E-08	8.7E-08
Pu-237	45.3 d	0.005	4.1E-09	0.0005	6.9E-10	3.6E-10	2.2E-10	1.3E-10	1.0E-10
Pu-238	87.74 y	0.005	5.0E-06	0.0005	4.0E-07	3.1E-07	2.4E-07	2.2E-07	2.3E-07
Pu-239	24065 y	0.005	5.2E-06	0.0005	4.2E-07	3.3E-07	2.7E-07	2.4E-07	2.5E-07
Pu-240	6537 y	0.005	5.2E-06	0.0005	4.2E-07	3.3E-07	2.7E-07	2.4E-07	2.5E-07
Pu-241	14.4 y	0.005	8.6E-08	0.0005	5.7E-09	5.5E-09	5.1E-09	4.8E-09	4.8E-09
Pu-242	3.763E5 y	0.005	5.0E-06	0.0005	4.0E-07	3.2E-07	2.6E-07	2.3E-07	2.4E-07
Pu-243	4.956 h	0.005	4.0E-09	0.0005	6.2E-10	3.1E-10	1.8E-10	1.1E-10	8.5E-11
Pu-244	8.26E7 y	0.005	5.0E-06	0.0005	4.1E-07	3.2E-07	2.6E-07	2.3E-07	2.4E-07
Pu-245	10.5 h	0.005	1.0E-09	0.0005	5.1E-09	2.6E-09	1.5E-09	8.9E-10	7.2E-10
Pu-246	10.85 d	0.005	5.6E-08	0.0005	2.3E-08	1.2E-08	7.1E-09	4.1E-09	3.3E-09
<b>Americium</b>									
Am-237	73.0 m	0.005	1.7E-10	0.0005	1.0E-10	5.5E-11	3.3E-11	2.2E-11	1.8E-11
Am-238	98 m	0.005	4.5E-10	0.0005	1.6E-10	9.1E-11	5.9E-11	4.0E-11	3.2E-11
Am-239	11.9 h	0.005	6.6E-09	0.0005	1.7E-09	8.4E-10	5.1E-10	3.0E-10	2.4E-10
Am-240	50.8 h	0.005	4.7E-09	0.0005	3.3E-09	1.8E-09	1.2E-09	7.3E-10	5.8E-10
Am-241	432.2 y	0.005	4.7E-06	0.0005	3.7E-07	2.7E-07	2.2E-07	2.0E-07	2.0E-07
Am-242	16.02 h	0.005	6.0E-09	0.0005	2.2E-09	1.1E-09	6.4E-10	3.7E-10	3.0E-10
Am-242m	152 y	0.005	4.1E-06	0.0005	3.0E-07	2.3E-07	2.0E-07	1.9E-07	1.9E-07
Am-243	7380 y	0.005	4.6E-06	0.0005	3.7E-07	2.7E-07	2.2E-07	2.0E-07	2.0E-07
Am-244	10.1 h	0.005	1.9E-09	0.0005	3.1E-09	1.6E-09	9.6E-10	5.8E-10	4.6E-10
Am-244m	26 m	0.005	6.7E-10	0.0005	2.0E-10	9.6E-11	5.5E-11	3.7E-11	2.9E-11
Am-245	2.05 h	0.005	2.8E-10	0.0005	4.5E-10	2.2E-10	1.3E-10	7.9E-11	6.2E-11
Am-246	39 m	0.005	1.7E-10	0.0005	3.8E-10	1.9E-10	1.1E-10	7.3E-11	5.8E-11
Am-246m	25.0 m	0.005	1.9E-10	0.0005	2.2E-10	1.1E-10	6.4E-11	4.4E-11	3.4E-11
<b>Curium</b>									
Cm-238	2.4 h	0.005	6.8E-10	0.0005	4.9E-10	2.6E-10	1.6E-10	1.0E-10	8.0E-11
Cm-240	27 d	0.005	8.2E-07	0.0005	4.8E-08	2.5E-08	1.5E-08	9.2E-09	7.6E-09
Cm-241	32.8 d	0.005	5.1E-08	0.0005	5.7E-09	3.0E-09	1.9E-09	1.1E-09	9.1E-10

(continued on next page)

Table F.1. (continued)

Nuclide	$T_{1/2}$	Infant		$f_1$	$e$ (Sv/Bq)				
		$f_1$	$e$ (Sv/Bq)	$\geq 1$ year	1 year	5 years	10 years	15 years	Adult
Cm-242	162.8 d	0.005	1.9E-07	0.0005	7.6E-08	3.9E-08	2.4E-08	1.5E-08	1.2E-08
Cm-243	28.5 y	0.005	2.2E-06	0.0005	3.3E-07	2.2E-07	1.6E-07	1.4E-07	1.5E-07
Cm-244	18.11 y	0.005	2.9E-06	0.0005	2.9E-07	1.9E-07	1.4E-07	1.2E-07	1.2E-07
Cm-245	8500 y	0.005	4.7E-06	0.0005	3.7E-07	2.8E-07	2.3E-07	2.1E-07	2.1E-07
Cm-246	4730 y	0.005	4.7E-06	0.0005	3.7E-07	2.8E-07	2.2E-07	2.1E-07	2.1E-07
Cm-247	1.56E7 y	0.005	4.4E-06	0.0005	3.5E-07	2.6E-07	2.1E-07	1.9E-07	1.9E-07
Cm-248	3.39E5 y	0.005	1.4E-05	0.0005	1.4E-06	1.0E-06	8.4E-07	7.7E-07	7.7E-07
Cm-249	64.15 m	0.005	8.9E-10	0.0005	2.2E-10	1.1E-10	6.1E-11	4.0E-11	3.1E-11
Cm-250	6900 y	0.005	9.8E-05	0.0005	8.2E-06	6.0E-06	4.9E-06	4.4E-06	4.4E-06
<b>Berkelium</b>									
Bk-245	4.94 d	0.005	1.1E-09	0.0005	3.9E-09	2.0E-09	1.2E-09	7.2E-10	5.7E-10
Bk-246	1.83 d	0.005	4.7E-09	0.0005	2.6E-09	1.4E-09	9.4E-10	6.0E-10	4.8E-10
Bk-247	1380 y	0.005	2.9E-06	0.0005	8.6E-07	6.3E-07	4.6E-07	3.8E-07	3.5E-07
Bk-249	320 d	0.005	1.2E-08	0.0005	2.9E-09	1.9E-09	1.4E-09	1.1E-09	9.7E-10
Bk-250	3.222 h	0.005	8.5E-09	0.0005	8.5E-10	4.4E-10	2.7E-10	1.7E-10	1.4E-10
<b>Californium</b>									
Cf-244	19.4 m	0.005	1.8E-10	0.0005	4.8E-10	2.4E-10	1.3E-10	8.9E-11	7.0E-11
Cf-246	35.7 h	0.005	4.0E-08	0.0005	2.4E-08	1.2E-08	7.3E-09	4.1E-09	3.3E-09
Cf-248	333.5 d	0.005	5.5E-06	0.0005	1.6E-07	9.9E-08	6.0E-08	3.3E-08	2.8E-08
Cf-249	350.6 y	0.005	5.0E-06	0.0005	8.7E-07	6.4E-07	4.7E-07	3.8E-07	3.5E-07
Cf-250	13.08 y	0.005	1.7E-06	0.0005	5.5E-07	3.7E-07	2.3E-07	1.7E-07	1.6E-07
Cf-251	898 y	0.005	2.1E-06	0.0005	8.8E-07	6.5E-07	4.7E-07	3.9E-07	3.6E-07
Cf-252	2.638 y	0.005	2.0E-06	0.0005	5.1E-07	3.2E-07	1.9E-07	1.0E-07	9.0E-08
Cf-253	17.81 d	0.005	1.0E-07	0.0005	1.1E-08	6.0E-09	3.7E-09	1.8E-09	1.4E-09
Cf-254	60.5 d	0.005	2.1E-05	0.0005	2.6E-06	1.4E-06	8.4E-07	5.0E-07	4.0E-07
<b>Einsteinium</b>									
Es-250	2.1 h	0.005	2.3E-10	0.0005	9.9E-11	5.7E-11	3.7E-11	2.6E-11	2.1E-11
Es-251	33 h	0.005	4.9E-09	0.0005	1.2E-09	6.1E-10	3.7E-10	2.2E-10	1.7E-10
Es-253	20.47 d	0.005	5.7E-07	0.0005	4.5E-08	2.3E-08	1.4E-08	7.6E-09	6.1E-09
Es-254	275.7 d	0.005	1.4E-06	0.0005	1.6E-07	9.8E-08	6.0E-08	3.3E-08	2.8E-08
Es-254m	39.3 h	0.005	6.7E-08	0.0005	3.0E-08	1.5E-08	9.1E-09	5.2E-09	4.2E-09
<b>Fermium</b>									
Fm-252	22.7 h	0.005	4.8E-08	0.0005	2.0E-08	9.9E-09	5.9E-09	3.3E-09	2.7E-09
Fm-253	3.00 d	0.005	1.5E-08	0.0005	6.7E-09	3.4E-09	2.1E-09	1.1E-09	9.1E-10
Fm-254	3.240 h	0.005	9.6E-09	0.0005	3.2E-09	1.6E-09	9.3E-10	5.6E-10	4.4E-10
Fm-255	20.07 h	0.005	3.3E-08	0.0005	1.9E-08	9.5E-09	5.6E-09	3.2E-09	2.5E-09
Fm-257	100.5 d	0.005	6.8E-07	0.0005	1.1E-07	6.5E-08	4.0E-08	1.9E-08	1.5E-08
<b>Mendelevium</b>									
Md-257	5.2 h	0.005	3.1E-09	0.0005	8.8E-10	4.5E-10	2.7E-10	1.5E-10	1.2E-10
Md-258	55 d	0.005	7.3E-07	0.0005	8.9E-08	5.0E-08	3.0E-08	1.6E-08	1.3E-08



## ANNEX G. EFFECTIVE DOSE COEFFICIENTS FOR INHALATION OF RADIONUCLIDES FOR MEMBERS OF THE PUBLIC

Table G.1. Effective dose coefficients  $e$  for inhalation (activity median aerodynamic diameter = 1  $\mu\text{m}$ ) of radionuclides for members of the public to 70 years of age.

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
<b>Hydrogen</b>										
H-3	12.35 y	F	1.0	2.6E-11	1.0	2.0E-11	1.1E-11	8.2E-12	5.9E-12	6.2E-12
		M	0.2	3.4E-10	0.1	2.7E-10	1.4E-10	8.2E-11	5.3E-11	4.5E-11
		S	0.02	1.2E-09	0.01	1.0E-09	6.3E-10	3.8E-10	2.8E-10	2.6E-10
<b>Beryllium</b>										
Be-7	53.3 d	M	0.02	2.5E-10	0.005	2.1E-10	1.2E-10	8.3E-11	6.2E-11	5.0E-11
		S	0.02	2.8E-10	0.005	2.4E-10	1.4E-10	9.6E-11	6.8E-11	5.5E-11
Be-10	1.6E6 y	M	0.02	4.1E-08	0.005	3.4E-08	2.0E-08	1.3E-08	1.1E-08	9.6E-09
		S	0.02	9.9E-08	0.005	9.1E-08	6.1E-08	4.2E-08	3.7E-08	3.5E-08
<b>Carbon</b>										
C-11	20.38 m	F	1.0	1.0E-10	1.0	7.0E-11	3.2E-11	2.1E-11	1.3E-11	1.1E-11
		M	0.2	1.5E-10	0.1	1.1E-10	4.9E-11	3.2E-11	2.1E-11	1.8E-11
		S	0.02	1.6E-10	0.01	1.1E-10	5.1E-11	3.3E-11	2.2E-11	1.8E-11
C-14	5730 y	F	1.0	6.1E-10	1.0	6.7E-10	3.6E-10	2.9E-10	1.9E-10	2.0E-10
		M	0.2	8.3E-09	0.1	6.6E-09	4.0E-09	2.8E-09	2.5E-09	2.0E-09
		S	0.02	1.9E-08	0.01	1.7E-08	1.1E-08	7.4E-09	6.4E-09	5.8E-09
<b>Fluorine</b>										
F-18	109.77 m	F	1.0	2.6E-10	1.0	1.9E-10	9.1E-11	5.6E-11	3.4E-11	2.8E-11
		M	1.0	4.1E-10	1.0	2.9E-10	1.5E-10	9.7E-11	6.9E-11	5.6E-11
		S	1.0	4.2E-10	1.0	3.1E-10	1.5E-10	1.0E-10	7.3E-11	5.9E-11
<b>Sodium</b>										
Na-22	2.602 y	F	1.0	9.7E-09	1.0	7.3E-09	3.8E-09	2.4E-09	1.5E-09	1.3E-09
Na-24	15.00 h	F	1.0	2.3E-09	1.0	1.8E-09	9.3E-10	5.7E-10	3.4E-10	2.7E-10
<b>Magnesium</b>										
Mg-28	20.91 h	F	1.0	5.3E-09	0.5	4.7E-09	2.2E-09	1.3E-09	7.3E-10	6.0E-10
		M	1.0	7.3E-09	0.5	7.2E-09	3.5E-09	2.3E-09	1.5E-09	1.2E-09
<b>Aluminium</b>										
Al-26	7.16E5 y	F	0.02	8.1E-08	0.01	6.2E-08	3.2E-08	2.0E-08	1.3E-08	1.1E-08
		M	0.02	8.8E-08	0.01	7.4E-08	4.4E-08	2.9E-08	2.2E-08	2.0E-08
<b>Silicon</b>										
Si-31	157.3 m	F	0.02	3.6E-10	0.01	2.3E-10	9.5E-11	5.9E-11	3.2E-11	2.7E-11
		M	0.02	6.9E-10	0.01	4.4E-10	2.0E-10	1.3E-10	8.9E-11	7.4E-11
		S	0.02	7.2E-10	0.01	4.7E-10	2.2E-10	1.4E-10	9.5E-11	7.9E-11
Si-32	450 y	F	0.02	3.0E-08	0.01	2.3E-08	1.1E-08	6.4E-09	3.8E-09	3.2E-09
		M	0.02	7.1E-08	0.01	6.0E-08	3.6E-08	2.4E-08	1.9E-08	1.7E-08
		S	0.02	2.8E-07	0.01	2.7E-07	1.9E-07	1.3E-07	1.1E-07	1.1E-07
<b>Phosphorus</b>										
P-32	14.29 d	F	1.0	1.2E-08	0.8	7.5E-09	3.2E-09	1.8E-09	9.8E-10	7.7E-10
		M	1.0	2.2E-08	0.8	1.5E-08	8.0E-09	5.3E-09	4.0E-09	3.4E-09
P-33	25.4 d	F	1.0	1.2E-09	0.8	7.8E-10	3.0E-10	2.0E-10	1.1E-10	9.2E-11
		M	1.0	6.1E-09	0.8	4.6E-09	2.8E-09	2.1E-09	1.9E-09	1.5E-09

*(continued on next page)*

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Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
<b>Sulphur</b>										
S-35 (inorganic)	87.44 d	F	1.0	5.5E-10	0.8	3.9E-10	1.8E-10	1.1E-10	6.0E-11	5.1E-11
		M	0.2	5.9E-09	0.1	4.5E-09	2.8E-09	2.0E-09	1.8E-09	1.4E-09
		S	0.02	7.7E-09	0.01	6.0E-09	3.6E-09	2.6E-09	2.3E-09	1.9E-09
<b>Chlorine</b>										
Cl-36	3.01E5 y	F	1.00	3.9E-09	1.0	2.6E-09	1.1E-09	7.1E-10	3.9E-10	3.3E-10
		M	1.00	3.1E-08	1.0	2.6E-08	1.5E-08	1.0E-08	8.8E-09	7.3E-09
Cl-38	37.21 m	F	1.00	2.9E-10	1.0	1.9E-10	8.4E-11	5.1E-11	3.0E-11	2.5E-11
		M	1.00	4.7E-10	1.0	3.0E-10	1.4E-10	8.5E-11	5.4E-11	4.5E-11
Cl-39	55.6 m	F	1.00	2.7E-10	1.0	1.8E-10	8.4E-11	5.1E-11	3.1E-11	2.5E-11
		M	1.00	4.3E-10	1.0	2.8E-10	1.3E-10	8.5E-11	5.6E-11	4.6E-11
<b>Potassium</b>										
K-40	1.28E9 y	F	1.00	2.4E-08	1.0	1.7E-08	7.5E-09	4.5E-09	2.5E-09	2.1E-09
K-42	12.36 h	F	1.00	1.6E-09	1.0	1.0E-09	4.4E-10	2.6E-10	1.5E-10	1.2E-10
K-43	22.6 h	F	1.00	1.3E-09	1.0	9.7E-10	4.7E-10	2.9E-10	1.7E-10	1.4E-10
K-44	22.13 m	F	1.00	2.2E-10	1.0	1.4E-10	6.5E-11	4.0E-11	2.4E-11	2.0E-11
K-45	20 m	F	1.00	1.5E-10	1.0	1.0E-10	4.8E-11	3.0E-11	1.8E-11	1.5E-11
<b>Calcium</b>										
Ca-41	1.4E5 y	F	0.6	6.7E-10	0.4*	3.8E-10	2.6E-10	3.3E-10	3.3E-10	1.7E-10
		M	0.2	4.2E-10	0.1	2.6E-10	1.7E-10	1.7E-10	1.6E-10	9.5E-11
		S	0.02	6.7E-10	0.01	6.0E-10	3.8E-10	2.4E-10	1.9E-10	1.8E-10
Ca-45	163 d	F	0.6	5.7E-09	0.4*	3.0E-09	1.4E-09	1.0E-09	7.6E-10	4.6E-10
		M	0.2	1.2E-08	0.1	8.8E-09	5.3E-09	3.9E-09	3.5E-09	2.7E-09
		S	0.02	1.5E-08	0.01	1.2E-08	7.2E-09	5.1E-09	4.6E-09	3.7E-09
Ca-47	4.53 d	F	0.6	4.9E-09	0.4*	3.6E-09	1.7E-09	1.1E-09	6.1E-10	5.5E-10
		M	0.2	1.0E-08	0.1	7.7E-09	4.2E-09	2.9E-09	2.4E-09	1.9E-09
S	0.02	1.2E-08	0.01	8.5E-09	4.6E-09	3.3E-09	2.6E-09	2.1E-09		
<b>Scandium</b>										
Sc-43	3.891 h	S	0.001	9.3E-10	0.0001	6.7E-10	3.3E-10	2.2E-10	1.4E-10	1.1E-10
Sc-44	3.927 h	S	0.001	1.6E-09	0.0001	1.2E-09	5.6E-10	3.6E-10	2.3E-10	1.8E-10
Sc-44m	58.6 h	S	0.001	1.1E-08	0.0001	8.4E-09	4.2E-09	2.8E-09	1.7E-09	1.4E-09
Sc-46	83.83 d	S	0.001	2.8E-08	0.0001	2.3E-08	1.4E-08	9.8E-09	8.4E-09	6.8E-09
Sc-47	3.351 d	S	0.001	4.0E-09	0.0001	2.8E-09	1.5E-09	1.1E-09	9.2E-10	7.3E-10
Sc-48	43.7 h	S	0.001	7.8E-09	0.0001	5.9E-09	3.1E-09	2.0E-09	1.4E-09	1.1E-09
Sc-49	57.4 m	S	0.001	3.9E-10	0.0001	2.4E-10	1.1E-10	7.1E-11	4.7E-11	4.0E-11
<b>Titanium</b>										
Ti-44	47.3 y	F	0.02	3.1E-07	0.01	2.6E-07	1.5E-07	9.6E-08	6.6E-08	6.1E-08
		M	0.02	1.7E-07	0.01	1.5E-07	9.2E-08	5.9E-08	4.6E-08	4.2E-08
		S	0.02	3.2E-07	0.01	3.1E-07	2.1E-07	1.5E-07	1.3E-07	1.2E-07
Ti-45	3.08 h	F	0.02	4.4E-10	0.01	3.2E-10	1.5E-10	9.1E-11	5.1E-11	4.2E-11
		M	0.02	7.4E-10	0.01	5.2E-10	2.5E-10	1.6E-10	1.1E-10	8.8E-11
		S	0.02	7.7E-10	0.01	5.5E-10	2.7E-10	1.7E-10	1.1E-10	9.3E-11
<b>Vanadium</b>										
V-47	32.6 m	F	0.02	1.8E-10	0.01	1.2E-10	5.6E-11	3.5E-11	2.1E-11	1.7E-11
		M	0.02	2.8E-10	0.01	1.9E-10	8.6E-11	5.5E-11	3.5E-11	2.9E-11
V-48	16.238 d	F	0.02	8.4E-09	0.01	6.4E-09	3.3E-09	2.1E-09	1.3E-09	1.1E-09
		M	0.02	1.4E-08	0.01	1.1E-08	6.3E-09	4.3E-09	2.9E-09	2.4E-09
V-49	330 d	F	0.02	2.0E-10	0.01	1.6E-10	7.7E-11	4.3E-11	2.5E-11	2.1E-11
		M	0.02	2.8E-10	0.01	2.1E-10	1.1E-10	6.3E-11	4.0E-11	3.4E-11
<b>Chromium</b>										
Cr-48	22.96 h	F	0.2	7.6E-10	0.1	6.0E-10	3.1E-10	2.0E-10	1.2E-10	9.9E-11
		M	0.2	1.1E-09	0.1	9.1E-10	5.1E-10	3.4E-10	2.5E-10	2.0E-10
		S	0.2	1.2E-09	0.1	9.8E-10	5.5E-10	3.7E-10	2.8E-10	2.2E-10
Cr-49	42.09 m	F	0.2	1.9E-10	0.1	1.3E-10	6.0E-11	3.7E-11	2.2E-11	1.9E-11

\* The  $f_1$  value for Type F for an adult is 0.3.

Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Cr-51	27.704 d	M	0.2	3.0E-10	0.1	2.0E-10	9.5E-11	6.1E-11	4.0E-11	3.3E-11
		S	0.2	3.1E-10	0.1	2.1E-10	9.9E-11	6.4E-11	4.2E-11	3.5E-11
		F	0.2	1.7E-10	0.1	1.3E-10	6.3E-11	4.0E-11	2.4E-11	2.0E-11
		M	0.2	2.6E-10	0.1	1.9E-10	1.0E-10	6.4E-11	3.9E-11	3.2E-11
		S	0.2	2.6E-10	0.1	2.1E-10	1.0E-10	6.6E-11	4.5E-11	3.7E-11
<b>Manganese</b>										
Mn-51	46.2 m	F	0.2	2.5E-10	0.1	1.7E-10	7.5E-11	4.6E-11	2.7E-11	2.3E-11
		M	0.2	4.0E-10	0.1	2.7E-10	1.2E-10	7.8E-11	5.0E-11	4.1E-11
Mn-52	5.591 d	F	0.2	7.0E-09	0.1	5.5E-09	2.9E-09	1.8E-09	1.1E-09	9.4E-10
		M	0.2	8.6E-09	0.1	6.8E-09	3.7E-09	2.4E-09	1.7E-09	1.4E-09
Mn-52m	21.1 m	F	0.2	1.9E-10	0.1	1.3E-10	6.1E-11	3.8E-11	2.2E-11	1.9E-11
		M	0.2	2.8E-10	0.1	1.9E-10	8.7E-11	5.5E-11	3.4E-11	2.9E-11
Mn-53	3.7E6 y	F	0.2	3.2E-10	0.1	2.2E-10	1.1E-10	6.0E-11	3.4E-11	2.9E-11
		M	0.2	4.6E-10	0.1	3.4E-10	1.7E-10	1.0E-10	6.4E-11	5.4E-11
Mn-54	312.5 d	F	0.2	5.2E-09	0.1	4.1E-09	2.2E-09	1.5E-09	9.9E-10	8.5E-10
		M	0.2	7.5E-09	0.1	6.2E-09	3.8E-09	2.4E-09	1.9E-09	1.5E-09
Mn-56	2.5785 h	F	0.2	6.9E-10	0.1	4.9E-10	2.3E-10	1.4E-10	7.8E-11	6.4E-11
		M	0.2	1.1E-09	0.1	7.8E-10	3.7E-10	2.4E-10	1.5E-10	1.2E-10
<b>Iron</b>										
Fe-52	8.275 h	F	0.6	5.2E-09	0.2 <sup>†</sup>	3.6E-09	1.5E-09	8.9E-10	4.9E-10	3.9E-10
		M	0.2	5.8E-09	0.1	4.1E-09	1.9E-09	1.2E-09	7.4E-10	6.0E-10
Fe-55	2.7 y	S	0.02	6.0E-09	0.01	4.2E-09	2.0E-09	1.3E-09	7.7E-10	6.3E-10
		F	0.6	4.2E-09	0.2 <sup>†</sup>	3.2E-09	2.2E-09	1.4E-09	9.4E-10	7.7E-10
		M	0.2	1.9E-09	0.1	1.4E-09	9.9E-10	6.2E-10	4.4E-10	3.8E-10
Fe-59	44.529 d	S	0.02	1.0E-09	0.01	8.5E-10	5.0E-10	2.9E-10	2.0E-10	1.8E-10
		F	0.6	2.1E-08	0.2 <sup>†</sup>	1.3E-08	7.1E-09	4.2E-09	2.6E-09	2.2E-09
		M	0.2	1.8E-08	0.1	1.3E-08	7.9E-09	5.5E-09	4.6E-09	3.7E-09
Fe-60	1E5 y	S	0.02	1.7E-08	0.01	1.3E-08	8.1E-09	5.8E-09	5.1E-09	4.0E-09
		F	0.6	4.4E-07	0.2 <sup>†</sup>	3.9E-07	3.5E-07	3.2E-07	2.9E-07	2.8E-07
		M	0.2	2.0E-07	0.1	1.7E-07	1.6E-07	1.4E-07	1.4E-07	1.4E-07
<b>Cobalt</b>										
Co-55	17.54 h	F	0.6	2.2E-09	0.3 <sup>†</sup>	1.8E-09	9.0E-10	5.5E-10	3.1E-10	2.7E-10
		M	0.2	4.1E-09	0.1	3.1E-09	1.5E-09	9.8E-10	6.1E-10	5.0E-10
		S	0.02	4.6E-09	0.01	3.3E-09	1.6E-09	1.1E-09	6.6E-10	5.3E-10
Co-56	78.76 d	F	0.6	1.4E-08	0.3 <sup>†</sup>	1.0E-08	5.5E-09	3.5E-09	2.2E-09	1.8E-09
		M	0.2	2.5E-08	0.1	2.1E-08	1.1E-08	7.4E-09	5.8E-09	4.8E-09
		S	0.02	2.9E-08	0.01	2.5E-08	1.5E-08	1.0E-08	8.0E-09	6.7E-09
Co-57	270.9 d	F	0.6	1.5E-09	0.3 <sup>†</sup>	1.1E-09	5.6E-10	3.7E-10	2.3E-10	1.9E-10
		M	0.2	2.8E-09	0.1	2.2E-09	1.3E-09	8.5E-10	6.7E-10	5.5E-10
		S	0.02	4.4E-09	0.01	3.7E-09	2.3E-09	1.5E-09	1.2E-09	1.0E-09
Co-58	70.80 d	F	0.6	4.0E-09	0.3 <sup>†</sup>	3.0E-09	1.6E-09	1.0E-09	6.4E-10	5.3E-10
		M	0.2	7.3E-09	0.1	6.5E-09	3.5E-09	2.4E-09	2.0E-09	1.6E-09
		S	0.02	9.0E-09	0.01	7.5E-09	4.5E-09	3.1E-09	2.6E-09	2.1E-09
Co-58m	9.15 h	F	0.6	4.8E-11	0.3 <sup>†</sup>	3.6E-11	1.7E-11	1.1E-11	5.9E-12	5.2E-12
		M	0.2	1.1E-10	0.1	7.6E-11	3.8E-11	2.4E-11	1.6E-11	1.3E-11
		S	0.02	1.3E-10	0.01	9.0E-11	4.5E-11	3.0E-11	2.0E-11	1.7E-11
Co-60	5.271 y	F	0.6	3.0E-08	0.3 <sup>†</sup>	2.3E-08	1.4E-08	8.9E-09	6.1E-09	5.2E-09
		M	0.2	4.2E-08	0.1	3.4E-08	2.1E-08	1.5E-08	1.2E-08	1.0E-08
		S	0.02	9.2E-08	0.01	8.6E-08	5.9E-08	4.0E-08	3.4E-08	3.1E-08
Co-60m	10.47 m	F	0.6	4.4E-12	0.3 <sup>†</sup>	2.8E-12	1.5E-12	1.0E-12	8.3E-13	6.9E-13
		M	0.2	7.1E-12	0.1	4.7E-12	2.7E-12	1.8E-12	1.5E-12	1.2E-12
		S	0.02	7.6E-12	0.01	5.1E-12	2.9E-12	2.0E-12	1.7E-12	1.4E-12
Co-61	1.65 h	F	0.6	2.1E-10	0.3 <sup>†</sup>	1.4E-10	6.0E-11	3.8E-11	2.2E-11	1.9E-11
		M	0.2	4.0E-10	0.1	2.7E-10	1.2E-10	8.2E-11	5.7E-11	4.7E-11

(continued on next page)

<sup>†</sup> The f<sub>1</sub> value for Type F for an adult is 0.1.

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Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Co-62m	13.91 m	S	0.02	4.3E-10	0.01	2.8E-10	1.3E-10	8.8E-11	6.1E-11	5.1E-11
		F	0.6	1.4E-10	0.3 <sup>†</sup>	9.5E-11	4.5E-11	2.8E-11	1.7E-11	1.4E-11
		M	0.2	1.9E-10	0.1	1.3E-10	6.1E-11	3.8E-11	2.4E-11	2.0E-11
		S	0.02	2.0E-10	0.01	1.3E-10	6.3E-11	4.0E-11	2.5E-11	2.1E-11
<b>Nickel</b>										
Ni-56	6.10 d	F	0.1	3.3E-09	0.05	2.8E-09	1.5E-09	9.3E-10	5.8E-10	4.9E-10
		M	0.1	4.9E-09	0.05	4.1E-09	2.3E-09	1.5E-09	1.1E-09	8.7E-10
		S	0.02	5.5E-09	0.01	4.6E-09	2.7E-09	1.8E-09	1.3E-09	1.0E-09
Ni-57	36.08 h	F	0.1	2.2E-09	0.05	1.8E-09	8.9E-10	5.5E-10	3.1E-10	2.5E-10
		M	0.1	3.6E-09	0.05	2.8E-09	1.5E-09	9.5E-10	6.2E-10	5.0E-10
		S	0.02	3.9E-09	0.01	3.0E-09	1.5E-09	1.0E-09	6.6E-10	5.3E-10
Ni-59	7.5E4 y	F	0.1	9.6E-10	0.05	8.1E-10	4.5E-10	2.8E-10	1.9E-10	1.8E-10
		M	0.1	7.9E-10	0.05	6.2E-10	3.4E-10	2.1E-10	1.4E-10	1.3E-10
		S	0.02	1.7E-09	0.01	1.5E-09	9.5E-10	5.9E-10	4.6E-10	4.4E-10
Ni-63	96 y	F	0.1	2.3E-09	0.05	2.0E-09	1.1E-09	6.7E-10	4.6E-10	4.4E-10
		M	0.1	2.5E-09	0.05	1.9E-09	1.1E-09	7.0E-10	5.3E-10	4.8E-10
		S	0.02	4.8E-09	0.01	4.3E-09	2.7E-09	1.7E-09	1.3E-09	1.3E-09
Ni-65	2.520 h	F	0.1	4.4E-10	0.05	3.0E-10	1.4E-10	8.5E-11	4.9E-11	4.1E-11
		M	0.1	7.7E-10	0.05	5.2E-10	2.4E-10	1.6E-10	1.0E-10	8.5E-11
		S	0.02	8.1E-10	0.01	5.5E-10	2.6E-10	1.7E-10	1.1E-10	9.0E-11
Ni-66	54.6 h	F	0.1	5.7E-09	0.05	3.8E-09	1.6E-09	1.0E-09	5.1E-10	4.2E-10
		M	0.1	1.3E-08	0.05	9.4E-09	4.5E-09	2.9E-09	2.0E-09	1.6E-09
		S	0.02	1.5E-08	0.01	1.0E-08	5.0E-09	3.2E-09	2.2E-09	1.8E-09
<b>Copper</b>										
Cu-60	23.2 m	F	1.0	2.1E-10	0.5	1.6E-10	7.5E-11	4.6E-11	2.8E-11	2.3E-11
		M	1.0	3.0E-10	0.5	2.2E-10	1.0E-10	6.5E-11	4.0E-11	3.3E-11
		S	1.0	3.1E-10	0.5	2.2E-10	1.1E-10	6.7E-11	4.2E-11	3.4E-11
Cu-61	3.408 h	F	1.0	3.1E-10	0.5	2.7E-10	1.3E-10	7.9E-11	4.5E-11	3.7E-11
		M	1.0	4.9E-10	0.5	4.4E-10	2.1E-10	1.4E-10	9.1E-11	7.4E-11
		S	1.0	5.1E-10	0.5	4.5E-10	2.2E-10	1.4E-10	9.6E-11	7.8E-11
Cu-64	12.701 h	F	1.0	2.8E-10	0.5	2.7E-10	1.2E-10	7.6E-11	4.2E-11	3.5E-11
		M	1.0	5.5E-10	0.5	5.4E-10	2.7E-10	1.9E-10	1.4E-10	1.1E-10
		S	1.0	5.8E-10	0.5	5.7E-10	2.9E-10	2.0E-10	1.3E-10	1.2E-10
Cu-67	61.86 h	F	1.0	9.5E-10	0.5	8.0E-10	3.5E-10	2.2E-10	1.2E-10	1.0E-10
		M	1.0	2.3E-09	0.5	2.0E-09	1.1E-09	8.1E-10	6.9E-10	5.5E-10
		S	1.0	2.5E-09	0.5	2.1E-09	1.2E-09	8.9E-10	7.7E-10	6.1E-10
<b>Zinc</b>										
Zn-62	9.26 h	F	1.0	1.7E-09	0.5	1.7E-09	7.7E-10	4.6E-10	2.5E-10	2.0E-10
		M	0.2	4.5E-09	0.1	3.5E-09	1.6E-09	1.0E-09	6.0E-10	5.0E-10
		S	0.02	5.1E-09	0.01	3.4E-09	1.8E-09	1.1E-09	6.6E-10	5.5E-10
Zn-63	38.1 m	F	1.0	2.1E-10	0.5	1.4E-10	6.5E-11	4.0E-11	2.4E-11	2.0E-11
		M	0.2	3.4E-10	0.1	2.3E-10	1.0E-10	6.6E-11	4.2E-11	3.5E-11
		S	0.02	3.6E-10	0.01	2.4E-10	1.1E-10	6.9E-11	4.4E-11	3.7E-11
Zn-65	243.9 d	F	1.0	1.5E-08	0.5	1.0E-08	5.7E-09	3.8E-09	2.5E-09	2.2E-09
		M	0.2	8.5E-09	0.1	6.5E-09	3.7E-09	2.4E-09	1.9E-09	1.6E-09
		S	0.02	7.6E-09	0.01	6.7E-09	4.4E-09	2.9E-09	2.4E-09	2.0E-09
Zn-69	57 m	F	1.0	1.1E-10	0.5	7.4E-11	3.2E-11	2.1E-11	1.2E-11	1.1E-11
		M	0.2	2.2E-10	0.1	1.4E-10	6.5E-11	4.4E-11	3.1E-11	2.6E-11
		S	0.02	2.3E-10	0.01	1.5E-10	6.9E-11	4.7E-11	3.4E-11	2.8E-11
Zn-69m	13.76 h	F	1.0	6.6E-10	0.5	6.7E-10	3.0E-10	1.8E-10	9.9E-11	8.2E-11
		M	0.2	2.1E-09	0.1	1.5E-09	7.5E-10	5.0E-10	3.0E-10	2.4E-10
		S	0.02	2.2E-09	0.01	1.7E-09	8.2E-10	5.4E-10	3.3E-10	2.7E-10
Zn-71m	3.92 h	F	1.0	6.2E-10	0.5	5.5E-10	2.6E-10	1.6E-10	9.1E-11	7.4E-11
		M	0.2	1.3E-09	0.1	9.4E-10	4.6E-10	2.9E-10	1.9E-10	1.5E-10
		S	0.02	1.4E-09	0.01	1.0E-09	4.9E-10	3.1E-10	2.0E-10	1.6E-10

<sup>†</sup> The  $f_1$  value for Type F for an adult is 0.1.

Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Zn-72	46.5 h	F	1.0	4.3E-09	0.5	3.5E-09	1.7E-09	1.0E-09	5.9E-10	4.9E-10
		M	0.2	8.8E-09	0.1	6.5E-09	3.4E-09	2.3E-09	1.5E-09	1.2E-09
		S	0.02	9.7E-09	0.01	7.0E-09	3.6E-09	2.4E-09	1.6E-09	1.3E-09
<b>Gallium</b>										
Ga-65	15.2 m	F	0.01	1.1E-10	0.001	7.3E-11	3.4E-11	2.1E-11	1.3E-11	1.1E-11
		M	0.01	1.6E-10	0.001	1.1E-10	4.8E-11	3.1E-11	2.0E-11	1.7E-11
Ga-66	9.40 h	F	0.01	2.8E-09	0.001	2.0E-09	9.2E-10	5.7E-10	3.0E-10	2.5E-10
		M	0.01	4.5E-09	0.001	3.1E-09	1.5E-09	9.2E-10	5.3E-10	4.4E-10
Ga-67	78.26 h	F	0.01	6.4E-10	0.001	4.6E-10	2.2E-10	1.4E-10	7.7E-11	6.4E-11
		M	0.01	1.4E-09	0.001	1.0E-09	5.0E-10	3.6E-10	3.0E-10	2.4E-10
Ga-68	68.0 m	F	0.01	2.9E-10	0.001	1.9E-10	8.8E-11	5.4E-11	3.1E-11	2.6E-11
		M	0.01	4.6E-10	0.001	3.1E-10	1.4E-10	9.2E-11	5.9E-11	4.9E-11
Ga-70	21.15 m	F	0.01	9.5E-11	0.001	6.0E-11	2.6E-11	1.6E-11	1.0E-11	8.8E-12
		M	0.01	1.5E-10	0.001	9.6E-11	4.3E-11	2.8E-11	1.8E-11	1.6E-11
Ga-72	14.1 h	F	0.01	2.9E-09	0.001	2.2E-09	1.0E-09	6.4E-10	3.6E-10	2.9E-10
		M	0.01	4.5E-09	0.001	3.3E-09	1.6E-09	1.0E-09	6.5E-10	5.3E-10
Ga-73	4.91 h	F	0.01	6.7E-10	0.001	4.5E-10	2.0E-10	1.2E-10	6.4E-11	5.4E-11
		M	0.01	1.2E-09	0.001	8.4E-10	4.0E-10	2.6E-10	1.7E-10	1.4E-10
<b>Germanium</b>										
Ge-66	2.27 h	F	1.0	4.5E-10	1.0	3.5E-10	1.8E-10	1.1E-10	6.7E-11	5.4E-11
		M	1.0	6.4E-10	1.0	4.8E-10	2.5E-10	1.6E-10	1.1E-10	9.1E-11
Ge-67	18.7 m	F	1.0	1.7E-10	1.0	1.1E-10	4.9E-11	3.1E-11	1.8E-11	1.5E-11
		M	1.0	2.5E-10	1.0	1.6E-10	7.3E-11	4.6E-11	2.9E-11	2.5E-11
Ge-68	288 d	F	1.0	5.4E-09	1.0	3.8E-09	1.8E-09	1.1E-09	6.3E-10	5.2E-10
		M	1.0	6.0E-08	1.0	5.0E-08	3.0E-08	2.0E-08	1.6E-08	1.4E-08
Ge-69	39.05 h	F	1.0	1.2E-09	1.0	9.0E-10	4.6E-10	2.8E-10	1.7E-10	1.3E-10
		M	1.0	1.8E-09	1.0	1.4E-09	7.4E-10	4.9E-10	3.6E-10	2.9E-10
Ge-71	11.8 d	F	1.0	6.0E-11	1.0	4.3E-11	2.0E-11	1.1E-11	6.1E-12	4.8E-12
		M	1.0	1.2E-10	1.0	8.6E-11	4.1E-11	2.4E-11	1.3E-11	1.1E-11
Ge-75	82.78 m	F	1.0	1.6E-10	1.0	1.0E-10	4.3E-11	2.8E-11	1.7E-11	1.5E-11
		M	1.0	2.9E-10	1.0	1.9E-10	8.9E-11	6.1E-11	4.4E-11	3.6E-11
Ge-77	11.30 h	F	1.0	1.3E-09	1.0	9.5E-10	4.7E-10	2.9E-10	1.7E-10	1.4E-10
		M	1.0	2.3E-09	1.0	1.7E-09	8.8E-10	6.0E-10	4.5E-10	3.7E-10
Ge-78	87 m	F	1.0	4.3E-10	1.0	2.9E-10	1.4E-10	8.9E-11	5.5E-11	4.5E-11
		M	1.0	7.3E-10	1.0	5.0E-10	2.5E-10	1.6E-10	1.2E-10	9.5E-11
<b>Arsenic</b>										
As-69	15.2 m	M	1.0	2.1E-10	0.5	1.4E-10	6.3E-11	4.0E-11	2.5E-11	2.1E-11
As-70	52.6 m	M	1.0	5.7E-10	0.5	4.3E-10	2.1E-10	1.3E-10	8.3E-11	6.7E-11
As-71	64.8 h	M	1.0	2.2E-09	0.5	1.9E-09	1.0E-09	6.8E-10	5.0E-10	4.0E-10
As-72	26.0 h	M	1.0	5.9E-09	0.5	5.7E-09	2.7E-09	1.7E-09	1.1E-09	9.0E-10
As-73	80.30 d	M	1.0	5.4E-09	0.5	4.0E-09	2.3E-09	1.5E-09	1.2E-09	1.0E-09
As-74	17.76 d	M	1.0	1.1E-08	0.5	8.4E-09	4.7E-09	3.3E-09	2.6E-09	2.1E-09
As-76	26.32 h	M	1.0	5.1E-09	0.5	4.6E-09	2.2E-09	1.4E-09	8.8E-10	7.4E-10
As-77	38.8 h	M	1.0	2.2E-09	0.5	1.7E-09	8.9E-10	6.2E-10	5.0E-10	3.9E-10
As-78	90.7 m	M	1.0	8.0E-10	0.5	5.8E-10	2.7E-10	1.7E-10	1.1E-10	8.9E-11
<b>Selenium</b>										
Se-70	41.0 m	F	1.0	3.9E-10	0.8	3.0E-10	1.5E-10	9.0E-11	5.1E-11	4.2E-11
		M	0.2	6.5E-10	0.1	4.7E-10	2.3E-10	1.4E-10	8.9E-11	7.3E-11
		S	0.02	6.8E-10	0.01	4.8E-10	2.3E-10	1.5E-10	9.4E-11	7.6E-11
Se-73	7.15 h	F	1.0	7.7E-10	0.8	6.5E-10	3.3E-10	2.1E-10	1.0E-10	8.0E-11
		M	0.2	1.6E-09	0.1	1.2E-09	5.9E-10	3.8E-10	2.4E-10	1.9E-10
		S	0.02	1.8E-09	0.01	1.3E-09	6.3E-10	4.0E-10	2.6E-10	2.1E-10
Se-73m	39 m	F	1.0	9.3E-11	0.8	7.2E-11	3.5E-11	2.3E-11	1.1E-11	9.2E-12
		M	0.2	1.8E-10	0.1	1.3E-10	6.1E-11	3.9E-11	2.5E-11	2.0E-11
		S	0.02	1.9E-10	0.01	1.3E-10	6.5E-11	4.1E-11	2.6E-11	2.2E-11

(continued on next page)

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Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Se-75	119.8 d	F	1.0	7.8E-09	0.8	6.0E-09	3.4E-09	2.5E-09	1.2E-09	1.0E-09
		M	0.2	5.4E-09	0.1	4.5E-09	2.5E-09	1.7E-09	1.3E-09	1.1E-09
		S	0.02	5.6E-09	0.01	4.7E-09	2.9E-09	2.0E-09	1.6E-09	1.3E-09
Se-79	65000 y	F	1.0	1.6E-08	0.8	1.3E-08	7.7E-09	5.6E-09	1.5E-09	1.1E-09
		M	0.2	1.4E-08	0.1	1.1E-08	6.9E-09	4.9E-09	3.3E-09	2.6E-09
		S	0.02	2.3E-08	0.01	2.0E-08	1.3E-08	8.7E-09	7.6E-09	6.8E-09
Se-81	18.5 m	F	1.0	8.6E-11	0.8	5.4E-11	2.3E-11	1.5E-11	9.2E-12	8.0E-12
		M	0.2	1.3E-10	0.1	8.5E-11	3.8E-11	2.5E-11	1.6E-11	1.4E-11
		S	0.02	1.4E-10	0.01	8.9E-11	3.9E-11	2.6E-11	1.7E-11	1.5E-11
Se-81m	57.25 m	F	1.0	1.8E-10	0.8	1.2E-10	5.4E-11	3.4E-11	1.9E-11	1.6E-11
		M	0.2	3.8E-10	0.1	2.5E-10	1.2E-10	8.0E-11	5.8E-11	4.7E-11
		S	0.02	4.1E-10	0.01	2.7E-10	1.3E-10	8.5E-11	6.2E-11	5.1E-11
Se-83	22.5 m	F	1.0	1.7E-10	0.8	1.2E-10	5.8E-11	3.6E-11	2.1E-11	1.8E-11
		M	0.2	2.7E-10	0.1	1.9E-10	9.2E-11	5.9E-11	3.9E-11	3.2E-11
		S	0.02	2.8E-10	0.01	2.0E-10	9.6E-11	6.2E-11	4.1E-11	3.4E-11
<b>Bromine</b>										
Br-74	25.3 m	F	1.0	2.5E-10	1.0	1.8E-10	8.6E-11	5.3E-11	3.2E-11	2.6E-11
		M	1.0	3.6E-10	1.0	2.5E-10	1.2E-10	7.5E-11	4.6E-11	3.8E-11
Br-74m	41.5 m	F	1.0	4.0E-10	1.0	2.8E-10	1.3E-10	8.1E-11	4.8E-11	3.9E-11
		M	1.0	5.9E-10	1.0	4.1E-10	1.9E-10	1.2E-10	7.5E-11	6.2E-11
Br-75	98 m	F	1.0	2.9E-10	1.0	2.1E-10	9.7E-11	5.9E-11	3.5E-11	2.9E-11
		M	1.0	4.5E-10	1.0	3.1E-10	1.5E-10	9.7E-11	6.5E-11	5.3E-11
Br-76	16.2 h	F	1.0	2.2E-09	1.0	1.7E-09	8.4E-10	5.1E-10	3.0E-10	2.4E-10
		M	1.0	3.0E-09	1.0	2.3E-09	1.2E-09	7.5E-10	5.0E-10	4.1E-10
Br-77	56 h	F	1.0	5.3E-10	1.0	4.4E-10	2.2E-10	1.3E-10	7.7E-11	6.2E-11
		M	1.0	6.3E-10	1.0	5.1E-10	2.7E-10	1.6E-10	1.1E-10	8.4E-11
Br-80	17.4 m	F	1.0	7.1E-11	1.0	4.4E-11	1.8E-11	1.2E-11	6.9E-12	5.9E-12
		M	1.0	1.1E-10	1.0	6.5E-11	2.8E-11	1.8E-11	1.1E-11	9.4E-12
Br-80m	4.42 h	F	1.0	4.3E-10	1.0	2.8E-10	1.2E-10	7.2E-11	4.0E-11	3.3E-11
		M	1.0	6.8E-10	1.0	4.5E-10	2.1E-10	1.4E-10	9.3E-11	7.6E-11
Br-82	35.30 h	F	1.0	2.7E-09	1.0	2.2E-09	1.2E-09	7.0E-10	4.2E-10	3.5E-10
		M	1.0	3.8E-09	1.0	3.0E-09	1.7E-09	1.1E-09	7.9E-10	6.3E-10
Br-83	2.39 h	F	1.0	1.7E-10	1.0	1.1E-10	4.7E-11	3.0E-11	1.8E-11	1.6E-11
		M	1.0	3.5E-10	1.0	2.3E-10	1.1E-10	7.7E-11	5.9E-11	4.8E-11
Br-84	31.80 m	F	1.0	2.4E-10	1.0	1.6E-10	7.1E-11	4.4E-11	2.6E-11	2.2E-11
		M	1.0	3.7E-10	1.0	2.4E-10	1.1E-10	6.9E-11	4.4E-11	3.7E-11
<b>Rubidium</b>										
Rb-79	22.9 m	F	1.0	1.6E-10	1.0	1.1E-10	5.0E-11	3.2E-11	1.9E-11	1.6E-11
Rb-81	4.58 h	F	1.0	3.2E-10	1.0	2.5E-10	1.2E-10	7.1E-11	4.2E-11	3.4E-11
Rb-81m	32 m	F	1.0	6.2E-11	1.0	4.6E-11	2.2E-11	1.4E-11	8.5E-12	7.0E-12
Rb-82m	6.2 h	F	1.0	8.6E-10	1.0	7.3E-10	3.9E-10	2.3E-10	1.4E-10	1.1E-10
Rb-83	86.2 d	F	1.0	4.9E-09	1.0	3.8E-09	2.0E-09	1.3E-09	7.9E-10	6.9E-10
Rb-84	32.77 d	F	1.0	8.6E-09	1.0	6.4E-09	3.1E-09	2.0E-09	1.2E-09	1.0E-09
Rb-86	18.66 d	F	1.0	1.2E-08	1.0	7.7E-09	3.4E-09	2.0E-09	1.1E-09	9.3E-10
Rb-87	4.7E10 y	F	1.0	6.0E-09	1.0	4.1E-09	1.8E-09	1.1E-09	6.0E-10	5.0E-10
Rb-88	17.8 m	F	1.0	1.9E-10	1.0	1.2E-10	5.2E-11	3.2E-11	1.9E-11	1.6E-11
Rb-89	15.2 m	F	1.0	1.4E-10	1.0	9.3E-11	4.3E-11	2.7E-11	1.6E-11	1.4E-11
<b>Strontium</b>										
Sr-80	100 m	F	0.6	7.8E-10	0.4*	5.4E-10	2.4E-10	1.4E-10	7.9E-11	7.1E-11
		M	0.2	1.4E-09	0.1	9.0E-10	4.1E-10	2.5E-10	1.5E-10	1.3E-10
		S	0.02	1.5E-09	0.01	9.4E-10	4.3E-10	2.7E-10	1.6E-10	1.4E-10
Sr-81	25.5 m	F	0.6	2.1E-10	0.4*	1.5E-10	6.7E-11	4.1E-11	2.4E-11	2.1E-11
		M	0.2	3.3E-10	0.1	2.2E-10	1.0E-10	6.6E-11	4.2E-11	3.5E-11
		S	0.02	3.4E-10	0.01	2.3E-10	1.1E-10	6.9E-11	4.4E-11	3.7E-11
Sr-82	25.0 d	F	0.6	2.8E-08	0.4*	1.5E-08	6.6E-09	4.6E-09	3.2E-09	2.1E-09
		M	0.2	5.5E-08	0.1	4.0E-08	2.1E-08	1.4E-08	1.0E-08	8.9E-09

\* The  $f_1$  value for Type F for an adult is 0.3.

Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)					
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult	
Sr-83	32.4 h	S	0.02	6.1E-08	0.01	4.6E-08	2.5E-08	1.7E-08	1.2E-08	1.1E-08	
		F	0.6	1.4E-09	0.4*	1.1E-09	5.5E-10	3.4E-10	2.0E-10	1.6E-10	
		M	0.2	2.5E-09	0.1	1.9E-09	9.5E-10	6.0E-10	3.9E-10	3.1E-10	
Sr-85	64.84 d	S	0.02	2.8E-09	0.01	2.0E-09	1.0E-09	6.5E-10	4.2E-10	3.4E-10	
		F	0.6	4.4E-09	0.4*	2.3E-09	1.1E-09	9.6E-10	8.3E-10	3.8E-10	
		M	0.2	4.3E-09	0.1	3.1E-09	1.8E-09	1.2E-09	8.8E-10	6.4E-10	
Sr-85m	69.5 m	S	0.02	4.4E-09	0.01	3.7E-09	2.2E-09	1.3E-09	1.0E-09	8.1E-10	
		F	0.6	2.4E-11	0.4*	1.9E-11	9.6E-12	6.0E-12	3.7E-12	2.9E-12	
		M	0.2	3.1E-11	0.1	2.5E-11	1.3E-11	8.0E-12	5.1E-12	4.1E-12	
Sr-87m	2.805 h	S	0.02	3.2E-11	0.01	2.6E-11	1.3E-11	8.3E-12	5.4E-12	4.3E-12	
		F	0.6	9.7E-11	0.4*	7.8E-11	3.8E-11	2.3E-11	1.3E-11	1.1E-11	
		M	0.2	1.6E-10	0.1	1.2E-10	5.9E-11	3.8E-11	2.5E-11	2.0E-11	
Sr-89	50.5 d	S	0.02	1.7E-10	0.01	1.2E-10	6.2E-11	4.0E-11	2.6E-11	2.1E-11	
		F	0.6	1.5E-08	0.4*	7.3E-09	3.2E-09	2.3E-09	1.7E-09	1.0E-09	
		M	0.2	3.3E-08	0.1	2.4E-08	1.3E-08	9.1E-09	7.3E-09	6.1E-09	
Sr-90	29.12 y	S	0.02	3.9E-08	0.01	3.0E-08	1.7E-08	1.2E-08	9.3E-09	7.9E-09	
		F	0.6	1.3E-07	0.4*	5.2E-08	3.1E-08	4.1E-08	5.3E-08	2.4E-08	
		M	0.2	1.5E-07	0.1	1.1E-07	6.5E-08	5.1E-08	5.0E-08	3.6E-08	
Sr-91	9.5 h	S	0.02	4.2E-07	0.01	4.0E-07	2.7E-07	1.8E-07	1.6E-07	1.6E-07	
		F	0.6	1.4E-09	0.4*	1.1E-09	5.2E-10	3.1E-10	1.7E-10	1.6E-10	
		M	0.2	3.1E-09	0.1	2.2E-09	1.1E-09	6.9E-10	4.4E-10	3.7E-10	
Sr-92	2.71 h	S	0.02	3.5E-09	0.01	2.5E-09	1.2E-09	7.7E-10	4.9E-10	4.1E-10	
		F	0.6	9.0E-10	0.4*	7.1E-10	3.3E-10	2.0E-10	1.0E-10	9.8E-11	
		M	0.2	1.9E-09	0.1	1.4E-09	6.5E-10	4.1E-10	2.5E-10	2.1E-10	
Yttrium	Y-86	14.74 h	S	0.02	2.2E-09	0.01	1.5E-09	7.0E-10	4.5E-10	2.7E-10	2.3E-10
			M	0.2	3.5E-09	0.1	2.2E-09	1.1E-09	6.9E-10	4.4E-10	3.7E-10
			S	0.02	3.7E-09	0.0001	2.9E-09	1.5E-09	9.3E-10	5.6E-10	4.5E-10
Y-86m	48 m	S	0.001	3.8E-09	0.0001	3.0E-09	1.5E-09	9.6E-10	5.8E-10	4.7E-10	
		M	0.001	2.2E-10	0.0001	1.7E-10	8.7E-11	5.6E-11	3.4E-11	2.7E-11	
		S	0.001	2.3E-10	0.0001	1.8E-10	9.0E-11	5.7E-11	3.5E-11	2.8E-11	
Y-87	80.3 h	M	0.001	2.7E-09	0.0001	2.1E-09	1.1E-09	7.0E-10	4.7E-10	3.7E-10	
		S	0.001	2.8E-09	0.0001	2.2E-09	1.1E-09	7.3E-10	5.0E-10	3.9E-10	
		M	0.001	1.9E-08	0.0001	1.6E-08	1.0E-08	6.7E-09	4.9E-09	4.1E-09	
Y-88	106.64 d	S	0.001	2.0E-08	0.0001	1.7E-08	9.8E-09	6.6E-09	5.4E-09	4.4E-09	
		M	0.001	1.3E-08	0.0001	8.4E-09	4.0E-09	2.6E-09	1.7E-09	1.4E-09	
		S	0.001	1.3E-08	0.0001	8.8E-09	4.2E-09	2.7E-09	1.8E-09	1.5E-09	
Y-90m	3.19 h	M	0.001	7.2E-10	0.0001	5.7E-10	2.8E-10	1.8E-10	1.1E-10	9.5E-11	
		S	0.001	7.5E-10	0.0001	6.0E-10	2.9E-10	1.9E-10	1.2E-10	1.0E-10	
		M	0.001	3.9E-08	0.0001	3.0E-08	1.6E-08	1.1E-08	8.4E-09	7.1E-09	
Y-91	58.51 d	S	0.001	4.3E-08	0.0001	3.4E-08	1.9E-08	1.3E-08	1.0E-08	8.9E-09	
		M	0.001	7.0E-11	0.0001	5.5E-11	2.9E-11	1.8E-11	1.2E-11	1.0E-11	
		S	0.001	7.4E-11	0.0001	5.9E-11	3.1E-11	2.0E-11	1.4E-11	1.1E-11	
Y-92	3.54 h	M	0.001	1.8E-09	0.0001	1.2E-09	5.3E-10	3.3E-10	2.0E-10	1.7E-10	
		S	0.001	1.9E-09	0.0001	1.2E-09	5.5E-10	3.5E-10	2.1E-10	1.8E-10	
		M	0.001	4.4E-09	0.0001	2.9E-09	1.3E-09	8.1E-10	4.7E-10	4.0E-10	
Y-93	10.1 h	S	0.001	4.6E-09	0.0001	3.0E-09	1.4E-09	8.5E-10	5.0E-10	4.2E-10	
		M	0.001	2.8E-10	0.0001	1.8E-10	8.1E-11	5.0E-11	3.1E-11	2.7E-11	
		S	0.001	2.9E-10	0.0001	1.9E-10	8.4E-11	5.2E-11	3.3E-11	2.8E-11	
Y-95	10.7 m	M	0.001	1.5E-10	0.0001	9.8E-11	4.4E-11	2.8E-11	1.8E-11	1.5E-11	
		S	0.001	1.6E-10	0.0001	1.0E-10	4.5E-11	2.9E-11	1.8E-11	1.6E-11	
		F	0.02	2.4E-09	0.002	1.9E-09	9.5E-10	5.9E-10	3.4E-10	2.7E-10	
Zirconium	Zr-86	16.5 h	M	0.02	3.4E-09	0.002	2.6E-09	1.3E-09	8.4E-10	5.2E-10	4.2E-10
			S	0.02	3.5E-09	0.002	2.7E-09	1.4E-09	8.7E-10	5.4E-10	4.3E-10
			F	0.02	6.9E-09	0.002	8.3E-09	5.6E-09	4.7E-09	3.6E-09	3.5E-09

(continued on next page)

\* The f<sub>1</sub> value for Type F for an adult is 0.3.

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Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Zr-89	78.43 h	M	0.02	8.5E-09	0.002	7.8E-09	5.1E-09	3.6E-09	3.0E-09	2.6E-09
		S	0.02	1.3E-08	0.002	1.2E-08	7.7E-09	5.2E-09	4.3E-09	3.6E-09
		F	0.02	2.6E-09	0.002	2.0E-09	9.9E-10	6.1E-10	3.6E-10	2.9E-10
		M	0.02	3.7E-09	0.002	2.8E-09	1.5E-09	9.6E-10	6.5E-10	5.2E-10
		S	0.02	3.9E-09	0.002	2.9E-09	1.5E-09	1.0E-09	6.8E-10	5.5E-10
Zr-93	1.53E6 y	F	0.02	3.5E-09	0.002	4.8E-09	5.3E-09	9.7E-09	1.8E-08	2.5E-08
		M	0.02	3.3E-09	0.002	3.1E-09	2.8E-09	4.1E-09	7.5E-09	1.0E-08
		S	0.02	7.0E-09	0.002	6.4E-09	4.5E-09	3.3E-09	3.3E-09	3.3E-09
Zr-95	63.98 d	F	0.02	1.2E-08	0.002	1.1E-08	6.4E-09	4.2E-09	2.8E-09	2.5E-09
		M	0.02	2.0E-08	0.002	1.6E-08	9.7E-09	6.8E-09	5.9E-09	4.8E-09
		S	0.02	2.4E-08	0.002	1.9E-08	1.2E-08	8.3E-09	7.3E-09	5.9E-09
Zr-97	16.90 h	F	0.02	5.0E-09	0.002	3.4E-09	1.5E-09	9.1E-10	4.8E-10	3.9E-10
		M	0.02	7.8E-09	0.002	5.3E-09	2.8E-09	1.8E-09	1.1E-09	9.2E-10
		S	0.02	8.2E-09	0.002	5.6E-09	2.9E-09	1.9E-09	1.2E-09	8.9E-10
<b>Niobium</b>										
Nb-88	14.3 m	F	0.02	1.8E-10	0.01	1.3E-10	6.3E-11	3.9E-11	2.4E-11	1.9E-11
		M	0.02	2.5E-10	0.01	1.8E-10	8.5E-11	5.3E-11	3.3E-11	2.7E-11
		S	0.02	2.6E-10	0.01	1.8E-10	8.7E-11	5.5E-11	3.5E-11	2.8E-11
Nb-89	122 m	F	0.02	7.0E-10	0.01	4.8E-10	2.2E-10	1.3E-10	7.4E-11	6.1E-11
		M	0.02	1.1E-09	0.01	7.6E-10	3.6E-10	2.2E-10	1.4E-10	1.1E-10
		S	0.02	1.2E-09	0.01	7.9E-10	3.7E-10	2.3E-10	1.5E-10	1.2E-10
Nb-89m	66 m	F	0.02	4.0E-10	0.01	2.9E-10	1.4E-10	8.3E-11	4.8E-11	3.9E-11
		M	0.02	6.2E-10	0.01	4.3E-10	2.1E-10	1.3E-10	8.2E-11	6.8E-11
		S	0.02	6.4E-10	0.01	4.4E-10	2.1E-10	1.4E-10	8.6E-11	7.1E-11
Nb-90	14.60 h	F	0.02	3.5E-09	0.01	2.7E-09	1.3E-09	8.2E-10	4.7E-10	3.8E-10
		M	0.02	5.1E-09	0.01	3.9E-09	1.9E-09	1.3E-09	7.8E-10	6.3E-10
		S	0.02	5.3E-09	0.01	4.0E-09	2.0E-09	1.3E-09	8.1E-10	6.6E-10
Nb-93m	13.6 y	F	0.02	1.8E-09	0.01	1.4E-09	7.0E-10	4.4E-10	2.7E-10	2.2E-10
		M	0.02	3.1E-09	0.01	2.4E-09	1.3E-09	8.2E-10	5.9E-10	5.1E-10
		S	0.02	7.4E-09	0.01	6.5E-09	4.0E-09	2.5E-09	1.9E-09	1.8E-09
Nb-94	2.03E4 y	F	0.02	3.1E-08	0.01	2.7E-08	1.5E-08	1.0E-08	6.7E-09	5.8E-09
		M	0.02	4.3E-08	0.01	3.7E-08	2.3E-08	1.6E-08	1.3E-08	1.1E-08
		S	0.02	1.2E-07	0.01	1.2E-07	8.3E-08	5.8E-08	5.2E-08	4.9E-08
Nb-95	35.15 d	F	0.02	4.1E-09	0.01	3.1E-09	1.6E-09	1.2E-09	7.5E-10	5.7E-10
		M	0.02	6.8E-09	0.01	5.2E-09	3.1E-09	2.2E-09	1.9E-09	1.5E-09
		S	0.02	7.7E-09	0.01	5.9E-09	3.6E-09	2.5E-09	2.2E-09	1.8E-09
Nb-95m	86.6 h	F	0.02	2.3E-09	0.01	1.6E-09	7.0E-10	4.2E-10	2.4E-10	2.0E-10
		M	0.02	4.3E-09	0.01	3.1E-09	1.7E-09	1.2E-09	1.0E-09	7.9E-10
		S	0.02	4.6E-09	0.01	3.4E-09	1.9E-09	1.3E-09	1.1E-09	8.8E-10
Nb-96	23.35 h	F	0.02	3.1E-09	0.01	2.4E-09	1.2E-09	7.3E-10	4.2E-10	3.4E-10
		M	0.02	4.7E-09	0.01	3.6E-09	1.8E-09	1.2E-09	7.8E-10	6.3E-10
		S	0.02	4.9E-09	0.01	3.7E-09	1.9E-09	1.2E-09	8.3E-10	6.6E-10
Nb-97	72.1 m	F	0.02	2.2E-10	0.01	1.5E-10	6.8E-11	4.2E-11	2.5E-11	2.1E-11
		M	0.02	3.7E-10	0.01	2.5E-10	1.2E-10	7.7E-11	5.2E-11	4.3E-11
		S	0.02	3.8E-10	0.01	2.6E-10	1.2E-10	8.1E-11	5.5E-11	4.5E-11
Nb-98	51.5 m	F	0.02	3.4E-10	0.01	2.4E-10	1.1E-10	6.9E-11	4.1E-11	3.3E-11
		M	0.02	5.2E-10	0.01	3.6E-10	1.7E-10	1.1E-10	6.8E-11	5.6E-11
		S	0.02	5.3E-10	0.01	3.7E-10	1.8E-10	1.1E-10	7.1E-11	5.8E-11
<b>Molybdenum</b>										
Mo-90	5.67 h	F	1.0	1.2E-09	0.8	1.1E-09	5.3E-10	3.2E-10	1.9E-10	1.5E-10
		M	0.2	2.6E-09	0.1	2.0E-09	9.9E-10	6.5E-10	4.2E-10	3.4E-10
		S	0.02	2.8E-09	0.01	2.1E-09	1.1E-09	6.9E-10	4.5E-10	3.6E-10
Mo-93	3.5E3 y	F	1.0	3.1E-09	0.8	2.6E-09	1.7E-09	1.3E-09	1.1E-09	1.0E-09
		M	0.2	2.2E-09	0.1	1.8E-09	1.1E-09	7.9E-10	6.6E-10	5.9E-10
		S	0.02	6.0E-09	0.01	5.8E-09	4.0E-09	2.8E-09	2.4E-09	2.3E-09



Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub>	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		≥ 1 year	1 year	5 years	10 years	15 years
Mo-93m	6.85 h	F	1.0	7.3E-10	0.8	6.4E-10	3.3E-10	2.0E-10	1.2E-10	9.6E-11
		M	0.2	1.2E-09	0.1	9.7E-10	5.0E-10	3.2E-10	2.0E-10	1.6E-10
		S	0.02	1.3E-09	0.01	1.0E-09	5.2E-10	3.4E-10	2.1E-10	1.7E-10
Mo-99	66.0 h	F	1.0	2.3E-09	0.8	1.7E-09	7.7E-10	4.7E-10	2.6E-10	2.2E-10
		M	0.2	6.0E-09	0.1	4.4E-09	2.2E-09	1.5E-09	1.1E-09	8.9E-10
Mo-101	14.62 m	S	0.02	6.9E-09	0.01	4.8E-09	2.4E-09	1.7E-09	1.2E-09	9.9E-10
		F	1.0	1.4E-10	0.8	9.7E-11	4.4E-11	2.8E-11	1.7E-11	1.4E-11
		M	0.2	2.2E-10	0.1	1.5E-10	7.0E-11	4.5E-11	3.0E-11	2.5E-11
S	0.02	2.3E-10	0.01	1.6E-10	7.2E-11	4.7E-11	3.1E-11	2.6E-11		
<b>Technetium</b>										
Tc-93	2.75 h	F	1.0	2.4E-10	0.8	2.1E-10	1.1E-10	6.7E-11	4.0E-11	3.2E-11
		M	0.2	2.7E-10	0.1	2.3E-10	1.2E-10	7.5E-11	4.4E-11	3.5E-11
		S	0.02	2.8E-10	0.01	2.3E-10	1.2E-10	7.6E-11	4.5E-11	3.5E-11
Tc-93m	43.5 m	F	1.0	1.2E-10	0.8	9.8E-11	4.9E-11	2.9E-11	1.8E-11	1.4E-11
		M	0.2	1.4E-10	0.1	1.1E-10	5.4E-11	3.4E-11	2.1E-11	1.7E-11
		S	0.02	1.4E-10	0.01	1.1E-10	5.4E-11	3.4E-11	2.1E-11	1.7E-11
Tc-94	293 m	F	1.0	8.9E-10	0.8	7.5E-10	3.9E-10	2.3E-10	1.4E-10	1.1E-10
		M	0.2	9.8E-10	0.1	8.1E-10	4.2E-10	2.6E-10	1.6E-10	1.2E-10
		S	0.02	9.9E-10	0.01	8.2E-10	4.3E-10	2.7E-10	1.6E-10	1.3E-10
Tc-94m	52 m	F	1.0	4.8E-10	0.8	3.4E-10	1.6E-10	8.6E-11	5.2E-11	4.1E-11
		M	0.2	4.4E-10	0.1	3.0E-10	1.4E-10	8.8E-11	5.5E-11	4.5E-11
		S	0.02	4.3E-10	0.01	3.0E-10	1.4E-10	8.8E-11	5.6E-11	4.6E-11
Tc-95	20.0 h	F	1.0	7.5E-10	0.8	6.3E-10	3.3E-10	2.0E-10	1.2E-10	9.6E-11
		M	0.2	8.3E-10	0.1	6.9E-10	3.6E-10	2.2E-10	1.3E-10	1.0E-10
		S	0.02	8.5E-10	0.01	7.0E-10	3.6E-10	2.3E-10	1.4E-10	1.1E-10
Tc-95m	61 d	F	1.0	2.4E-09	0.8	1.8E-09	9.3E-10	5.7E-10	3.6E-10	2.9E-10
		M	0.2	4.9E-09	0.1	4.0E-09	2.3E-09	1.5E-09	1.1E-09	8.8E-10
		S	0.02	6.0E-09	0.01	5.0E-09	2.7E-09	1.8E-09	1.5E-09	1.2E-09
Tc-96	4.28 d	F	1.0	4.2E-09	0.8	3.4E-09	1.8E-09	1.1E-09	7.0E-10	5.7E-10
		M	0.2	4.7E-09	0.1	3.9E-09	2.1E-09	1.3E-09	8.6E-10	6.8E-10
		S	0.02	4.8E-09	0.01	3.9E-09	2.1E-09	1.4E-09	8.9E-10	7.0E-10
Tc-96m	51.5 m	F	1.0	5.3E-11	0.8	4.1E-11	2.1E-11	1.3E-11	7.7E-12	6.2E-12
		M	0.2	5.6E-11	0.1	4.4E-11	2.3E-11	1.4E-11	9.3E-12	7.4E-12
		S	0.02	5.7E-11	0.01	4.4E-11	2.3E-11	1.5E-11	9.5E-12	7.5E-12
Tc-97	2.6E6 y	F	1.0	5.2E-10	0.8	3.7E-10	1.7E-10	9.4E-11	5.6E-11	4.3E-11
		M	0.2	1.2E-09	0.1	1.0E-09	5.7E-10	3.6E-10	2.8E-10	2.2E-10
		S	0.02	5.0E-09	0.01	4.8E-09	3.3E-09	2.2E-09	1.9E-09	1.8E-09
Tc-97m	87 d	F	1.0	3.4E-09	0.8	2.3E-09	9.8E-10	5.6E-10	3.0E-10	2.7E-10
		M	0.2	1.3E-08	0.1	1.0E-08	6.1E-09	4.4E-09	4.1E-09	3.2E-09
		S	0.02	1.6E-08	0.01	1.3E-08	7.8E-09	5.7E-09	5.2E-09	4.1E-09
Tc-98	4.2E6 y	F	1.0	1.0E-08	0.8	6.8E-09	3.2E-09	1.9E-09	1.2E-09	9.7E-10
		M	0.2	3.5E-08	0.1	2.9E-08	1.7E-08	1.2E-08	1.0E-08	8.3E-09
		S	0.02	1.1E-07	0.01	1.1E-07	7.6E-08	5.4E-08	4.8E-08	4.5E-08
Tc-99	2.13E5 y	F	1.0	4.0E-09	0.8	2.5E-09	1.0E-09	5.9E-10	3.6E-10	2.9E-10
		M	0.2	1.7E-08	0.1	1.3E-08	8.0E-09	5.7E-09	5.0E-09	4.0E-09
		S	0.02	4.1E-08	0.01	3.7E-08	2.4E-08	1.7E-08	1.5E-08	1.3E-08
Tc-99m	6.02 h	F	1.0	1.2E-10	0.8	8.7E-11	4.1E-11	2.4E-11	1.5E-11	1.2E-11
		M	0.2	1.3E-10	0.1	9.9E-11	5.1E-11	3.4E-11	2.4E-11	1.9E-11
		S	0.02	1.3E-10	0.01	1.0E-10	5.2E-11	3.5E-11	2.5E-11	2.0E-11
Tc-101	14.2 m	F	1.0	8.5E-11	0.8	5.6E-11	2.5E-11	1.6E-11	9.7E-12	8.2E-12
		M	0.2	1.1E-10	0.1	7.1E-11	3.2E-11	2.1E-11	1.4E-11	1.2E-11
		S	0.02	1.1E-10	0.01	7.3E-11	3.3E-11	2.2E-11	1.4E-11	1.2E-11
Tc-104	18.2 m	F	1.0	2.7E-10	0.8	1.8E-10	8.0E-11	4.6E-11	2.8E-11	2.3E-11
		M	0.2	2.9E-10	0.1	1.9E-10	8.6E-11	5.4E-11	3.3E-11	2.8E-11
		S	0.02	2.9E-10	0.01	1.9E-10	8.7E-11	5.4E-11	3.4E-11	2.9E-11

(continued on next page)

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Table G.1. (continued)

Nuclide	T <sub>1/2</sub>	Type	Infant		f <sub>i</sub> ≥ 1 year	e (Sv/Bq)				
			f <sub>i</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
<b>Ruthenium</b>										
Ru-94	51.8 m	F	0.1	2.5E-10	0.05	1.9E-10	9.0E-11	5.4E-11	3.1E-11	2.5E-11
		M	0.1	3.8E-10	0.05	2.8E-10	1.3E-10	8.4E-11	5.2E-11	4.2E-11
		S	0.02	4.0E-10	0.01	2.9E-10	1.4E-10	8.7E-11	5.4E-11	4.4E-11
Ru-97	2.9 d	F	0.1	5.5E-10	0.05	4.4E-10	2.2E-10	1.3E-10	7.7E-11	6.2E-11
		M	0.1	7.7E-10	0.05	6.1E-10	3.1E-10	2.0E-10	1.3E-10	1.0E-10
		S	0.02	8.1E-10	0.01	6.3E-10	3.3E-10	2.1E-10	1.4E-10	1.1E-10
Ru-103	39.28 d	F	0.1	4.2E-09	0.05	3.0E-09	1.5E-09	9.3E-10	5.6E-10	4.8E-10
		M	0.1	1.1E-08	0.05	8.4E-09	5.0E-09	3.5E-09	3.0E-09	2.4E-09
		S	0.02	1.3E-08	0.01	1.0E-08	6.0E-09	4.2E-09	3.7E-09	3.0E-09
Ru-105	4.44 h	F	0.1	7.1E-10	0.05	5.1E-10	2.3E-10	1.4E-10	7.9E-11	6.5E-11
		M	0.1	1.3E-09	0.05	9.2E-10	4.5E-10	3.0E-10	2.0E-10	1.7E-10
		S	0.02	1.4E-09	0.01	9.8E-10	4.8E-10	3.2E-10	2.2E-10	1.8E-10
Ru-106	368.2 d	F	0.1	7.2E-08	0.05	5.4E-08	2.6E-08	1.6E-08	9.2E-09	7.9E-09
		M	0.1	1.4E-07	0.05	1.1E-07	6.4E-08	4.1E-08	3.1E-08	2.8E-08
		S	0.02	2.6E-07	0.01	2.3E-07	1.4E-07	9.1E-08	7.1E-08	6.6E-08
<b>Rhodium</b>										
Rh-99	16 d	F	0.1	2.6E-09	0.05	2.0E-09	9.9E-10	6.2E-10	3.8E-10	3.2E-10
		M	0.1	4.5E-09	0.05	3.5E-09	2.0E-09	1.3E-09	9.6E-10	7.7E-10
		S	0.1	4.9E-09	0.05	3.8E-09	2.2E-09	1.3E-09	1.1E-09	8.7E-10
Rh-99m	4.7 h	F	0.1	2.4E-10	0.05	2.0E-10	1.0E-10	6.1E-11	3.5E-11	2.8E-11
		M	0.1	3.1E-10	0.05	2.5E-10	1.3E-10	8.0E-11	4.9E-11	3.9E-11
		S	0.1	3.2E-10	0.05	2.6E-10	1.3E-10	8.2E-11	5.1E-11	4.0E-11
Rh-100	20.8 h	F	0.1	2.1E-09	0.05	1.8E-09	9.1E-10	5.6E-10	3.3E-10	2.6E-10
		M	0.1	2.7E-09	0.05	2.2E-09	1.1E-09	7.1E-10	4.3E-10	3.4E-10
		S	0.1	2.8E-09	0.05	2.2E-09	1.2E-09	7.3E-10	4.4E-10	3.5E-10
Rh-101	3.2 y	F	0.1	7.4E-09	0.05	6.1E-09	3.5E-09	2.3E-09	1.5E-09	1.4E-09
		M	0.1	9.8E-09	0.05	8.0E-09	4.9E-09	3.4E-09	2.8E-09	2.3E-09
		S	0.1	1.9E-08	0.05	1.7E-08	1.1E-08	7.4E-09	6.2E-09	5.4E-09
Rh-101m	4.34 d	F	0.1	8.4E-10	0.05	6.6E-10	3.3E-10	2.0E-10	1.2E-10	9.7E-11
		M	0.1	1.3E-09	0.05	9.8E-10	5.2E-10	3.5E-10	2.5E-10	1.9E-10
		S	0.1	1.3E-09	0.05	1.0E-09	5.5E-10	3.7E-10	2.7E-10	2.1E-10
Rh-102	2.9 y	F	0.1	3.3E-08	0.05	2.8E-08	1.7E-08	1.1E-08	7.9E-09	7.3E-09
		M	0.1	3.0E-08	0.05	2.5E-08	1.5E-08	1.0E-08	7.9E-09	6.9E-09
		S	0.1	5.4E-08	0.05	5.0E-08	3.5E-08	2.4E-08	2.0E-08	1.7E-08
Rh-102m	207 d	F	0.1	1.2E-08	0.05	8.7E-09	4.4E-09	2.7E-09	1.7E-09	1.5E-09
		M	0.1	2.0E-08	0.05	1.6E-08	9.0E-09	6.0E-09	4.7E-09	4.0E-09
		S	0.1	3.0E-08	0.05	2.5E-08	1.5E-08	1.0E-08	8.2E-09	7.1E-09
Rh-103m	56.12 m	F	0.1	8.6E-12	0.05	5.9E-12	2.7E-12	1.6E-12	1.0E-12	8.6E-13
		M	0.1	1.9E-11	0.05	1.2E-11	6.3E-12	4.0E-12	3.0E-12	2.5E-12
		S	0.1	2.0E-11	0.05	1.3E-11	6.7E-12	4.3E-12	3.2E-12	2.7E-12
Rh-105	35.36 h	F	0.1	1.0E-09	0.05	6.9E-10	3.0E-10	1.8E-10	9.6E-11	8.2E-11
		M	0.1	2.2E-09	0.05	1.6E-09	7.4E-10	5.2E-10	4.1E-10	3.2E-10
		S	0.1	2.4E-09	0.05	1.7E-09	8.0E-10	5.6E-10	4.5E-10	3.5E-10
Rh-106m	132 m	F	0.1	5.7E-10	0.05	4.5E-10	2.2E-10	1.4E-10	8.0E-11	6.5E-11
		M	0.1	8.2E-10	0.05	6.3E-10	3.2E-10	2.0E-10	1.3E-10	1.1E-10
		S	0.1	8.5E-10	0.05	6.5E-10	3.3E-10	2.1E-10	1.4E-10	1.1E-10
Rh-107	21.7 m	F	0.1	8.9E-11	0.05	5.9E-11	2.6E-11	1.7E-11	1.0E-11	9.0E-12
		M	0.1	1.4E-10	0.05	9.3E-11	4.2E-11	2.8E-11	1.9E-11	1.6E-11
		S	0.1	1.5E-10	0.05	9.7E-11	4.4E-11	2.9E-11	1.9E-11	1.7E-11
<b>Palladium</b>										
Pd-100	3.63 d	F	0.05	3.9E-09	0.005	3.0E-09	1.5E-09	9.7E-10	5.8E-10	4.7E-10
		M	0.05	5.2E-09	0.005	4.0E-09	2.2E-09	1.4E-09	9.9E-10	8.0E-10
		S	0.05	5.3E-09	0.005	4.1E-09	2.2E-09	1.5E-09	1.0E-09	8.5E-10
Pd-101	8.27 h	F	0.05	3.6E-10	0.005	2.9E-10	1.4E-10	8.6E-11	4.9E-11	3.9E-11
		M	0.05	4.8E-10	0.005	3.8E-10	1.9E-10	1.2E-10	7.5E-11	5.9E-11

Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Pd-103	16.96 d	S	0.05	5.0E-10	0.005	3.9E-10	2.0E-10	1.2E-10	7.8E-11	6.2E-11
		F	0.05	9.7E-10	0.005	6.5E-10	3.0E-10	1.9E-10	1.1E-10	8.9E-11
		M	0.05	2.3E-09	0.005	1.6E-09	9.0E-10	5.9E-10	4.5E-10	3.8E-10
Pd-107	6.5E6 y	S	0.05	2.5E-09	0.005	1.8E-09	1.0E-09	6.8E-10	5.3E-10	4.5E-10
		F	0.05	2.6E-10	0.005	1.8E-10	8.2E-11	5.2E-11	3.1E-11	2.5E-11
		M	0.05	6.5E-10	0.005	5.0E-10	2.6E-10	1.5E-10	1.0E-10	8.5E-11
Pd-109	13.427 h	S	0.05	2.2E-09	0.005	2.0E-09	1.3E-09	7.8E-10	6.2E-10	5.9E-10
		F	0.05	1.5E-09	0.005	9.9E-10	4.2E-10	2.6E-10	1.4E-10	1.2E-10
		M	0.05	2.6E-09	0.005	1.8E-09	8.8E-10	5.9E-10	4.3E-10	3.4E-10
Pd-109	13.427 h	S	0.05	2.7E-09	0.005	1.9E-09	9.3E-10	6.3E-10	4.6E-10	3.7E-10
		F	0.05	2.7E-09	0.005	1.9E-09	9.3E-10	6.3E-10	4.6E-10	3.7E-10
		M	0.05	2.7E-09	0.005	1.9E-09	9.3E-10	6.3E-10	4.6E-10	3.7E-10
<b>Silver</b>										
Ag-102	12.9 m	F	0.1	1.2E-10	0.05	8.6E-11	4.2E-11	2.6E-11	1.5E-11	1.3E-11
		M	0.1	1.6E-10	0.05	1.1E-10	5.5E-11	3.4E-11	2.1E-11	1.7E-11
		S	0.02	1.6E-10	0.01	1.2E-10	5.6E-11	3.5E-11	2.2E-11	1.8E-11
Ag-103	65.7 m	F	0.1	1.4E-10	0.05	1.0E-10	4.9E-11	3.0E-11	1.8E-11	1.4E-11
		M	0.1	2.2E-10	0.05	1.6E-10	7.6E-11	4.8E-11	3.2E-11	2.6E-11
		S	0.02	2.3E-10	0.01	1.6E-10	7.9E-11	5.1E-11	3.3E-11	2.7E-11
Ag-104	69.2 m	F	0.1	2.3E-10	0.05	1.9E-10	9.8E-11	5.9E-11	3.5E-11	2.8E-11
		M	0.1	2.9E-10	0.05	2.3E-10	1.2E-10	7.4E-11	4.5E-11	3.6E-11
		S	0.02	2.9E-10	0.01	2.4E-10	1.2E-10	7.6E-11	4.6E-11	3.7E-11
Ag-104m	33.5 m	F	0.1	1.6E-10	0.05	1.1E-10	5.5E-11	3.4E-11	2.0E-11	1.6E-11
		M	0.1	2.3E-10	0.05	1.6E-10	7.7E-11	4.8E-11	3.0E-11	2.5E-11
		S	0.02	2.4E-10	0.01	1.7E-10	8.0E-11	5.0E-11	3.1E-11	2.6E-11
Ag-105	41.0 d	F	0.1	3.9E-09	0.05	3.4E-09	1.7E-09	1.0E-09	6.4E-10	5.4E-10
		M	0.1	4.5E-09	0.05	3.5E-09	2.0E-09	1.3E-09	9.0E-10	7.3E-10
		S	0.02	4.5E-09	0.01	3.6E-09	2.1E-09	1.3E-09	1.0E-09	8.1E-10
Ag-106	23.96 m	F	0.1	9.4E-11	0.05	6.4E-11	2.9E-11	1.8E-11	1.1E-11	9.1E-12
		M	0.1	1.4E-10	0.05	9.5E-11	4.4E-11	2.8E-11	1.8E-11	1.5E-11
		S	0.02	1.5E-10	0.01	9.9E-11	4.5E-11	2.9E-11	1.9E-11	1.6E-11
Ag-106m	8.41 d	F	0.1	7.7E-09	0.05	6.1E-09	3.2E-09	2.1E-09	1.3E-09	1.1E-09
		M	0.1	7.2E-09	0.05	5.8E-09	3.2E-09	2.1E-09	1.4E-09	1.1E-09
		S	0.02	7.0E-09	0.01	5.7E-09	3.2E-09	2.1E-09	1.4E-09	1.1E-09
Ag-108m	127 y	F	0.1	3.5E-08	0.05	2.8E-08	1.6E-08	1.0E-08	6.9E-09	6.1E-09
		M	0.1	3.3E-08	0.05	2.7E-08	1.7E-08	1.1E-08	8.6E-09	7.4E-09
		S	0.02	8.9E-08	0.01	8.7E-08	6.2E-08	4.4E-08	3.9E-08	3.7E-08
Ag-110m	249.9 d	F	0.1	3.5E-08	0.05	2.8E-08	1.5E-08	9.7E-09	6.3E-09	5.5E-09
		M	0.1	3.5E-08	0.05	2.8E-08	1.7E-08	1.2E-08	9.2E-09	7.6E-09
		S	0.02	4.6E-08	0.01	4.1E-08	2.6E-08	1.8E-08	1.5E-08	1.2E-08
Ag-111	7.45 d	F	0.1	4.8E-09	0.05	3.2E-09	1.4E-09	8.8E-10	4.8E-10	4.0E-10
		M	0.1	9.2E-09	0.05	6.6E-09	3.5E-09	2.4E-09	1.9E-09	1.5E-09
		S	0.02	9.9E-09	0.01	7.1E-09	3.8E-09	2.7E-09	2.1E-09	1.7E-09
Ag-112	3.12 h	F	0.1	9.8E-10	0.05	6.4E-10	2.8E-10	1.7E-10	9.1E-11	7.6E-11
		M	0.1	1.7E-09	0.05	1.1E-09	5.1E-10	3.2E-10	2.0E-10	1.6E-10
		S	0.02	1.8E-09	0.01	1.2E-09	5.4E-10	3.4E-10	2.1E-10	1.7E-10
Ag-115	20.0 m	F	0.1	1.6E-10	0.05	1.0E-10	4.6E-11	2.9E-11	1.7E-11	1.5E-11
		M	0.1	2.5E-10	0.05	1.7E-10	7.6E-11	4.9E-11	3.2E-11	2.7E-11
		S	0.02	2.7E-10	0.01	1.7E-10	8.0E-11	5.2E-11	3.4E-11	2.9E-11
<b>Cadmium</b>										
Cd-104	57.7 m	F	0.1	2.0E-10	0.05	1.7E-10	8.7E-11	5.2E-11	3.1E-11	2.4E-11
		M	0.1	2.6E-10	0.05	2.1E-10	1.1E-10	6.9E-11	4.2E-11	3.4E-11
		S	0.1	2.7E-10	0.05	2.2E-10	1.1E-10	7.0E-11	4.4E-11	3.5E-11
Cd-107	6.49 h	F	0.1	2.3E-10	0.05	1.7E-10	7.4E-11	4.6E-11	2.5E-11	2.1E-11
		M	0.1	5.2E-10	0.05	3.7E-10	2.0E-10	1.3E-10	8.8E-11	8.3E-11
		S	0.1	5.5E-10	0.05	3.9E-10	2.1E-10	1.4E-10	9.7E-11	7.7E-11
Cd-109	464 d	F	0.1	4.5E-08	0.05	3.7E-08	2.1E-08	1.4E-08	9.3E-09	8.1E-09
		M	0.1	3.0E-08	0.05	2.3E-08	1.4E-08	9.5E-09	7.8E-09	6.6E-09
		F	0.1	3.0E-08	0.05	2.3E-08	1.4E-08	9.5E-09	7.8E-09	6.6E-09

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Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Cd-113	9.3E15 y	S	0.1	2.7E-08	0.05	2.1E-08	1.3E-08	8.9E-09	7.6E-09	6.2E-09
		F	0.1	2.6E-07	0.05	2.4E-07	1.7E-07	1.4E-07	1.2E-07	1.2E-07
		M	0.1	1.2E-07	0.05	1.0E-07	7.6E-08	6.1E-08	5.7E-08	5.5E-08
		S	0.1	7.8E-08	0.05	5.8E-08	4.1E-08	3.0E-08	2.7E-08	2.6E-08
Cd-113m	13.6 y	F	0.1	3.0E-07	0.05	2.7E-07	1.8E-07	1.3E-07	1.1E-07	1.1E-07
		M	0.1	1.4E-07	0.05	1.2E-07	8.1E-08	6.0E-08	5.3E-08	5.2E-08
		S	0.1	1.1E-07	0.05	8.4E-08	5.5E-08	3.9E-08	3.3E-08	3.1E-08
Cd-115	53.46 h	F	0.1	4.0E-09	0.05	2.6E-09	1.2E-09	7.5E-10	4.3E-10	3.5E-10
		M	0.1	6.7E-09	0.05	4.8E-09	2.4E-09	1.7E-09	1.2E-09	9.8E-10
Cd-115m	44.6 d	S	0.1	7.2E-09	0.05	5.1E-09	2.6E-09	1.8E-09	1.3E-09	1.1E-09
		F	0.1	4.6E-08	0.05	3.2E-08	1.5E-08	1.0E-08	6.4E-09	5.3E-09
		M	0.1	4.0E-08	0.05	2.5E-08	1.4E-08	9.4E-09	7.3E-09	6.2E-09
Cd-117	2.49 h	S	0.1	3.9E-08	0.05	3.0E-08	1.7E-08	1.1E-08	8.9E-09	7.7E-09
		F	0.1	7.4E-10	0.05	5.2E-10	2.4E-10	1.5E-10	8.1E-11	6.7E-11
		M	0.1	1.3E-09	0.05	9.3E-10	4.5E-10	2.9E-10	2.0E-10	1.6E-10
Cd-117m	3.36 h	S	0.1	1.4E-09	0.05	9.8E-10	4.8E-10	3.1E-10	2.1E-10	1.7E-10
		F	0.1	8.9E-10	0.05	6.7E-10	3.3E-10	2.0E-10	1.1E-10	9.4E-11
		M	0.1	1.5E-09	0.05	1.1E-09	5.5E-10	3.6E-10	2.4E-10	2.0E-10
S	0.1	1.5E-09	0.05	1.1E-09	5.7E-10	3.8E-10	2.6E-10	2.1E-10		
<b>Indium</b>										
In-109	4.2 h	F	0.04	2.6E-10	0.02	2.1E-10	1.0E-10	6.3E-11	3.6E-11	2.9E-11
		M	0.04	3.3E-10	0.02	2.6E-10	1.3E-10	8.4E-11	5.3E-11	4.2E-11
In-110	4.9 h	F	0.04	8.2E-10	0.02	7.1E-10	3.7E-10	2.3E-10	1.3E-10	1.1E-10
		M	0.04	9.9E-10	0.02	8.3E-10	4.4E-10	2.7E-10	1.6E-10	1.3E-10
In-110m	69.1 m	F	0.04	3.0E-10	0.02	2.1E-10	9.9E-11	6.0E-11	3.5E-11	2.8E-11
		M	0.04	4.5E-10	0.02	3.1E-10	1.5E-10	9.2E-11	5.8E-11	4.7E-11
In-111	2.83 d	F	0.04	1.2E-09	0.02	8.6E-10	4.2E-10	2.6E-10	1.5E-10	1.3E-10
		M	0.04	1.5E-09	0.02	1.2E-09	6.2E-10	4.1E-10	2.9E-10	2.3E-10
In-112	14.4 m	F	0.04	4.4E-11	0.02	3.0E-11	1.3E-11	8.7E-12	5.4E-12	4.7E-12
		M	0.04	6.5E-11	0.02	4.4E-11	2.0E-11	1.3E-11	8.7E-12	7.4E-12
In-113m	1.658 h	F	0.04	1.0E-10	0.02	7.0E-11	3.2E-11	2.0E-11	1.2E-11	9.7E-12
		M	0.04	1.6E-10	0.02	1.1E-10	5.5E-11	3.6E-11	2.4E-11	2.0E-11
In-114m	49.51 d	F	0.04	1.2E-07	0.02	7.7E-08	3.4E-08	1.9E-08	1.1E-08	9.3E-09
		M	0.04	4.8E-08	0.02	3.3E-08	1.6E-08	1.0E-08	7.8E-09	6.1E-09
In-115	5.1E15 y	F	0.04	8.3E-07	0.02	7.8E-07	5.5E-07	5.0E-07	4.2E-07	3.9E-07
		M	0.04	3.0E-07	0.02	2.8E-07	2.1E-07	1.9E-07	1.7E-07	1.6E-07
In-115m	4.486 h	F	0.04	2.8E-10	0.02	1.9E-10	8.4E-11	5.1E-11	2.8E-11	2.4E-11
		M	0.04	4.7E-10	0.02	3.3E-10	1.6E-10	1.0E-10	7.2E-11	5.9E-11
In-116m	54.15 m	F	0.04	2.5E-10	0.02	1.9E-10	9.2E-11	5.7E-11	3.4E-11	2.8E-11
		M	0.04	3.6E-10	0.02	2.7E-10	1.3E-10	8.5E-11	5.6E-11	4.5E-11
In-117	43.8 m	F	0.04	1.4E-10	0.02	9.7E-11	4.5E-11	2.8E-11	1.7E-11	1.5E-11
		M	0.04	2.3E-10	0.02	1.6E-10	7.5E-11	5.0E-11	3.5E-11	2.9E-11
In-117m	116.5 m	F	0.04	3.4E-10	0.02	2.3E-10	1.0E-10	6.2E-11	3.5E-11	2.9E-11
		M	0.04	6.0E-10	0.02	4.0E-10	1.9E-10	1.3E-10	8.7E-11	7.2E-11
In-119m	18.0 m	F	0.04	1.2E-10	0.02	7.3E-11	3.1E-11	2.0E-11	1.2E-11	1.0E-11
		M	0.04	1.8E-10	0.02	1.1E-10	4.9E-11	3.2E-11	2.0E-11	1.7E-11
<b>Tin</b>										
Sn-110	4.0 h	F	0.04	1.0E-09	0.02	7.6E-10	3.6E-10	2.2E-10	1.2E-10	9.9E-11
		M	0.04	1.5E-09	0.02	1.1E-09	5.1E-10	3.2E-10	1.9E-10	1.6E-10
Sn-111	35.3 m	F	0.04	7.7E-11	0.02	5.4E-11	2.6E-11	1.6E-11	9.4E-12	7.8E-12
		M	0.04	1.1E-10	0.02	8.0E-11	3.8E-11	2.5E-11	1.6E-11	1.3E-11
Sn-113	115.1 d	F	0.04	5.1E-09	0.02	3.7E-09	1.8E-09	1.1E-09	6.4E-10	5.4E-10
		M	0.04	1.3E-08	0.02	1.0E-08	5.8E-09	4.0E-09	3.2E-09	2.7E-09
Sn-117m	13.61 d	F	0.04	3.3E-09	0.02	2.2E-09	1.0E-09	6.1E-10	3.4E-10	2.8E-10
		M	0.04	1.0E-08	0.02	7.7E-09	4.6E-09	3.4E-09	3.1E-09	2.4E-09

Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Sn-119m	293.0 d	F	0.04	3.0E-09	0.02	2.2E-09	1.0E-09	6.0E-10	3.4E-10	2.8E-10
		M	0.04	1.0E-08	0.02	7.9E-09	4.7E-09	3.1E-09	2.6E-09	2.2E-09
Sn-121	27.06 h	F	0.04	7.7E-10	0.02	5.0E-10	2.2E-10	1.3E-10	7.0E-11	6.0E-11
		M	0.04	1.5E-09	0.02	1.1E-09	5.1E-10	3.6E-10	2.9E-10	2.3E-10
Sn-121m	55 y	F	0.04	6.9E-09	0.02	5.4E-09	2.8E-09	1.6E-09	9.4E-10	8.0E-10
		M	0.04	1.9E-08	0.02	1.5E-08	9.2E-09	6.4E-09	5.5E-09	4.5E-09
Sn-123	129.2 d	F	0.04	1.4E-08	0.02	9.9E-09	4.5E-09	2.6E-09	1.4E-09	1.2E-09
		M	0.04	4.0E-08	0.02	3.1E-08	1.8E-08	1.2E-08	9.5E-09	8.1E-09
Sn-123m	40.08 m	F	0.04	1.4E-10	0.02	8.9E-11	3.9E-11	2.5E-11	1.5E-11	1.3E-11
		M	0.04	2.3E-10	0.02	1.5E-10	7.0E-11	4.6E-11	3.2E-11	2.7E-11
Sn-125	9.64 d	F	0.04	1.2E-08	0.02	8.0E-09	3.5E-09	2.0E-09	1.1E-09	8.9E-10
		M	0.04	2.1E-08	0.02	1.5E-08	7.6E-09	5.0E-09	3.6E-09	3.1E-09
Sn-126	1.0E5 y	F	0.04	7.3E-08	0.02	5.9E-08	3.2E-08	2.0E-08	1.3E-08	1.1E-08
		M	0.04	1.2E-07	0.02	1.0E-07	6.2E-08	4.1E-08	3.3E-08	2.8E-08
Sn-127	2.10 h	F	0.04	6.6E-10	0.02	4.7E-10	2.3E-10	1.4E-10	7.9E-11	6.5E-11
		M	0.04	1.0E-09	0.02	7.4E-10	3.7E-10	2.4E-10	1.6E-10	1.3E-10
Sn-128	59.1 m	F	0.04	5.1E-10	0.02	3.6E-10	1.7E-10	1.0E-10	6.1E-11	5.0E-11
		M	0.04	8.0E-10	0.02	5.5E-10	2.7E-10	1.7E-10	1.1E-10	9.2E-11
<b>Antimony</b>										
Sb-115	31.8 m	F	0.2	8.1E-11	0.1	5.9E-11	2.8E-11	1.7E-11	1.0E-11	8.5E-12
		M	0.02	1.2E-10	0.01	8.3E-11	4.0E-11	2.5E-11	1.6E-11	1.3E-11
		S	0.02	1.2E-10	0.01	8.6E-11	4.1E-11	2.6E-11	1.7E-11	1.4E-11
Sb-116	15.8 m	F	0.2	8.4E-11	0.1	6.2E-11	3.0E-11	1.9E-11	1.1E-11	9.1E-12
		M	0.02	1.1E-10	0.01	8.2E-11	4.0E-11	2.5E-11	1.5E-11	1.3E-11
		S	0.02	1.2E-10	0.01	8.5E-11	4.1E-11	2.6E-11	1.6E-11	1.3E-11
Sb-116m	60.3 m	F	0.2	2.6E-10	0.1	2.1E-10	1.1E-10	6.6E-11	4.0E-11	3.2E-11
		M	0.02	3.6E-10	0.01	2.8E-10	1.5E-10	9.1E-11	5.9E-11	4.7E-11
		S	0.02	3.7E-10	0.01	2.9E-10	1.5E-10	9.4E-11	6.1E-11	4.9E-11
Sb-117	2.80 h	F	0.2	7.7E-11	0.1	6.0E-11	2.9E-11	1.8E-11	1.0E-11	8.5E-12
		M	0.02	1.2E-10	0.01	9.1E-11	4.8E-11	3.0E-11	2.0E-11	1.6E-11
		S	0.02	1.3E-10	0.01	9.5E-11	4.8E-11	3.1E-11	2.2E-11	1.7E-11
Sb-118m	5.00 h	F	0.2	7.3E-10	0.1	6.2E-10	3.3E-10	2.0E-10	1.2E-10	9.3E-11
		M	0.02	9.3E-10	0.01	7.6E-10	4.0E-10	2.5E-10	1.5E-10	1.2E-10
		S	0.02	9.5E-10	0.01	7.8E-10	4.1E-10	2.5E-10	1.5E-10	1.2E-10
Sb-119	38.1 h	F	0.2	2.7E-10	0.1	2.0E-10	9.4E-11	5.5E-11	2.9E-11	2.3E-11
		M	0.02	4.0E-10	0.01	2.8E-10	1.3E-10	7.9E-11	4.4E-11	3.5E-11
		S	0.02	4.1E-10	0.01	2.9E-10	1.4E-10	8.2E-11	4.5E-11	3.6E-11
Sb-120m	5.76 d	F	0.2	4.1E-09	0.1	3.3E-09	1.8E-09	1.1E-09	6.7E-10	5.5E-10
		M	0.02	6.3E-09	0.01	5.0E-09	2.8E-09	1.8E-09	1.3E-09	1.0E-09
		S	0.02	6.6E-09	0.01	5.3E-09	2.9E-09	1.9E-09	1.4E-09	1.1E-09
Sb-120	15.89 m	F	0.2	4.6E-11	0.1	3.1E-11	1.4E-11	8.9E-12	5.4E-12	4.6E-12
		M	0.02	6.6E-11	0.01	4.4E-11	2.0E-11	1.3E-11	8.3E-12	7.0E-12
		S	0.02	6.8E-11	0.01	4.6E-11	2.1E-11	1.4E-11	8.7E-12	7.3E-12
Sb-122	2.70 d	F	0.2	4.2E-09	0.1	2.8E-09	1.4E-09	8.4E-10	4.4E-10	3.6E-10
		M	0.02	8.3E-09	0.01	5.7E-09	2.8E-09	1.8E-09	1.3E-09	1.0E-09
		S	0.02	8.8E-09	0.01	6.1E-09	3.0E-09	2.0E-09	1.4E-09	1.1E-09
Sb-124	60.20 d	F	0.2	1.2E-08	0.1	8.8E-09	4.3E-09	2.6E-09	1.6E-09	1.3E-09
		M	0.02	3.1E-08	0.01	2.4E-08	1.4E-08	9.6E-09	7.7E-09	6.4E-09
		S	0.02	3.9E-08	0.01	3.1E-08	1.8E-08	1.3E-08	1.0E-08	8.6E-09
Sb-124n	20.2 m	F	0.2	2.7E-11	0.1	1.9E-11	9.0E-12	5.6E-12	3.4E-12	2.8E-12
		M	0.02	4.3E-11	0.01	3.1E-11	1.5E-11	9.6E-12	6.5E-12	5.4E-12
		S	0.02	4.6E-11	0.01	3.3E-11	1.6E-11	1.0E-11	7.2E-12	5.9E-12
Sb-125	2.77 y	F	0.2	8.7E-09	0.1	6.8E-09	3.7E-09	2.3E-09	1.5E-09	1.4E-09
		M	0.02	2.0E-08	0.01	1.6E-08	1.0E-08	6.8E-09	5.8E-09	4.8E-09
		S	0.02	4.2E-08	0.01	3.8E-08	2.4E-08	1.6E-08	1.4E-08	1.2E-08

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Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Sb-126	12.4 d	F	0.2	8.8E-09	0.1	6.6E-09	3.3E-09	2.1E-09	1.2E-09	1.0E-09
		M	0.02	1.7E-08	0.01	1.3E-08	7.4E-09	5.1E-09	3.5E-09	2.8E-09
		S	0.02	1.9E-08	0.01	1.5E-08	8.2E-09	5.0E-09	4.0E-09	3.2E-09
Sb-126m	19.0 m	F	0.2	1.2E-10	0.1	8.2E-11	3.8E-11	2.4E-11	1.5E-11	1.2E-11
		M	0.02	1.7E-10	0.01	1.2E-10	5.5E-11	3.5E-11	2.3E-11	1.9E-11
		S	0.02	1.8E-10	0.01	1.2E-10	5.7E-11	3.7E-11	2.4E-11	2.0E-11
Sb-127	3.85 d	F	0.2	5.1E-09	0.1	3.5E-09	1.6E-09	9.7E-10	5.2E-10	4.3E-10
		M	0.02	1.0E-08	0.01	7.3E-09	3.9E-09	2.7E-09	2.1E-09	1.7E-09
		S	0.02	1.1E-08	0.01	7.9E-09	4.2E-09	3.0E-09	2.3E-09	1.9E-09
Sb-128	9.01 h	F	0.2	2.1E-09	0.1	1.7E-09	8.3E-10	5.1E-10	2.9E-10	2.3E-10
		M	0.02	3.3E-09	0.01	2.5E-09	1.2E-09	7.9E-10	5.0E-10	4.0E-10
		S	0.02	3.4E-09	0.01	2.6E-09	1.3E-09	8.3E-10	5.2E-10	4.2E-10
Sb-128m	10.4 m	F	0.2	9.8E-11	0.1	6.9E-11	3.2E-11	2.0E-11	1.2E-11	1.0E-11
		M	0.02	1.3E-10	0.01	9.2E-11	4.3E-11	2.7E-11	1.7E-11	1.4E-11
		S	0.02	1.4E-10	0.01	9.4E-11	4.4E-11	2.8E-11	1.8E-11	1.5E-11
Sb-129	4.32 h	F	0.2	1.1E-09	0.1	8.2E-10	3.8E-10	2.3E-10	1.3E-10	1.0E-10
		M	0.02	2.0E-09	0.01	1.4E-09	6.8E-10	4.4E-10	2.9E-10	2.3E-10
		S	0.02	2.1E-09	0.01	1.5E-09	7.2E-10	4.6E-10	3.0E-10	2.5E-10
Sb-130	40 m	F	0.2	3.0E-10	0.1	2.2E-10	1.1E-10	6.6E-11	4.0E-11	3.3E-11
		M	0.02	4.5E-10	0.01	3.2E-10	1.6E-10	9.8E-11	6.3E-11	5.1E-11
		S	0.02	4.6E-10	0.01	3.3E-10	1.6E-10	1.0E-10	6.5E-11	5.3E-11
Sb-131	23 m	F	0.2	3.5E-10	0.1	2.8E-10	1.4E-10	7.7E-11	4.6E-11	3.5E-11
		M	0.02	3.9E-10	0.01	2.6E-10	1.3E-10	8.0E-11	5.3E-11	4.4E-11
		S	0.02	3.8E-10	0.01	2.6E-10	1.2E-10	7.9E-11	5.3E-11	4.4E-11
<b>Tellurium</b>										
Te-116	2.49 h	F	0.6	5.3E-10	0.3	4.2E-10	2.1E-10	1.3E-10	7.2E-11	5.8E-11
		M	0.2	8.6E-10	0.1	6.4E-10	3.2E-10	2.0E-10	1.3E-10	1.0E-10
		S	0.02	9.1E-10	0.01	6.7E-10	3.3E-10	2.1E-10	1.4E-10	1.1E-10
Te-121	17 d	F	0.6	1.7E-09	0.3	1.4E-09	7.2E-10	4.6E-10	2.9E-10	2.4E-10
		M	0.2	2.3E-09	0.1	1.9E-09	1.0E-09	6.8E-10	4.7E-10	3.8E-10
		S	0.02	2.4E-09	0.01	2.0E-09	1.1E-09	7.2E-10	5.1E-10	4.1E-10
Te-121m	154 d	F	0.6	1.4E-08	0.3	1.0E-08	5.3E-09	3.3E-09	2.1E-09	1.8E-09
		M	0.2	1.9E-08	0.1	1.5E-08	8.8E-09	6.1E-09	5.1E-09	4.2E-09
		S	0.02	2.3E-08	0.01	1.9E-08	1.2E-08	8.1E-09	6.9E-09	5.7E-09
Te-123	1E13 y	F	0.6	1.1E-08	0.3	9.1E-09	6.2E-09	4.8E-09	4.0E-09	3.9E-09
		M	0.2	5.6E-09	0.1	4.4E-09	3.0E-09	2.3E-09	2.0E-09	1.9E-09
		S	0.02	5.3E-09	0.01	5.0E-09	3.5E-09	2.4E-09	2.1E-09	2.0E-09
Te-123m	119.7 d	F	0.6	9.8E-09	0.3	6.8E-09	3.4E-09	1.9E-09	1.1E-09	9.5E-10
		M	0.2	1.8E-08	0.1	1.3E-08	8.0E-09	5.7E-09	5.0E-09	4.0E-09
		S	0.02	2.0E-08	0.01	1.6E-08	9.8E-09	7.1E-09	6.3E-09	5.1E-09
Te-125m	58 d	F	0.6	6.2E-09	0.3	4.2E-09	2.0E-09	1.1E-09	6.1E-10	5.1E-10
		M	0.2	1.5E-08	0.1	1.1E-08	6.6E-09	4.8E-09	4.3E-09	3.4E-09
		S	0.02	1.7E-08	0.01	1.3E-08	7.8E-09	5.8E-09	5.3E-09	4.2E-09
Te-127	9.35 h	F	0.6	4.3E-10	0.3	3.2E-10	1.4E-10	8.5E-11	4.5E-11	3.9E-11
		M	0.2	1.0E-09	0.1	7.3E-10	3.6E-10	2.4E-10	1.6E-10	1.3E-10
		S	0.02	1.2E-09	0.01	7.9E-10	3.9E-10	2.6E-10	1.7E-10	1.4E-10
Te-127m	109 d	F	0.6	2.1E-08	0.3	1.4E-08	6.5E-09	3.5E-09	2.0E-09	1.5E-09
		M	0.2	3.5E-08	0.1	2.6E-08	1.5E-08	1.1E-08	9.2E-09	7.4E-09
		S	0.02	4.1E-08	0.01	3.3E-08	2.0E-08	1.4E-08	1.2E-08	9.8E-09
Te-129	69.6 m	F	0.6	1.8E-10	0.3	1.2E-10	5.1E-11	3.2E-11	1.9E-11	1.6E-11
		M	0.2	3.3E-10	0.1	2.2E-10	9.9E-11	6.5E-11	4.4E-11	3.7E-11
		S	0.02	3.5E-10	0.01	2.3E-10	1.0E-10	6.9E-11	4.7E-11	3.9E-11
Te-129m	33.6 d	F	0.6	2.0E-08	0.3	1.3E-08	5.8E-09	3.1E-09	1.7E-09	1.3E-09
		M	0.2	3.5E-08	0.1	2.6E-08	1.4E-08	9.8E-09	8.0E-09	6.6E-09
		S	0.02	3.8E-08	0.01	2.9E-08	1.7E-08	1.2E-08	9.6E-09	7.9E-09

Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Te-131	25.0 m	F	0.6	2.3E-10	0.3	2.0E-10	9.9E-11	5.3E-11	3.3E-11	2.3E-11
		M	0.2	2.6E-10	0.1	1.7E-10	8.1E-11	5.2E-11	3.5E-11	2.8E-11
		S	0.02	2.4E-10	0.01	1.6E-10	7.4E-11	4.9E-11	3.3E-11	2.8E-11
Te-131m	30 h	F	0.6	8.7E-09	0.3	7.6E-09	3.9E-09	2.0E-09	1.2E-09	8.6E-10
		M	0.2	7.9E-09	0.1	5.8E-09	3.0E-09	1.9E-09	1.2E-09	9.4E-10
		S	0.02	7.0E-09	0.01	5.1E-09	2.6E-09	1.8E-09	1.1E-09	9.1E-10
Te-132	78.2 h	F	0.6	2.2E-08	0.3	1.8E-08	8.5E-09	4.2E-09	2.6E-09	1.8E-09
		M	0.2	1.6E-08	0.1	1.3E-08	6.4E-09	4.0E-09	2.6E-09	2.0E-09
		S	0.02	1.5E-08	0.01	1.1E-08	5.8E-09	3.8E-09	2.5E-09	2.0E-09
Te-133	12.45 m	F	0.6	2.4E-10	0.3	2.1E-10	9.6E-11	4.6E-11	2.8E-11	1.9E-11
		M	0.2	2.0E-10	0.1	1.3E-10	6.1E-11	3.8E-11	2.4E-11	2.0E-11
		S	0.02	1.7E-10	0.01	1.2E-10	5.4E-11	3.5E-11	2.2E-11	1.9E-11
Te-133m	55.4 m	F	0.6	1.0E-09	0.3	8.9E-10	4.1E-10	2.0E-10	1.2E-10	8.1E-11
		M	0.2	8.5E-10	0.1	5.8E-10	2.8E-10	1.7E-10	1.1E-10	8.7E-11
		S	0.02	7.4E-10	0.01	5.1E-10	2.5E-10	1.6E-10	1.0E-10	8.4E-11
Te-134	41.8 m	F	0.6	4.7E-10	0.3	3.7E-10	1.8E-10	1.0E-10	6.0E-11	4.7E-11
		M	0.2	5.5E-10	0.1	3.9E-10	1.9E-10	1.2E-10	8.1E-11	6.6E-11
		S	0.02	5.6E-10	0.01	4.0E-10	1.9E-10	1.3E-10	8.4E-11	6.8E-11
<b>Iodine</b>										
I-120	81.0 m	F	1.0	1.3E-09	1.0	1.0E-09	4.8E-10	2.3E-10	1.4E-10	1.0E-10
		M	0.2	1.1E-09	0.1	7.3E-10	3.4E-10	2.1E-10	1.3E-10	1.0E-10
		S	0.02	1.0E-09	0.01	6.9E-10	3.2E-10	2.0E-10	1.2E-10	1.0E-10
I-120m	53 m	F	1.0	8.6E-10	1.0	6.9E-10	3.3E-10	1.8E-10	1.1E-10	8.2E-11
		M	0.2	8.2E-10	0.1	5.9E-10	2.9E-10	1.8E-10	1.1E-10	8.7E-11
		S	0.02	8.2E-10	0.01	5.8E-10	2.8E-10	1.8E-10	1.1E-10	8.8E-11
I-121	2.12 h	F	1.0	2.3E-10	1.0	2.1E-10	1.1E-10	6.0E-11	3.8E-11	2.7E-11
		M	0.2	2.1E-10	0.1	1.5E-10	7.8E-11	4.9E-11	3.2E-11	2.5E-11
		S	0.02	1.9E-10	0.01	1.4E-10	7.0E-11	4.5E-11	3.0E-11	2.4E-11
I-123	13.2 h	F	1.0	8.7E-10	1.0	7.9E-10	3.8E-10	1.8E-10	1.1E-10	7.4E-11
		M	0.2	5.3E-10	0.1	3.9E-10	2.0E-10	1.2E-10	8.2E-11	6.4E-11
		S	0.02	4.3E-10	0.01	3.2E-10	1.7E-10	1.1E-10	7.6E-11	6.0E-11
I-124	4.18 d	F	1.0	4.7E-08	1.0	4.5E-08	2.2E-08	1.1E-08	6.7E-09	4.4E-09
		M	0.2	1.4E-08	0.1	9.3E-09	4.6E-09	2.5E-09	1.6E-09	1.2E-09
		S	0.02	6.2E-09	0.01	4.4E-09	2.2E-09	1.4E-09	9.4E-10	7.7E-10
I-125	60.14 d	F	1.0	2.0E-08	1.0	2.3E-08	1.5E-08	1.1E-08	7.2E-09	5.1E-09
		M	0.2	6.9E-09	0.1	5.6E-09	3.6E-09	2.6E-09	1.8E-09	1.4E-09
		S	0.02	2.4E-09	0.01	1.8E-09	1.0E-09	6.7E-10	4.8E-10	3.8E-10
I-126	13.02 d	F	1.0	8.1E-08	1.0	8.3E-08	4.5E-08	2.4E-08	1.5E-08	9.8E-09
		M	0.2	2.4E-08	0.1	1.7E-08	9.5E-09	5.5E-09	3.8E-09	2.7E-09
		S	0.02	8.3E-09	0.01	5.9E-09	3.3E-09	2.2E-09	1.8E-09	1.4E-09
I-128	24.99 m	F	1.0	1.5E-10	1.0	1.1E-10	4.7E-11	2.7E-11	1.6E-11	1.3E-11
		M	0.2	1.9E-10	0.1	1.2E-10	5.3E-11	3.4E-11	2.2E-11	1.9E-11
		S	0.02	1.9E-10	0.01	1.2E-10	5.4E-11	3.5E-11	2.3E-11	2.0E-11
I-129	1.57E7 y	F	1.0	7.2E-08	1.0	8.6E-08	6.1E-08	6.7E-08	4.6E-08	3.6E-08
		M	0.2	3.6E-08	0.1	3.3E-08	2.4E-08	2.4E-08	1.9E-08	1.5E-08
		S	0.02	2.9E-08	0.01	2.6E-08	1.8E-08	1.3E-08	1.1E-08	9.8E-09
I-130	12.36 h	F	1.0	8.2E-09	1.0	7.4E-09	3.5E-09	1.6E-09	1.0E-09	6.7E-10
		M	0.2	4.3E-09	0.1	3.1E-09	1.5E-09	9.2E-10	5.8E-10	4.5E-10
		S	0.02	3.3E-09	0.01	2.4E-09	1.2E-09	7.9E-10	5.1E-10	4.1E-10
I-131	8.04 d	F	1.0	7.2E-08	1.0	7.2E-08	3.7E-08	1.9E-08	1.1E-08	7.4E-09
		M	0.2	2.2E-08	0.1	1.5E-08	8.2E-09	4.7E-09	3.4E-09	2.4E-09
		S	0.02	8.8E-09	0.01	6.2E-09	3.5E-09	2.4E-09	2.0E-09	1.6E-09
I-132	2.30 h	F	1.0	1.1E-09	1.0	9.6E-10	4.5E-10	2.2E-10	1.3E-10	9.4E-11
		M	0.2	9.9E-10	0.1	7.3E-10	3.6E-10	2.2E-10	1.4E-10	1.1E-10
		S	0.02	9.3E-10	0.01	6.8E-10	3.4E-10	2.1E-10	1.4E-10	1.1E-10

(continued on next page)

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Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
I-132m	83.6 m	F	1.0	9.6E-10	1.0	8.4E-10	4.0E-10	1.9E-10	1.2E-10	7.9E-11
		M	0.2	7.2E-10	0.1	5.3E-10	2.6E-10	1.6E-10	1.1E-10	8.7E-11
		S	0.02	6.6E-10	0.01	4.8E-10	2.4E-10	1.6E-10	1.1E-10	8.5E-11
I-133	20.8 h	F	1.0	1.9E-08	1.0	1.8E-08	8.3E-09	3.8E-09	2.2E-09	1.5E-09
		M	0.2	6.6E-09	0.1	4.4E-09	2.1E-09	1.2E-09	7.4E-10	5.5E-10
I-134	52.6 m	S	0.02	3.8E-09	0.01	2.9E-09	1.4E-09	9.0E-10	5.3E-10	4.3E-10
		F	1.0	4.6E-10	1.0	3.7E-10	1.8E-10	9.7E-11	5.9E-11	4.5E-11
		M	0.2	4.8E-10	0.1	3.4E-10	1.7E-10	1.0E-10	6.7E-11	5.4E-11
I-135	6.61 h	S	0.02	4.8E-10	0.01	3.4E-10	1.7E-10	1.1E-10	6.8E-11	5.5E-11
		F	1.0	4.1E-09	1.0	3.7E-09	1.7E-09	7.9E-10	4.8E-10	3.2E-10
		M	0.2	2.2E-09	0.1	1.6E-09	7.8E-10	4.7E-10	3.0E-10	2.4E-10
S	0.02	1.8E-09	0.01	1.3E-09	6.5E-10	4.2E-10	2.7E-10	2.2E-10		
<b>Caesium</b>										
Cs-125	45 m	F	1.0	1.2E-10	1.0	8.3E-11	3.9E-11	2.4E-11	1.4E-11	1.2E-11
		M	0.2	2.0E-10	0.1	1.4E-10	6.5E-11	4.2E-11	2.7E-11	2.2E-11
		S	0.02	2.1E-10	0.01	1.4E-10	6.8E-11	4.4E-11	2.8E-11	2.3E-11
Cs-127	6.25 h	F	1.0	1.6E-10	1.0	1.3E-10	6.9E-11	4.2E-11	2.5E-11	2.0E-11
		M	0.2	2.8E-10	0.1	2.2E-10	1.1E-10	7.3E-11	4.6E-11	3.6E-11
		S	0.02	3.0E-10	0.01	2.3E-10	1.2E-10	7.6E-11	4.8E-11	3.8E-11
Cs-129	32.06 h	F	1.0	3.4E-10	1.0	2.8E-10	1.4E-10	8.7E-11	5.2E-11	4.2E-11
		M	0.2	5.7E-10	0.1	4.6E-10	2.4E-10	1.5E-10	9.1E-11	7.3E-11
		S	0.02	6.3E-10	0.01	4.9E-10	2.5E-10	1.6E-10	9.7E-11	7.7E-11
Cs-130	29.9 m	F	1.0	8.3E-11	1.0	5.6E-11	2.5E-11	1.6E-11	9.4E-12	7.8E-12
		M	0.2	1.3E-10	0.1	8.7E-11	4.0E-11	2.5E-11	1.6E-11	1.4E-11
		S	0.02	1.4E-10	0.01	9.0E-11	4.1E-11	2.6E-11	1.7E-11	1.4E-11
Cs-131	9.69 d	F	1.0	2.4E-10	1.0	1.7E-10	8.4E-11	5.3E-11	3.2E-11	2.7E-11
		M	0.2	3.5E-10	0.1	2.6E-10	1.4E-10	8.5E-11	5.5E-11	4.4E-11
		S	0.02	3.8E-10	0.01	2.8E-10	1.4E-10	9.1E-11	5.9E-11	4.7E-11
Cs-132	6.475 d	F	1.0	1.5E-09	1.0	1.2E-09	6.4E-10	4.1E-10	2.7E-10	2.3E-10
		M	0.2	1.9E-09	0.1	1.5E-09	8.4E-10	5.4E-10	3.7E-10	2.9E-10
		S	0.02	2.0E-09	0.01	1.6E-09	8.7E-10	5.6E-10	3.8E-10	3.0E-10
Cs-134	2.062 y	F	1.0	1.1E-08	1.0	7.3E-09	5.2E-09	5.3E-09	6.3E-09	6.6E-09
		M	0.2	3.2E-08	0.1	2.6E-08	1.6E-08	1.2E-08	1.1E-08	9.1E-09
		S	0.02	7.0E-08	0.01	6.3E-08	4.1E-08	2.8E-08	2.3E-08	2.0E-08
Cs-134m	2.90 h	F	1.0	1.3E-10	1.0	8.6E-11	3.8E-11	2.5E-11	1.6E-11	1.4E-11
		M	0.2	3.3E-10	0.1	2.3E-10	1.2E-10	8.3E-11	6.6E-11	5.4E-11
		S	0.02	3.6E-10	0.01	2.5E-10	1.3E-10	9.2E-11	7.4E-11	6.0E-11
Cs-135	2.3E6 y	F	1.0	1.7E-09	1.0	9.9E-10	6.2E-10	6.1E-10	6.8E-10	6.9E-10
		M	0.2	1.2E-08	0.1	9.3E-09	5.7E-09	4.1E-09	3.8E-09	3.1E-09
		S	0.02	2.7E-08	0.01	2.4E-08	1.6E-08	1.1E-08	9.5E-09	8.6E-09
Cs-135m	53 m	F	1.0	9.2E-11	1.0	7.8E-11	4.1E-11	2.4E-11	1.5E-11	1.2E-11
		M	0.2	1.2E-10	0.1	9.9E-11	5.2E-11	3.2E-11	1.9E-11	1.5E-11
		S	0.02	1.2E-10	0.01	1.0E-10	5.3E-11	3.3E-11	2.0E-11	1.6E-11
Cs-136	13.1 d	F	1.0	7.3E-09	1.0	5.2E-09	2.9E-09	2.0E-09	1.4E-09	1.2E-09
		M	0.2	1.3E-08	0.1	1.0E-08	6.0E-09	3.7E-09	3.1E-09	2.5E-09
		S	0.02	1.5E-08	0.01	1.1E-08	5.7E-09	4.1E-09	3.5E-09	2.8E-09
Cs-137	30.0 y	F	1.0	8.8E-09	1.0	5.4E-09	3.6E-09	3.7E-09	4.4E-09	4.6E-09
		M	0.2	3.6E-08	0.1	2.9E-08	1.8E-08	1.3E-08	1.1E-08	9.7E-09
		S	0.02	1.1E-07	0.01	1.0E-07	7.0E-08	4.8E-08	4.2E-08	3.9E-08
Cs-138	32.2 m	F	1.0	2.6E-10	1.0	1.8E-10	8.1E-11	5.0E-11	2.9E-11	2.4E-11
		M	0.2	4.0E-10	0.1	2.7E-10	1.3E-10	7.8E-11	4.9E-11	4.1E-11
		S	0.02	4.2E-10	0.01	2.8E-10	1.3E-10	8.2E-11	5.1E-11	4.3E-11
<b>Barium</b>										
Ba-126	96.5 m	F	0.6	6.7E-10	0.3 <sup>‡</sup>	5.2E-10	2.4E-10	1.4E-10	6.9E-11	7.4E-11
		M	0.2	1.0E-09	0.1	7.0E-10	3.2E-10	2.0E-10	1.2E-10	1.0E-10
		S	0.02	1.1E-09	0.01	7.2E-10	3.3E-10	2.1E-10	1.3E-10	1.1E-10



Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Ba-128	2.43 d	F	0.6	5.9E-09	0.3 <sup>‡</sup>	5.4E-09	2.5E-09	1.4E-09	7.4E-10	7.6E-10
		M	0.2	1.1E-08	0.1	7.8E-09	3.7E-09	2.4E-09	1.5E-09	1.3E-09
		S	0.02	1.2E-08	0.01	8.3E-09	4.0E-09	2.6E-09	1.6E-09	1.4E-09
Ba-131	11.8 d	F	0.6	2.1E-09	0.3 <sup>‡</sup>	1.4E-09	7.1E-10	4.7E-10	3.1E-10	2.2E-10
		M	0.2	3.7E-09	0.1	3.1E-09	1.6E-09	1.1E-09	9.7E-10	7.6E-10
Ba-131m	14.6 m	F	0.6	2.7E-11	0.3 <sup>‡</sup>	2.1E-11	1.0E-11	6.7E-12	4.7E-12	4.0E-12
		M	0.2	4.8E-11	0.1	3.3E-11	1.7E-11	1.2E-11	9.0E-12	7.4E-12
		S	0.02	5.0E-11	0.01	3.5E-11	1.8E-11	1.2E-11	9.5E-12	7.8E-12
Ba-133	10.74 y	F	0.6	1.1E-08	0.3 <sup>‡</sup>	4.5E-09	2.6E-09	3.7E-09	6.0E-09	1.5E-09
		M	0.2	1.5E-08	0.1	1.0E-08	6.4E-09	5.1E-09	5.5E-09	3.1E-09
		S	0.02	3.2E-08	0.01	2.9E-08	2.0E-08	1.3E-08	1.1E-08	1.0E-08
Ba-133m	38.9 h	F	0.6	1.4E-09	0.3 <sup>‡</sup>	1.1E-09	4.9E-10	3.1E-10	1.5E-10	1.8E-10
		M	0.2	3.0E-09	0.1	2.2E-09	1.0E-09	6.9E-10	5.2E-10	4.2E-10
		S	0.02	3.1E-09	0.01	2.4E-09	1.1E-09	7.6E-10	5.8E-10	4.6E-10
Ba-135m	28.7 h	F	0.6	1.1E-09	0.3 <sup>‡</sup>	1.0E-09	4.6E-10	2.5E-10	1.2E-10	1.4E-10
		M	0.2	2.4E-09	0.1	1.8E-09	8.9E-10	5.4E-10	4.1E-10	3.3E-10
		S	0.02	2.7E-09	0.01	1.9E-09	8.6E-10	5.9E-10	4.5E-10	3.6E-10
Ba-139	82.7 m	F	0.6	3.3E-10	0.3 <sup>‡</sup>	2.4E-10	1.1E-10	6.0E-11	3.1E-11	3.4E-11
		M	0.2	5.4E-10	0.1	3.5E-10	1.6E-10	1.0E-10	6.6E-11	5.6E-11
		S	0.02	5.7E-10	0.01	3.6E-10	1.6E-10	1.1E-10	7.0E-11	5.9E-11
Ba-140	12.74 d	F	0.6	1.4E-08	0.3 <sup>‡</sup>	7.8E-09	3.6E-09	2.4E-09	1.6E-09	1.0E-09
		M	0.2	2.7E-08	0.1	2.0E-08	1.1E-08	7.6E-09	6.2E-09	5.1E-09
		S	0.02	2.9E-08	0.01	2.2E-08	1.2E-08	8.6E-09	7.1E-09	5.8E-09
Ba-141	18.27 m	F	0.6	1.9E-10	0.3 <sup>‡</sup>	1.4E-10	6.4E-11	3.8E-11	2.1E-11	2.1E-11
		M	0.2	3.0E-10	0.1	2.0E-10	9.3E-11	5.9E-11	3.8E-11	3.2E-11
		S	0.02	3.2E-10	0.01	2.1E-10	9.7E-11	6.2E-11	4.0E-11	3.4E-11
Ba-142	10.6 m	F	0.6	1.3E-10	0.3 <sup>‡</sup>	9.6E-11	4.5E-11	2.7E-11	1.6E-11	1.5E-11
		M	0.2	1.8E-10	0.1	1.3E-10	6.1E-11	3.9E-11	2.5E-11	2.1E-11
		S	0.02	1.9E-10	0.01	1.3E-10	6.2E-11	4.0E-11	2.6E-11	2.2E-11
<b>Lanthanum</b>										
La-131	59 m	F	0.005	1.2E-10	0.0005	8.7E-11	4.2E-11	2.6E-11	1.5E-11	1.3E-11
		M	0.005	1.8E-10	0.0005	1.3E-10	6.4E-11	4.1E-11	2.8E-11	2.3E-11
La-132	4.8 h	F	0.005	1.0E-09	0.0005	7.7E-10	3.7E-10	2.2E-10	1.2E-10	1.0E-10
		M	0.005	1.5E-09	0.0005	1.1E-09	5.4E-10	3.4E-10	2.0E-10	1.6E-10
La-135	19.5 h	F	0.005	1.0E-10	0.0005	7.7E-11	3.8E-11	2.3E-11	1.3E-11	1.0E-11
		M	0.005	1.3E-10	0.0005	1.0E-10	4.9E-11	3.0E-11	1.7E-11	1.4E-11
La-137	6E4 y	F	0.005	2.5E-08	0.0005	2.3E-08	1.5E-08	1.1E-08	8.9E-09	8.7E-09
		M	0.005	8.6E-09	0.0005	8.1E-09	5.6E-09	4.0E-09	3.6E-09	3.6E-09
La-138	1.35E11 y	F	0.005	3.7E-07	0.0005	3.5E-07	2.4E-07	1.8E-07	1.6E-07	1.5E-07
		M	0.005	1.3E-07	0.0005	1.2E-07	9.1E-08	6.8E-08	6.4E-08	6.4E-08
La-140	40.272 h	F	0.005	5.8E-09	0.0005	4.2E-09	2.0E-09	1.2E-09	6.9E-10	5.7E-10
		M	0.005	8.8E-09	0.0005	6.3E-09	3.1E-09	2.0E-09	1.3E-09	1.1E-09
La-141	3.93 h	F	0.005	8.6E-10	0.0005	5.5E-10	2.3E-10	1.4E-10	7.5E-11	6.3E-11
		M	0.005	1.4E-09	0.0005	9.3E-10	4.3E-10	2.8E-10	1.8E-10	1.5E-10
La-142	92.5 m	F	0.005	5.3E-10	0.0005	3.8E-10	1.8E-10	1.1E-10	6.3E-11	5.2E-11
		M	0.005	8.1E-10	0.0005	5.7E-10	2.7E-10	1.7E-10	1.1E-10	8.9E-11
La-143	14.23 m	F	0.005	1.4E-10	0.0005	8.6E-11	3.7E-11	2.3E-11	1.4E-11	1.2E-11
		M	0.005	2.1E-10	0.0005	1.3E-10	6.0E-11	3.9E-11	2.5E-11	2.1E-11
<b>Cerium</b>										
Ce-134	72.0 h	F	0.005	7.6E-09	0.0005	5.3E-09	2.3E-09	1.4E-09	7.7E-10	5.7E-10
		M	0.005	1.1E-08	0.0005	7.6E-09	3.7E-09	2.4E-09	1.5E-09	1.3E-09
		S	0.005	1.2E-08	0.0005	8.0E-09	3.8E-09	2.5E-09	1.6E-09	1.3E-09
Ce-135	17.6 h	F	0.005	2.3E-09	0.0005	1.7E-09	8.5E-10	5.3E-10	3.0E-10	2.4E-10
		M	0.005	3.6E-09	0.0005	2.7E-09	1.4E-09	8.9E-10	5.9E-10	4.8E-10

(continued on next page)

<sup>‡</sup> The f<sub>1</sub> value for Type F for an adult is 0.2.

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Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Ce-137	9.0 h	S	0.005	3.7E-09	0.0005	2.8E-09	1.4E-09	9.4E-10	6.3E-10	5.0E-10
		F	0.005	7.5E-11	0.0005	5.6E-11	2.7E-11	1.6E-11	8.7E-12	7.0E-12
		M	0.005	1.1E-10	0.0005	7.6E-11	3.6E-11	2.2E-11	1.2E-11	9.8E-12
Ce-137m	34.4 h	S	0.005	1.1E-10	0.0005	7.8E-11	3.7E-11	2.3E-11	1.3E-11	1.0E-11
		F	0.005	1.6E-09	0.0005	1.1E-09	4.6E-10	2.8E-10	1.5E-10	1.2E-10
		M	0.005	3.1E-09	0.0005	2.2E-09	1.1E-09	6.7E-10	5.1E-10	4.1E-10
Ce-139	137.66 d	S	0.005	3.3E-09	0.0005	2.3E-09	1.0E-09	7.3E-10	5.6E-10	4.4E-10
		F	0.005	1.1E-08	0.0005	8.5E-09	4.5E-09	2.8E-09	1.8E-09	1.5E-09
		M	0.005	7.5E-09	0.0005	6.1E-09	3.6E-09	2.5E-09	2.1E-09	1.7E-09
Ce-141	32.501 d	S	0.005	7.8E-09	0.0005	6.3E-09	3.9E-09	2.7E-09	2.4E-09	1.9E-09
		F	0.005	1.1E-08	0.0005	7.3E-09	3.5E-09	2.0E-09	1.2E-09	9.3E-10
		M	0.005	1.4E-08	0.0005	1.1E-08	6.3E-09	4.6E-09	4.1E-09	3.2E-09
Ce-143	33.0 h	S	0.005	1.6E-08	0.0005	1.2E-08	7.1E-09	5.3E-09	4.8E-09	3.8E-09
		F	0.005	3.6E-09	0.0005	2.3E-09	1.0E-09	6.2E-10	3.3E-10	2.7E-10
		M	0.005	5.6E-09	0.0005	3.9E-09	1.9E-09	1.3E-09	9.3E-10	7.5E-10
Ce-144	284.3 d	S	0.005	5.9E-09	0.0005	4.1E-09	2.1E-09	1.4E-09	1.0E-09	8.3E-10
		F	0.005	3.6E-07	0.0005	2.7E-07	1.4E-07	7.8E-08	4.8E-08	4.0E-08
		M	0.005	1.9E-07	0.0005	1.6E-07	8.8E-08	5.5E-08	4.1E-08	3.6E-08
		S	0.005	2.1E-07	0.0005	1.8E-07	1.1E-07	7.3E-08	5.8E-08	5.3E-08
<b>Praseodymium</b>										
Pr-136	13.1 m	M	0.005	1.3E-10	0.0005	8.8E-11	4.2E-11	2.6E-11	1.6E-11	1.3E-11
		S	0.005	1.3E-10	0.0005	9.0E-11	4.3E-11	2.7E-11	1.7E-11	1.4E-11
Pr-137	76.6 m	M	0.005	1.8E-10	0.0005	1.3E-10	6.1E-11	3.9E-11	2.4E-11	2.0E-11
		S	0.005	1.9E-10	0.0005	1.3E-10	6.4E-11	4.0E-11	2.5E-11	2.1E-11
Pr-138m	2.1 h	M	0.005	5.9E-10	0.0005	4.5E-10	2.3E-10	1.4E-10	9.0E-11	7.2E-11
		S	0.005	6.0E-10	0.0005	4.7E-10	2.4E-10	1.5E-10	9.3E-11	7.4E-11
Pr-139	4.51 h	M	0.005	1.5E-10	0.0005	1.1E-10	5.5E-11	3.5E-11	2.3E-11	1.8E-11
		S	0.005	1.6E-10	0.0005	1.2E-10	5.7E-11	3.7E-11	2.4E-11	2.0E-11
Pr-142	19.13 h	M	0.005	5.3E-09	0.0005	3.5E-09	1.6E-09	1.0E-09	6.2E-10	5.2E-10
		S	0.005	5.5E-09	0.0005	3.7E-09	1.7E-09	1.1E-09	6.6E-10	5.5E-10
Pr-142m	14.6 m	M	0.005	6.7E-11	0.0005	4.5E-11	2.0E-11	1.3E-11	7.9E-12	6.6E-12
		S	0.005	7.0E-11	0.0005	4.7E-11	2.2E-11	1.4E-11	8.4E-12	7.0E-12
Pr-143	13.56 d	M	0.005	1.2E-08	0.0005	8.4E-09	4.6E-09	3.2E-09	2.7E-09	2.2E-09
		S	0.005	1.3E-08	0.0005	9.2E-09	5.1E-09	3.6E-09	3.0E-09	2.4E-09
Pr-144	17.28 m	M	0.005	1.9E-10	0.0005	1.2E-10	5.0E-11	3.2E-11	2.1E-11	1.8E-11
		S	0.005	1.9E-10	0.0005	1.2E-10	5.2E-11	3.4E-11	2.1E-11	1.8E-11
Pr-145	5.98 h	M	0.005	1.6E-09	0.0005	1.0E-09	4.7E-10	3.0E-10	1.9E-10	1.6E-10
		S	0.005	1.6E-09	0.0005	1.1E-09	4.9E-10	3.2E-10	2.0E-10	1.7E-10
Pr-147	13.6 m	M	0.005	1.5E-10	0.0005	1.0E-10	4.8E-11	3.1E-11	2.1E-11	1.8E-11
		S	0.005	1.6E-10	0.0005	1.1E-10	5.0E-11	3.3E-11	2.2E-11	1.8E-11
<b>Neodymium</b>										
Nd-136	50.65 m	M	0.005	4.6E-10	0.0005	3.2E-10	1.6E-10	9.8E-11	6.3E-11	5.1E-11
		S	0.005	4.8E-10	0.0005	3.3E-10	1.6E-10	1.0E-10	6.6E-11	5.4E-11
Nd-138	5.04 h	M	0.005	2.3E-09	0.0005	1.7E-09	7.7E-10	4.8E-10	2.8E-10	2.3E-10
		S	0.005	2.4E-09	0.0005	1.8E-09	8.0E-10	5.0E-10	3.0E-10	2.5E-10
Nd-139	29.7 m	M	0.005	9.0E-11	0.0005	6.2E-11	3.0E-11	1.9E-11	1.2E-11	9.9E-12
		S	0.005	9.4E-11	0.0005	6.4E-11	3.1E-11	2.0E-11	1.3E-11	1.0E-11
Nd-139m	5.5 h	M	0.005	1.1E-09	0.0005	8.8E-10	4.5E-10	2.9E-10	1.8E-10	1.5E-10
		S	0.005	1.2E-09	0.0005	9.1E-10	4.6E-10	3.0E-10	1.9E-10	1.5E-10
Nd-141	2.49 h	M	0.005	4.1E-11	0.0005	3.1E-11	1.5E-11	9.6E-12	6.0E-12	4.8E-12
		S	0.005	4.3E-11	0.0005	3.2E-11	1.6E-11	1.0E-11	6.2E-12	5.0E-12
Nd-147	10.98 d	M	0.005	1.1E-08	0.0005	8.0E-09	4.5E-09	3.2E-09	2.6E-09	2.1E-09
		S	0.005	1.2E-08	0.0005	8.6E-09	4.9E-09	3.5E-09	3.0E-09	2.4E-09
Nd-149	1.73 h	M	0.005	6.8E-10	0.0005	4.6E-10	2.2E-10	1.5E-10	1.0E-10	8.4E-11
		S	0.005	7.1E-10	0.0005	4.8E-10	2.3E-10	1.5E-10	1.1E-10	8.9E-11

Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Nd-151	12.44 m	M	0.005	1.5E-10	0.0005	9.9E-11	4.6E-11	3.0E-11	2.0E-11	1.7E-11
		S	0.005	1.5E-10	0.0005	1.0E-10	4.8E-11	3.1E-11	2.1E-11	1.7E-11
<b>Promethium</b>										
Pm-141	20.90 m	M	0.005	1.4E-10	0.0005	9.4E-11	4.3E-11	2.7E-11	1.7E-11	1.4E-11
		S	0.005	1.5E-10	0.0005	9.7E-11	4.4E-11	2.8E-11	1.8E-11	1.5E-11
Pm-143	265 d	M	0.005	6.2E-09	0.0005	5.4E-09	3.3E-09	2.2E-09	1.7E-09	1.5E-09
		S	0.005	5.5E-09	0.0005	4.8E-09	3.1E-09	2.1E-09	1.7E-09	1.4E-09
Pm-144	363 d	M	0.005	3.1E-08	0.0005	2.8E-08	1.8E-08	1.2E-08	9.3E-09	8.2E-09
		S	0.005	2.6E-08	0.0005	2.4E-08	1.6E-08	1.1E-08	8.9E-09	7.5E-09
Pm-145	17.7 y	M	0.005	1.1E-08	0.0005	9.8E-09	6.4E-09	4.3E-09	3.7E-09	3.6E-09
		S	0.005	7.1E-09	0.0005	6.5E-09	4.3E-09	2.9E-09	2.4E-09	2.3E-09
Pm-146	2020 d	M	0.005	6.4E-08	0.0005	5.9E-08	3.9E-08	2.6E-08	2.2E-08	2.1E-08
		S	0.005	5.3E-08	0.0005	4.9E-08	3.3E-08	2.2E-08	1.9E-08	1.7E-08
Pm-147	2.6234 y	M	0.005	2.1E-08	0.0005	1.8E-08	1.1E-08	7.0E-09	5.7E-09	5.0E-09
		S	0.005	1.9E-08	0.0005	1.6E-08	1.0E-08	6.8E-09	5.8E-09	4.9E-09
Pm-148	5.37 d	M	0.005	1.5E-08	0.0005	1.0E-08	5.2E-09	3.4E-09	2.4E-09	2.0E-09
		S	0.005	1.5E-08	0.0005	1.1E-08	5.5E-09	3.7E-09	2.6E-09	2.2E-09
Pm-148m	41.3 d	M	0.005	2.4E-08	0.0005	1.9E-08	1.1E-08	7.7E-09	6.3E-09	5.1E-09
		S	0.005	2.5E-08	0.0005	2.0E-08	1.2E-08	8.3E-09	7.1E-09	5.7E-09
Pm-149	53.08 h	M	0.005	5.0E-09	0.0005	3.5E-09	1.7E-09	1.1E-09	8.3E-10	6.7E-10
		S	0.005	5.3E-09	0.0005	3.6E-09	1.8E-09	1.2E-09	9.0E-10	7.3E-10
Pm-150	2.68 h	M	0.005	1.2E-09	0.0005	7.9E-10	3.8E-10	2.4E-10	1.5E-10	1.2E-10
		S	0.005	1.2E-09	0.0005	8.2E-10	3.9E-10	2.5E-10	1.6E-10	1.3E-10
Pm-151	28.40 h	M	0.005	3.3E-09	0.0005	2.5E-09	1.2E-09	8.3E-10	5.3E-10	4.3E-10
		S	0.005	3.4E-09	0.0005	2.6E-09	1.3E-09	7.9E-10	5.7E-10	4.6E-10
<b>Samarium</b>										
Sm-141	10.2 m	M	0.005	1.5E-10	0.0005	1.0E-10	4.7E-11	2.9E-11	1.8E-11	1.5E-11
Sm-141m	22.6 m	M	0.005	3.0E-10	0.0005	2.1E-10	9.7E-11	6.1E-11	3.9E-11	3.2E-11
Sm-142	72.49 m	M	0.005	7.5E-10	0.0005	4.8E-10	2.2E-10	1.4E-10	8.5E-11	7.1E-11
Sm-145	340 d	M	0.005	8.1E-09	0.0005	6.8E-09	4.0E-09	2.5E-09	1.9E-09	1.6E-09
Sm-146	1.03E8 y	M	0.005	2.7E-05	0.0005	2.6E-05	1.7E-05	1.2E-05	1.1E-05	1.1E-05
Sm-147	1.06E11 y	M	0.005	2.5E-05	0.0005	2.3E-05	1.6E-05	1.1E-05	9.6E-06	9.6E-06
Sm-151	90 y	M	0.005	1.1E-08	0.0005	1.0E-08	6.7E-09	4.5E-09	4.0E-09	4.0E-09
Sm-153	46.7 h	M	0.005	4.2E-09	0.0005	2.9E-09	1.5E-09	1.0E-09	7.9E-10	6.3E-10
Sm-155	22.1 m	M	0.005	1.5E-10	0.0005	9.9E-11	4.4E-11	2.9E-11	2.0E-11	1.7E-11
Sm-156	9.4 h	M	0.005	1.6E-09	0.0005	1.1E-09	5.8E-10	3.5E-10	2.7E-10	2.2E-10
<b>Europium</b>										
Eu-145	5.94 d	M	0.005	3.6E-09	0.0005	2.9E-09	1.6E-09	1.0E-09	6.8E-10	5.5E-10
Eu-146	4.61 d	M	0.005	5.5E-09	0.0005	4.4E-09	2.4E-09	1.5E-09	1.0E-09	8.0E-10
Eu-147	24 d	M	0.005	4.9E-09	0.0005	3.7E-09	2.2E-09	1.6E-09	1.3E-09	1.1E-09
Eu-148	54.5 d	M	0.005	1.4E-08	0.0005	1.2E-08	6.8E-09	4.6E-09	3.2E-09	2.6E-09
Eu-149	93.1 d	M	0.005	1.6E-09	0.0005	1.3E-09	7.3E-10	4.7E-10	3.5E-10	2.9E-10
Eu-150	34.2 y	M	0.005	1.1E-07	0.0005	1.1E-07	7.8E-08	5.7E-08	5.3E-08	5.3E-08
Eu-150m	12.62 h	M	0.005	1.6E-09	0.0005	1.1E-09	5.2E-10	3.4E-10	2.3E-10	1.9E-10
Eu-152	13.33 y	M	0.005	1.1E-07	0.0005	1.0E-07	7.0E-08	4.9E-08	4.3E-08	4.2E-08
Eu-152m	9.32 h	M	0.005	1.9E-09	0.0005	1.3E-09	6.6E-10	4.2E-10	2.4E-10	2.2E-10
Eu-154	8.8 y	M	0.005	1.6E-07	0.0005	1.5E-07	9.7E-08	6.5E-08	5.6E-08	5.3E-08
Eu-155	4.96 y	M	0.005	2.6E-08	0.0005	2.3E-08	1.4E-08	9.2E-09	7.6E-09	6.9E-09
Eu-156	15.19 d	M	0.005	1.9E-08	0.0005	1.4E-08	7.7E-09	5.3E-09	4.2E-09	3.4E-09
Eu-157	15.15 h	M	0.005	2.5E-09	0.0005	1.9E-09	8.9E-10	5.9E-10	3.5E-10	2.8E-10
Eu-158	45.9 m	M	0.005	4.3E-10	0.0005	2.9E-10	1.3E-10	8.5E-11	5.6E-11	4.7E-11
<b>Gadolinium</b>										
Gd-145	22.9 m	F	0.005	1.3E-10	0.0005	9.6E-11	4.7E-11	2.9E-11	1.7E-11	1.4E-11
		M	0.005	1.8E-10	0.0005	1.3E-10	6.2E-11	3.9E-11	2.4E-11	2.0E-11

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Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Gd-146	48.3 d	F	0.005	2.9E-08	0.0005	2.3E-08	1.2E-08	7.8E-09	5.1E-09	4.4E-09
		M	0.005	2.8E-08	0.0005	2.2E-08	1.3E-08	9.3E-09	7.9E-09	6.4E-09
Gd-147	38.1 h	F	0.005	2.1E-09	0.0005	1.7E-09	8.4E-10	5.3E-10	3.1E-10	2.6E-10
		M	0.005	2.8E-09	0.0005	2.2E-09	1.1E-09	7.5E-10	5.1E-10	4.0E-10
Gd-148	93 y	F	0.005	8.3E-05	0.0005	7.6E-05	4.7E-05	3.2E-05	2.6E-05	2.6E-05
		M	0.005	3.2E-05	0.0005	2.9E-05	1.9E-05	1.3E-05	1.2E-05	1.1E-05
Gd-149	9.4 d	F	0.005	2.6E-09	0.0005	2.0E-09	8.0E-10	5.1E-10	3.1E-10	2.6E-10
		M	0.005	3.6E-09	0.0005	3.0E-09	1.5E-09	1.1E-09	9.2E-10	7.3E-10
Gd-151	120 d	F	0.005	6.3E-09	0.0005	4.9E-09	2.5E-09	1.5E-09	9.2E-10	7.8E-10
		M	0.005	4.5E-09	0.0005	3.5E-09	2.0E-09	1.3E-09	1.0E-09	8.6E-10
Gd-152	1.08E14 y	F	0.005	5.9E-05	0.0005	5.4E-05	3.4E-05	2.4E-05	1.9E-05	1.9E-05
		M	0.005	2.1E-05	0.0005	1.9E-05	1.3E-05	8.9E-06	7.9E-06	8.0E-06
Gd-153	242 d	F	0.005	1.5E-08	0.0005	1.2E-08	6.5E-09	3.9E-09	2.4E-09	2.1E-09
		M	0.005	9.9E-09	0.0005	7.9E-09	4.8E-09	3.1E-09	2.5E-09	2.1E-09
Gd-159	18.56 h	F	0.005	1.2E-09	0.0005	8.9E-10	3.8E-10	2.3E-10	1.2E-10	1.0E-10
		M	0.005	2.2E-09	0.0005	1.5E-09	7.3E-10	4.9E-10	3.4E-10	2.7E-10
<b>Terbium</b>										
Tb-147	1.65 h	M	0.005	6.7E-10	0.0005	4.8E-10	2.3E-10	1.5E-10	9.3E-11	7.6E-11
Tb-149	4.15 h	M	0.005	2.1E-08	0.0005	1.5E-08	9.6E-09	6.6E-09	5.8E-09	4.9E-09
Tb-150	3.27 h	M	0.005	1.0E-09	0.0005	7.4E-10	3.5E-10	2.2E-10	1.3E-10	1.1E-10
Tb-151	17.6 h	M	0.005	1.6E-09	0.0005	1.2E-09	6.3E-10	4.2E-10	2.8E-10	2.3E-10
Tb-153	2.34 d	M	0.005	1.4E-09	0.0005	1.0E-09	5.4E-10	3.6E-10	2.3E-10	1.9E-10
Tb-154	21.4 h	M	0.005	2.7E-09	0.0005	2.1E-09	1.1E-09	7.1E-10	4.5E-10	3.6E-10
Tb-155	5.32 d	M	0.005	1.4E-09	0.0005	1.0E-09	5.6E-10	3.4E-10	2.7E-10	2.2E-10
Tb-156	5.34 d	M	0.005	7.0E-09	0.0005	5.4E-09	3.0E-09	2.0E-09	1.5E-09	1.2E-09
Tb-156m	5.0 h	M	0.005	6.2E-10	0.0005	4.5E-10	2.4E-10	1.7E-10	1.2E-10	9.6E-11
Tb-156m	24.4 h	M	0.005	1.1E-09	0.0005	9.4E-10	4.7E-10	3.3E-10	2.7E-10	2.1E-10
Tb-157	150 y	M	0.005	3.2E-09	0.0005	3.0E-09	2.0E-09	1.4E-09	1.2E-09	1.2E-09
Tb-158	150 y	M	0.005	1.1E-07	0.0005	1.0E-07	7.0E-08	5.1E-08	4.7E-08	4.6E-08
Tb-160	72.3 d	M	0.005	3.2E-08	0.0005	2.5E-08	1.5E-08	1.0E-08	8.6E-09	7.0E-09
Tb-161	6.91 d	M	0.005	6.6E-09	0.0005	4.7E-09	2.6E-09	1.9E-09	1.6E-09	1.3E-09
<b>Dysprosium</b>										
Dy-155	10.0 h	M	0.005	5.6E-10	0.0005	4.4E-10	2.3E-10	1.5E-10	9.6E-11	7.7E-11
Dy-157	8.1 h	M	0.005	2.4E-10	0.0005	1.9E-10	9.9E-11	6.2E-11	3.8E-11	3.0E-11
Dy-159	144.4 d	M	0.005	2.1E-09	0.0005	1.7E-09	9.6E-10	6.0E-10	4.4E-10	3.7E-10
Dy-165	2.334 h	M	0.005	5.2E-10	0.0005	3.4E-10	1.6E-10	1.1E-10	7.2E-11	6.0E-11
Dy-166	81.6 h	M	0.005	1.2E-08	0.0005	8.3E-09	4.4E-09	3.0E-09	2.3E-09	1.9E-09
<b>Holmium</b>										
Ho-155	48 m	M	0.005	1.7E-10	0.0005	1.2E-10	5.8E-11	3.7E-11	2.4E-11	2.0E-11
Ho-157	12.6 m	M	0.005	3.4E-11	0.0005	2.5E-11	1.3E-11	8.0E-12	5.1E-12	4.2E-12
Ho-159	33 m	M	0.005	4.6E-11	0.0005	3.3E-11	1.7E-11	1.1E-11	7.5E-12	6.1E-12
Ho-161	2.5 h	M	0.005	5.7E-11	0.0005	4.0E-11	2.0E-11	1.2E-11	7.5E-12	6.0E-12
Ho-162	15 m	M	0.005	2.1E-11	0.0005	1.5E-11	7.2E-12	4.8E-12	3.4E-12	2.8E-12
Ho-162m	68 m	M	0.005	1.5E-10	0.0005	1.1E-10	5.8E-11	3.8E-11	2.6E-11	2.1E-11
Ho-164	29 m	M	0.005	6.8E-11	0.0005	4.5E-11	2.1E-11	1.4E-11	9.9E-12	8.4E-12
Ho-164m	37.5 m	M	0.005	9.1E-11	0.0005	5.9E-11	3.0E-11	2.0E-11	1.3E-11	1.2E-11
Ho-166	26.80 h	M	0.005	6.0E-09	0.0005	4.0E-09	1.9E-09	1.2E-09	7.9E-10	6.5E-10
Ho-166m	1.20E3 y	M	0.005	2.6E-07	0.0005	2.5E-07	1.8E-07	1.3E-07	1.2E-07	1.2E-07
Ho-167	3.1 h	M	0.005	5.2E-10	0.0005	3.6E-10	1.8E-10	1.2E-10	8.7E-11	7.1E-11
<b>Erbium</b>										
Er-161	3.24 h	M	0.005	3.8E-10	0.0005	2.9E-10	1.5E-10	9.5E-11	6.0E-11	4.8E-11
Er-165	10.36 h	M	0.005	7.2E-11	0.0005	5.3E-11	2.6E-11	1.6E-11	9.6E-12	7.9E-12
Er-169	9.3 d	M	0.005	4.7E-09	0.0005	3.5E-09	2.0E-09	1.5E-09	1.3E-09	1.0E-09
Er-171	7.52 h	M	0.005	1.8E-09	0.0005	1.2E-09	5.9E-10	3.9E-10	2.7E-10	2.2E-10
Er-172	49.3 h	M	0.005	6.6E-09	0.0005	4.7E-09	2.5E-09	1.7E-09	1.4E-09	1.1E-09

Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
<b>Thulium</b>										
Tm-162	21.7 m	M	0.005	1.3E-10	0.0005	9.6E-11	4.7E-11	3.0E-11	1.9E-11	1.6E-11
Tm-166	7.70 h	M	0.005	1.3E-09	0.0005	9.9E-10	5.2E-10	3.3E-10	2.2E-10	1.7E-10
Tm-167	9.24 d	M	0.005	5.6E-09	0.0005	4.1E-09	2.3E-09	1.7E-09	1.4E-09	1.1E-09
Tm-170	128.6 d	M	0.005	3.6E-08	0.0005	2.8E-08	1.6E-08	1.1E-08	8.5E-09	7.0E-09
Tm-171	1.92 y	M	0.005	6.8E-09	0.0005	5.7E-09	3.4E-09	2.0E-09	1.6E-09	1.4E-09
Tm-172	63.6 h	M	0.005	8.4E-09	0.0005	5.8E-09	2.9E-09	1.9E-09	1.4E-09	1.1E-09
Tm-173	8.24 h	M	0.005	1.5E-09	0.0005	1.0E-09	5.0E-10	3.3E-10	2.2E-10	1.8E-10
Tm-175	15.2 m	M	0.005	1.6E-10	0.0005	1.1E-10	5.0E-11	3.3E-11	2.2E-11	1.8E-11
<b>Ytterbium</b>										
Yb-162	18.9 m	M	0.005	1.1E-10	0.0005	7.9E-11	3.9E-11	2.5E-11	1.6E-11	1.3E-11
		S	0.005	1.2E-10	0.0005	8.2E-11	4.0E-11	2.6E-11	1.7E-11	1.4E-11
Yb-166	56.7 h	M	0.005	4.7E-09	0.0005	3.5E-09	1.9E-09	1.3E-09	9.0E-10	7.2E-10
		S	0.005	4.9E-09	0.0005	3.7E-09	2.0E-09	1.3E-09	9.6E-10	7.7E-10
Yb-167	17.5 m	M	0.005	4.4E-11	0.0005	3.1E-11	1.6E-11	1.1E-11	7.9E-12	6.5E-12
		S	0.005	4.6E-11	0.0005	3.2E-11	1.7E-11	1.1E-11	8.4E-12	6.9E-12
Yb-169	32.01 d	M	0.005	1.2E-08	0.0005	8.7E-09	5.1E-09	3.7E-09	3.2E-09	2.5E-09
		S	0.005	1.3E-08	0.0005	9.8E-09	5.9E-09	4.2E-09	3.7E-09	3.0E-09
Yb-175	4.19 d	M	0.005	3.5E-09	0.0005	2.5E-09	1.4E-09	9.8E-10	8.3E-10	6.5E-10
		S	0.005	3.7E-09	0.0005	2.7E-09	1.5E-09	1.1E-09	9.2E-10	7.3E-10
Yb-177	1.9 h	M	0.005	5.0E-10	0.0005	3.3E-10	1.6E-10	1.1E-10	7.8E-11	6.4E-11
		S	0.005	5.3E-10	0.0005	3.5E-10	1.7E-10	1.2E-10	8.4E-11	6.9E-11
Yb-178	74 m	M	0.005	5.9E-10	0.0005	3.9E-10	1.8E-10	1.2E-10	8.5E-11	7.0E-11
		S	0.005	6.2E-10	0.0005	4.1E-10	1.9E-10	1.3E-10	9.1E-11	7.5E-11
<b>Lutetium</b>										
Lu-169	34.06 h	M	0.005	2.3E-09	0.0005	1.8E-09	9.5E-10	6.3E-10	4.4E-10	3.5E-10
		S	0.005	2.4E-09	0.0005	1.9E-09	1.0E-09	6.7E-10	4.8E-10	3.8E-10
Lu-170	2.00 d	M	0.005	4.3E-09	0.0005	3.4E-09	1.8E-09	1.2E-09	7.8E-10	6.3E-10
		S	0.005	4.5E-09	0.0005	3.5E-09	1.8E-09	1.2E-09	8.2E-10	6.6E-10
Lu-171	8.22 d	M	0.005	5.0E-09	0.0005	3.7E-09	2.1E-09	1.2E-09	9.8E-10	8.0E-10
		S	0.005	4.7E-09	0.0005	3.9E-09	2.0E-09	1.4E-09	1.1E-09	8.8E-10
Lu-172	6.70 d	M	0.005	8.7E-09	0.0005	6.7E-09	3.8E-09	2.6E-09	1.8E-09	1.4E-09
		S	0.005	9.3E-09	0.0005	7.1E-09	4.0E-09	2.8E-09	2.0E-09	1.6E-09
Lu-173	1.37 y	M	0.005	1.0E-08	0.0005	8.5E-09	5.1E-09	3.2E-09	2.5E-09	2.2E-09
		S	0.005	1.0E-08	0.0005	8.7E-09	5.4E-09	3.6E-09	2.9E-09	2.4E-09
Lu-174	3.31 y	M	0.005	1.7E-08	0.0005	1.5E-08	9.1E-09	5.8E-09	4.7E-09	4.2E-09
		S	0.005	1.6E-08	0.0005	1.4E-08	8.9E-09	5.9E-09	4.9E-09	4.2E-09
Lu-174m	142 d	M	0.005	1.9E-08	0.0005	1.4E-08	8.6E-09	5.4E-09	4.3E-09	3.7E-09
		S	0.005	2.0E-08	0.0005	1.5E-08	9.2E-09	6.1E-09	5.0E-09	4.2E-09
Lu-176	3.60E10 y	M	0.005	1.8E-07	0.0005	1.7E-07	1.1E-07	7.8E-08	7.1E-08	7.0E-08
		S	0.005	1.5E-07	0.0005	1.4E-07	9.4E-08	6.5E-08	5.9E-08	5.6E-08
Lu-176m	3.68 h	M	0.005	8.9E-10	0.0005	5.9E-10	2.8E-10	1.9E-10	1.2E-10	1.1E-10
		S	0.005	9.3E-10	0.0005	6.2E-10	3.0E-10	2.0E-10	1.2E-10	1.2E-10
Lu-177	6.71 d	M	0.005	5.3E-09	0.0005	3.8E-09	2.2E-09	1.6E-09	1.4E-09	1.1E-09
		S	0.005	5.7E-09	0.0005	4.1E-09	2.4E-09	1.7E-09	1.5E-09	1.2E-09
Lu-177m	160.9 d	M	0.005	5.8E-08	0.0005	4.6E-08	2.8E-08	1.9E-08	1.6E-08	1.3E-08
		S	0.005	6.5E-08	0.0005	5.3E-08	3.2E-08	2.3E-08	2.0E-08	1.6E-08
Lu-178	28.4 m	M	0.005	2.3E-10	0.0005	1.5E-10	6.6E-11	4.3E-11	2.9E-11	2.4E-11
		S	0.005	2.4E-10	0.0005	1.5E-10	6.9E-11	4.5E-11	3.0E-11	2.6E-11
Lu-178m	22.7 m	M	0.005	2.6E-10	0.0005	1.8E-10	8.3E-11	5.6E-11	3.8E-11	3.2E-11
		S	0.005	2.7E-10	0.0005	1.9E-10	8.7E-11	5.8E-11	4.0E-11	3.3E-11
Lu-179	4.59 h	M	0.005	9.9E-10	0.0005	6.5E-10	3.0E-10	2.0E-10	1.2E-10	1.1E-10
		S	0.005	1.0E-09	0.0005	6.8E-10	3.2E-10	2.1E-10	1.3E-10	1.2E-10
<b>Hafnium</b>										
Hf-170	16.01 h	F	0.02	1.4E-09	0.002	1.1E-09	5.4E-10	3.4E-10	2.0E-10	1.6E-10
		M	0.02	2.2E-09	0.002	1.7E-09	8.7E-10	5.8E-10	3.9E-10	3.2E-10

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Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Hf-172	1.87 y	F	0.02	1.5E-07	0.002	1.3E-07	7.8E-08	4.9E-08	3.5E-08	3.2E-08
		M	0.02	8.1E-08	0.002	6.9E-08	4.3E-08	2.8E-08	2.3E-08	2.0E-08
Hf-173	24.0 h	F	0.02	6.6E-10	0.002	5.0E-10	2.5E-10	1.5E-10	8.9E-11	7.4E-11
		M	0.02	1.1E-09	0.002	8.2E-10	4.3E-10	2.9E-10	2.0E-10	1.6E-10
Hf-175	70 d	F	0.02	5.4E-09	0.002	4.0E-09	2.1E-09	1.3E-09	8.5E-10	7.2E-10
		M	0.02	5.8E-09	0.002	4.5E-09	2.6E-09	1.8E-09	1.4E-09	1.2E-09
Hf-177m	51.4 m	F	0.02	3.9E-10	0.002	2.8E-10	1.3E-10	8.5E-11	5.2E-11	4.4E-11
		M	0.02	6.5E-10	0.002	4.7E-10	2.3E-10	1.5E-10	1.1E-10	9.0E-11
Hf-178m	31 y	F	0.02	6.2E-07	0.002	5.8E-07	4.0E-07	3.1E-07	2.7E-07	2.6E-07
		M	0.02	2.6E-07	0.002	2.4E-07	1.7E-07	1.3E-07	1.2E-07	1.2E-07
Hf-179m	25.1 d	F	0.02	9.7E-09	0.002	6.8E-09	3.4E-09	2.1E-09	1.2E-09	1.1E-09
		M	0.02	1.7E-08	0.002	1.3E-08	7.6E-09	5.5E-09	4.8E-09	3.8E-09
Hf-180m	5.5 h	F	0.02	5.4E-10	0.002	4.1E-10	2.0E-10	1.3E-10	7.2E-11	5.9E-11
		M	0.02	9.1E-10	0.002	6.8E-10	3.6E-10	2.4E-10	1.7E-10	1.3E-10
Hf-181	42.4 d	F	0.02	1.3E-08	0.002	9.6E-09	4.8E-09	2.8E-09	1.7E-09	1.4E-09
		M	0.02	2.2E-08	0.002	1.7E-08	9.9E-09	7.1E-09	6.3E-09	5.0E-09
Hf-182	9E6 y	F	0.02	6.5E-07	0.002	6.2E-07	4.4E-07	3.6E-07	3.1E-07	3.1E-07
		M	0.02	2.4E-07	0.002	2.3E-07	1.7E-07	1.3E-07	1.3E-07	1.3E-07
Hf-182m	61.5 m	F	0.02	1.9E-10	0.002	1.4E-10	6.6E-11	4.2E-11	2.6E-11	2.1E-11
		M	0.02	3.2E-10	0.002	2.3E-10	1.2E-10	7.8E-11	5.6E-11	4.6E-11
Hf-183	64 m	F	0.02	2.5E-10	0.002	1.7E-10	7.9E-11	4.9E-11	2.8E-11	2.4E-11
		M	0.02	4.4E-10	0.002	3.0E-10	1.5E-10	9.8E-11	7.0E-11	5.7E-11
Hf-184	4.12 h	F	0.02	1.4E-09	0.002	9.6E-10	4.3E-10	2.7E-10	1.4E-10	1.2E-10
		M	0.02	2.6E-09	0.002	1.8E-09	8.9E-10	5.9E-10	4.0E-10	3.3E-10
<b>Tantalum</b>										
Ta-172	36.8 m	M	0.01	2.8E-10	0.001	1.9E-10	9.3E-11	6.0E-11	4.0E-11	3.3E-11
		S	0.01	2.9E-10	0.001	2.0E-10	9.8E-11	6.3E-11	4.2E-11	3.5E-11
Ta-173	3.65 h	M	0.01	8.8E-10	0.001	6.2E-10	3.0E-10	2.0E-10	1.3E-10	1.1E-10
		S	0.01	9.2E-10	0.001	6.5E-10	3.2E-10	2.1E-10	1.4E-10	1.1E-10
Ta-174	1.2 h	M	0.01	3.2E-10	0.001	2.2E-10	1.1E-10	7.1E-11	5.0E-11	4.1E-11
		S	0.01	3.4E-10	0.001	2.3E-10	1.1E-10	7.5E-11	5.3E-11	4.3E-11
Ta-175	10.5 h	M	0.01	9.1E-10	0.001	7.0E-10	3.7E-10	2.4E-10	1.5E-10	1.2E-10
		S	0.01	9.5E-10	0.001	7.3E-10	3.8E-10	2.5E-10	1.6E-10	1.3E-10
Ta-176	8.08 h	M	0.01	1.4E-09	0.001	1.1E-09	5.7E-10	3.7E-10	2.4E-10	1.9E-10
		S	0.01	1.4E-09	0.001	1.1E-09	5.9E-10	3.8E-10	2.5E-10	2.0E-10
Ta-177	56.6 h	M	0.01	6.5E-10	0.001	4.7E-10	2.5E-10	1.5E-10	1.2E-10	9.6E-11
		S	0.01	6.9E-10	0.001	5.0E-10	2.7E-10	1.7E-10	1.3E-10	1.1E-10
Ta-178m	2.2 h	M	0.01	4.4E-10	0.001	3.3E-10	1.7E-10	1.1E-10	8.0E-11	6.5E-11
		S	0.01	4.6E-10	0.001	3.4E-10	1.8E-10	1.2E-10	8.5E-11	6.8E-11
Ta-179	664.9 d	M	0.01	1.2E-09	0.001	9.6E-10	5.5E-10	3.5E-10	2.6E-10	2.2E-10
		S	0.01	2.4E-09	0.001	2.1E-09	1.3E-09	8.3E-10	6.4E-10	5.6E-10
Ta-180	1.0E13 y	M	0.01	2.7E-08	0.001	2.2E-08	1.3E-08	9.2E-09	7.9E-09	6.4E-09
		S	0.01	7.0E-08	0.001	6.5E-08	4.5E-08	3.1E-08	2.8E-08	2.6E-08
Ta-180m	8.1 h	M	0.01	3.1E-10	0.001	2.2E-10	1.1E-10	7.4E-11	4.8E-11	4.4E-11
		S	0.01	3.3E-10	0.001	2.3E-10	1.2E-10	7.9E-11	5.2E-11	4.2E-11
Ta-182	115.0 d	M	0.01	3.2E-08	0.001	2.6E-08	1.5E-08	1.1E-08	9.5E-09	7.6E-09
		S	0.01	4.2E-08	0.001	3.4E-08	2.1E-08	1.5E-08	1.3E-08	1.0E-08
Ta-182m	15.84 m	M	0.01	1.6E-10	0.001	1.1E-10	4.9E-11	3.4E-11	2.4E-11	2.0E-11
		S	0.01	1.6E-10	0.001	1.1E-10	5.2E-11	3.6E-11	2.5E-11	2.1E-11
Ta-183	5.1 d	M	0.01	1.0E-08	0.001	7.4E-09	4.1E-09	2.9E-09	2.4E-09	1.9E-09
		S	0.01	1.1E-08	0.001	8.0E-09	4.5E-09	3.2E-09	2.7E-09	2.1E-09
Ta-184	8.7 h	M	0.01	3.2E-09	0.001	2.3E-09	1.1E-09	7.5E-10	5.0E-10	4.1E-10
		S	0.01	3.4E-09	0.001	2.4E-09	1.2E-09	7.9E-10	5.4E-10	4.3E-10
Ta-185	49 m	M	0.01	3.8E-10	0.001	2.5E-10	1.2E-10	7.7E-11	5.4E-11	4.5E-11
		S	0.01	4.0E-10	0.001	2.6E-10	1.2E-10	8.2E-11	5.7E-11	4.8E-11

Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Ta-186	10.5 m	M	0.01	1.6E-10	0.001	1.1E-10	4.8E-11	3.1E-11	2.0E-11	1.7E-11
		S	0.01	1.6E-10	0.001	1.1E-10	5.0E-11	3.2E-11	2.1E-11	1.8E-11
<b>Tungsten</b>										
W-176	2.3 h	F	0.6	3.3E-10	0.3	2.7E-10	1.4E-10	8.6E-11	5.0E-11	4.1E-11
W-177	135 m	F	0.6	2.0E-10	0.3	1.6E-10	8.2E-11	5.1E-11	3.0E-11	2.4E-11
W-178	21.7 d	F	0.6	7.2E-10	0.3	5.4E-10	2.5E-10	1.6E-10	8.7E-11	7.2E-11
W-179	37.5 m	F	0.6	9.3E-12	0.3	6.8E-12	3.3E-12	2.0E-12	1.2E-12	9.2E-13
W-181	121.2 d	F	0.6	2.5E-10	0.3	1.9E-10	9.2E-11	5.7E-11	3.2E-11	2.7E-11
W-185	75.1 d	F	0.6	1.4E-09	0.3	1.0E-09	4.4E-10	2.7E-10	1.4E-10	1.2E-10
W-187	23.9 h	F	0.6	2.0E-09	0.3	1.5E-09	7.0E-10	4.3E-10	2.3E-10	1.9E-10
W-188	69.4 d	F	0.6	7.1E-09	0.3	5.0E-09	2.2E-09	1.3E-09	6.8E-10	5.7E-10
<b>Rhenium</b>										
Re-177	14.0 m	F	1.0	9.4E-11	0.8	6.7E-11	3.2E-11	1.9E-11	1.2E-11	9.7E-12
		M	1.0	1.1E-10	0.8	7.9E-11	3.9E-11	2.5E-11	1.7E-11	1.4E-11
Re-178	13.2 m	F	1.0	9.9E-11	0.8	6.8E-11	3.1E-11	1.9E-11	1.2E-11	1.0E-11
		M	1.0	1.3E-10	0.8	8.5E-11	3.9E-11	2.6E-11	1.7E-11	1.4E-11
Re-181	20 h	F	1.0	2.0E-09	0.8	1.4E-09	6.7E-10	3.8E-10	2.3E-10	1.8E-10
		M	1.0	2.1E-09	0.8	1.5E-09	7.4E-10	4.6E-10	3.1E-10	2.5E-10
Re-182	64.0 h	F	1.0	6.5E-09	0.8	4.7E-09	2.2E-09	1.3E-09	8.0E-10	6.4E-10
		M	1.0	8.7E-09	0.8	6.3E-09	3.4E-09	2.2E-09	1.5E-09	1.2E-09
Re-182m	12.7 h	F	1.0	1.3E-09	0.8	1.0E-09	4.9E-10	2.8E-10	1.7E-10	1.4E-10
		M	1.0	1.4E-09	0.8	1.1E-09	5.7E-10	3.6E-10	2.5E-10	2.0E-10
Re-184	38.0 d	F	1.0	4.1E-09	0.8	2.9E-09	1.4E-09	8.6E-10	5.4E-10	4.4E-10
		M	1.0	9.1E-09	0.8	6.8E-09	4.0E-09	2.8E-09	2.4E-09	1.9E-09
Re-184m	165 d	F	1.0	6.6E-09	0.8	4.6E-09	2.0E-09	1.2E-09	7.3E-10	5.9E-10
		M	1.0	2.9E-08	0.8	2.2E-08	1.3E-08	9.3E-09	8.1E-09	6.5E-09
Re-186	90.64 h	F	1.0	7.3E-09	0.8	4.7E-09	2.0E-09	1.1E-09	6.6E-10	5.2E-10
		M	1.0	8.7E-09	0.8	5.7E-09	2.8E-09	1.8E-09	1.4E-09	1.1E-09
Re-186m	2.0E5 y	F	1.0	1.2E-08	0.8	7.0E-09	2.9E-09	1.7E-09	1.0E-09	8.3E-10
		M	1.0	5.9E-08	0.8	4.6E-08	2.7E-08	1.8E-08	1.4E-08	1.2E-08
Re-187	5E10 y	F	1.0	2.6E-11	0.8	1.6E-11	6.8E-12	3.8E-12	2.3E-12	1.8E-12
		M	1.0	5.7E-11	0.8	4.1E-11	2.0E-11	1.2E-11	7.5E-12	6.3E-12
Re-188	16.98 h	F	1.0	6.5E-09	0.8	4.4E-09	1.9E-09	1.0E-09	6.1E-10	4.6E-10
		M	1.0	6.0E-09	0.8	4.0E-09	1.8E-09	1.0E-09	6.8E-10	5.4E-10
Re-188m	18.6 m	F	1.0	1.4E-10	0.8	9.1E-11	4.0E-11	2.1E-11	1.3E-11	1.0E-11
		M	1.0	1.3E-10	0.8	8.6E-11	4.0E-11	2.7E-11	1.6E-11	1.3E-11
Re-189	24.3 h	F	1.0	3.7E-09	0.8	2.5E-09	1.1E-09	5.8E-10	3.5E-10	2.7E-10
		M	1.0	3.9E-09	0.8	2.6E-09	1.2E-09	7.6E-10	5.5E-10	4.3E-10
<b>Osmium</b>										
Os-180	22 m	F	0.02	7.1E-11	0.01	5.3E-11	2.6E-11	1.6E-11	1.0E-11	8.2E-12
		M	0.02	1.1E-10	0.01	7.9E-11	3.9E-11	2.5E-11	1.7E-11	1.4E-11
		S	0.02	1.1E-10	0.01	8.2E-11	4.1E-11	2.6E-11	1.8E-11	1.5E-11
Os-181	105 m	F	0.02	3.0E-10	0.01	2.3E-10	1.1E-10	7.0E-11	4.1E-11	3.3E-11
		M	0.02	4.5E-10	0.01	3.4E-10	1.8E-10	1.1E-10	7.6E-11	6.2E-11
		S	0.02	4.7E-10	0.01	3.6E-10	1.8E-10	1.2E-10	8.1E-11	6.5E-11
Os-182	22 h	F	0.02	1.6E-09	0.01	1.2E-09	6.0E-10	3.7E-10	2.1E-10	1.7E-10
		M	0.02	2.5E-09	0.01	1.9E-09	1.0E-09	6.6E-10	4.5E-10	3.6E-10
		S	0.02	2.6E-09	0.01	2.0E-09	1.0E-09	6.9E-10	4.8E-10	3.8E-10
Os-185	94 d	F	0.02	7.2E-09	0.01	5.8E-09	3.1E-09	1.9E-09	1.2E-09	1.1E-09
		M	0.02	6.6E-09	0.01	5.4E-09	2.9E-09	2.0E-09	1.5E-09	1.3E-09
		S	0.02	7.0E-09	0.01	5.8E-09	3.6E-09	2.4E-09	1.9E-09	1.6E-09
Os-189m	6.0 h	F	0.02	3.8E-11	0.01	2.8E-11	1.2E-11	7.0E-12	3.5E-12	2.5E-12
		M	0.02	6.5E-11	0.01	4.1E-11	1.8E-11	1.1E-11	6.0E-12	5.0E-12
		S	0.02	6.8E-11	0.01	4.3E-11	1.9E-11	1.2E-11	6.3E-12	5.3E-12

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Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)	$\geq 1$ year	1 year	5 years	10 years	15 years	Adult
Os-191	15.4 d	F	0.02	2.8E-09	0.01	1.9E-09	8.5E-10	5.3E-10	3.0E-10	2.5E-10
		M	0.02	8.0E-09	0.01	5.8E-09	3.4E-09	2.4E-09	2.0E-09	1.7E-09
		S	0.02	9.0E-09	0.01	6.5E-09	3.9E-09	2.7E-09	2.3E-09	1.9E-09
Os-191m	13.03 h	F	0.02	3.0E-10	0.01	2.0E-10	8.8E-11	5.4E-11	2.9E-11	2.4E-11
		M	0.02	7.8E-10	0.01	5.4E-10	3.1E-10	2.1E-10	1.7E-10	1.4E-10
		S	0.02	8.5E-10	0.01	6.0E-10	3.4E-10	2.4E-10	2.0E-10	1.6E-10
Os-193	30.0 h	F	0.02	1.9E-09	0.01	1.2E-09	5.2E-10	3.2E-10	1.8E-10	1.6E-10
		M	0.02	3.8E-09	0.01	2.6E-09	1.3E-09	8.4E-10	5.9E-10	4.8E-10
		S	0.02	4.0E-09	0.01	2.7E-09	1.3E-09	9.0E-10	6.4E-10	5.2E-10
Os-194	6.0 y	F	0.02	8.7E-08	0.01	6.8E-08	3.4E-08	2.1E-08	1.3E-08	1.1E-08
		M	0.02	9.9E-08	0.01	8.3E-08	4.8E-08	3.1E-08	2.4E-08	2.1E-08
		S	0.02	2.6E-07	0.01	2.4E-07	1.6E-07	1.1E-07	8.8E-08	8.5E-08
<b>Iridium</b>										
Ir-182	15 m	F	0.02	1.4E-10	0.01	9.8E-11	4.5E-11	2.8E-11	1.7E-11	1.4E-11
		M	0.02	2.1E-10	0.01	1.4E-10	6.7E-11	4.3E-11	2.8E-11	2.3E-11
		S	0.02	2.2E-10	0.01	1.5E-10	6.9E-11	4.4E-11	2.9E-11	2.4E-11
Ir-184	3.02 h	F	0.02	5.7E-10	0.01	4.4E-10	2.1E-10	1.3E-10	7.6E-11	6.2E-11
		M	0.02	8.6E-10	0.01	6.4E-10	3.2E-10	2.1E-10	1.4E-10	1.1E-10
		S	0.02	8.9E-10	0.01	6.6E-10	3.4E-10	2.2E-10	1.4E-10	1.2E-10
Ir-185	14.0 h	F	0.02	8.0E-10	0.01	6.1E-10	2.9E-10	1.8E-10	1.0E-10	8.2E-11
		M	0.02	1.3E-09	0.01	9.7E-10	4.9E-10	3.2E-10	2.2E-10	1.8E-10
		S	0.02	1.4E-09	0.01	1.0E-09	5.2E-10	3.4E-10	2.3E-10	1.9E-10
Ir-186	15.8 h	F	0.02	1.5E-09	0.01	1.2E-09	5.9E-10	3.6E-10	2.1E-10	1.7E-10
		M	0.02	2.2E-09	0.01	1.7E-09	8.8E-10	5.8E-10	3.8E-10	3.1E-10
		S	0.02	2.3E-09	0.01	1.8E-09	9.2E-10	6.0E-10	4.0E-10	3.2E-10
Ir-186m	1.75 h	F	0.02	2.1E-10	0.01	1.6E-10	7.7E-11	4.8E-11	2.8E-11	2.3E-11
		M	0.02	3.3E-10	0.01	2.4E-10	1.2E-10	7.7E-11	5.1E-11	4.2E-11
		S	0.02	3.4E-10	0.01	2.5E-10	1.2E-10	8.1E-11	5.4E-11	4.4E-11
Ir-187	10.5 h	F	0.02	3.6E-10	0.01	2.8E-10	1.4E-10	8.2E-11	4.6E-11	3.7E-11
		M	0.02	5.8E-10	0.01	4.3E-10	2.2E-10	1.4E-10	9.2E-11	7.4E-11
		S	0.02	6.0E-10	0.01	4.5E-10	2.3E-10	1.5E-10	9.7E-11	7.9E-11
Ir-188	41.5 h	F	0.02	2.0E-09	0.01	1.6E-09	8.0E-10	5.0E-10	2.9E-10	2.4E-10
		M	0.02	2.7E-09	0.01	2.1E-09	1.1E-09	7.5E-10	5.0E-10	4.0E-10
		S	0.02	2.8E-09	0.01	2.2E-09	1.2E-09	7.8E-10	5.2E-10	4.2E-10
Ir-189	13.3 d	F	0.02	1.2E-09	0.01	8.2E-10	3.8E-10	2.4E-10	1.3E-10	1.1E-10
		M	0.02	2.7E-09	0.01	1.9E-09	1.1E-09	7.7E-10	6.4E-10	5.2E-10
		S	0.02	3.0E-09	0.01	2.2E-09	1.3E-09	8.7E-10	7.3E-10	6.0E-10
Ir-190	12.1 d	F	0.02	6.2E-09	0.01	4.7E-09	2.4E-09	1.5E-09	9.1E-10	7.7E-10
		M	0.02	1.1E-08	0.01	8.6E-09	4.4E-09	3.1E-09	2.7E-09	2.1E-09
		S	0.02	1.1E-08	0.01	9.4E-09	4.8E-09	3.5E-09	3.0E-09	2.4E-09
Ir-190n	3.1 h	F	0.02	4.2E-10	0.01	3.4E-10	1.7E-10	1.0E-10	6.0E-11	4.9E-11
		M	0.02	6.0E-10	0.01	4.7E-10	2.4E-10	1.5E-10	9.9E-11	7.9E-11
		S	0.02	6.2E-10	0.01	4.8E-10	2.5E-10	1.6E-10	1.0E-10	8.3E-11
Ir-190m	1.2 h	F	0.02	3.2E-11	0.01	2.4E-11	1.2E-11	7.2E-12	4.3E-12	3.6E-12
		M	0.02	5.7E-11	0.01	4.2E-11	2.0E-11	1.4E-11	1.2E-11	9.3E-12
		S	0.02	5.5E-11	0.01	4.5E-11	2.2E-11	1.6E-11	1.3E-11	1.0E-11
Ir-192	74.02 d	F	0.02	1.5E-08	0.01	1.1E-08	5.7E-09	3.3E-09	2.1E-09	1.8E-09
		M	0.02	2.3E-08	0.01	1.8E-08	1.1E-08	7.6E-09	6.4E-09	5.2E-09
		S	0.02	2.8E-08	0.01	2.2E-08	1.3E-08	9.5E-09	8.1E-09	6.6E-09
Ir-192m	241 y	F	0.02	2.7E-08	0.01	2.3E-08	1.4E-08	8.2E-09	5.4E-09	4.8E-09
		M	0.02	2.3E-08	0.01	2.1E-08	1.3E-08	8.4E-09	6.6E-09	5.8E-09
		S	0.02	9.2E-08	0.01	9.1E-08	6.5E-08	4.5E-08	4.0E-08	3.9E-08
Ir-193m	11.9 d	F	0.02	1.2E-09	0.01	8.4E-10	3.7E-10	2.2E-10	1.2E-10	1.0E-10
		M	0.02	4.8E-09	0.01	3.5E-09	2.1E-09	1.5E-09	1.4E-09	1.1E-09
		S	0.02	5.4E-09	0.01	4.0E-09	2.4E-09	1.8E-09	1.6E-09	1.3E-09
Ir-194	19.15 h	F	0.02	2.9E-09	0.01	1.9E-09	8.1E-10	4.9E-10	2.5E-10	2.1E-10
		M	0.02	5.3E-09	0.01	3.5E-09	1.6E-09	1.0E-09	6.3E-10	5.2E-10



Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Ir-194m	171 d	S	0.02	5.5E-09	0.01	3.7E-09	1.7E-09	1.1E-09	6.7E-10	5.6E-10
		F	0.02	3.4E-08	0.01	2.7E-08	1.4E-08	9.5E-09	6.2E-09	5.4E-09
		M	0.02	3.9E-08	0.01	3.2E-08	1.9E-08	1.3E-08	1.1E-08	9.0E-09
Ir-195	2.5 h	S	0.02	5.0E-08	0.01	4.2E-08	2.6E-08	1.8E-08	1.5E-08	1.3E-08
		F	0.02	2.9E-10	0.01	1.9E-10	8.1E-11	5.1E-11	2.9E-11	2.4E-11
		M	0.02	5.4E-10	0.01	3.6E-10	1.7E-10	1.1E-10	8.1E-11	6.7E-11
Ir-195m	3.8 h	S	0.02	5.7E-10	0.01	3.8E-10	1.8E-10	1.2E-10	8.7E-11	7.1E-11
		F	0.02	6.9E-10	0.01	4.8E-10	2.1E-10	1.3E-10	7.2E-11	6.0E-11
		M	0.02	1.2E-09	0.01	8.6E-10	4.2E-10	2.7E-10	1.9E-10	1.6E-10
		S	0.02	1.3E-09	0.01	9.0E-10	4.4E-10	2.9E-10	2.0E-10	1.7E-10
<b>Platinum</b>										
Pt-186	2.0 h	F	0.02	3.0E-10	0.01	2.4E-10	1.2E-10	7.2E-11	4.1E-11	3.3E-11
Pt-188	10.2 d	F	0.02	3.6E-09	0.01	2.7E-09	1.3E-09	8.4E-10	5.0E-10	4.2E-10
Pt-189	10.87 h	F	0.02	3.8E-10	0.01	2.9E-10	1.4E-10	8.4E-11	4.7E-11	3.8E-11
Pt-191	2.8 d	F	0.02	1.1E-09	0.01	7.9E-10	3.7E-10	2.3E-10	1.3E-10	1.1E-10
Pt-193	50 y	F	0.02	2.2E-10	0.01	1.6E-10	7.2E-11	4.3E-11	2.5E-11	2.1E-11
Pt-193m	4.33 d	F	0.02	1.6E-09	0.01	1.0E-09	4.5E-10	2.7E-10	1.4E-10	1.2E-10
Pt-195m	4.02 d	F	0.02	2.2E-09	0.01	1.5E-09	6.4E-10	3.9E-10	2.1E-10	1.8E-10
Pt-197	18.3 h	F	0.02	1.1E-09	0.01	7.3E-10	3.1E-10	1.9E-10	1.0E-10	8.5E-11
Pt-197m	94.4 m	F	0.02	2.8E-10	0.01	1.8E-10	7.9E-11	4.9E-11	2.8E-11	2.4E-11
Pt-199	30.8 m	F	0.02	1.3E-10	0.01	8.3E-11	3.6E-11	2.3E-11	1.4E-11	1.2E-11
Pt-200	12.5 h	F	0.02	2.6E-09	0.01	1.7E-09	7.2E-10	5.1E-10	2.6E-10	2.2E-10
<b>Gold</b>										
Au-193	17.65 h	F	0.2	3.7E-10	0.1	2.8E-10	1.3E-10	7.9E-11	4.3E-11	3.6E-11
		M	0.2	7.5E-10	0.1	5.6E-10	2.8E-10	1.9E-10	1.4E-10	1.1E-10
		S	0.2	7.9E-10	0.1	5.9E-10	3.0E-10	2.0E-10	1.5E-10	1.2E-10
Au-194	39.5 h	F	0.2	1.2E-09	0.1	9.6E-10	4.9E-10	3.0E-10	1.8E-10	1.4E-10
		M	0.2	1.7E-09	0.1	1.4E-09	7.1E-10	4.6E-10	2.9E-10	2.3E-10
		S	0.2	1.7E-09	0.1	1.4E-09	7.3E-10	4.7E-10	3.0E-10	2.4E-10
Au-195	183 d	F	0.2	7.2E-10	0.1	5.3E-10	2.5E-10	1.5E-10	8.1E-11	6.6E-11
		M	0.2	5.2E-09	0.1	4.1E-09	2.4E-09	1.6E-09	1.4E-09	1.1E-09
		S	0.2	8.1E-09	0.1	6.6E-09	3.9E-09	2.6E-09	2.1E-09	1.7E-09
Au-198	2.696 d	F	0.2	2.4E-09	0.1	1.7E-09	7.6E-10	4.7E-10	2.5E-10	2.1E-10
		M	0.2	5.0E-09	0.1	4.1E-09	1.9E-09	1.3E-09	9.7E-10	7.8E-10
		S	0.2	5.4E-09	0.1	4.4E-09	2.0E-09	1.4E-09	1.1E-09	8.6E-10
Au-198m	2.30 d	F	0.2	3.3E-09	0.1	2.4E-09	1.1E-09	6.9E-10	3.7E-10	3.2E-10
		M	0.2	8.7E-09	0.1	6.5E-09	3.6E-09	2.6E-09	2.2E-09	1.8E-09
		S	0.2	9.5E-09	0.1	7.1E-09	4.0E-09	2.9E-09	2.5E-09	2.0E-09
Au-199	3.139 d	F	0.2	1.1E-09	0.1	7.9E-10	3.5E-10	2.2E-10	1.1E-10	9.8E-11
		M	0.2	3.4E-09	0.1	2.5E-09	1.4E-09	1.0E-09	9.0E-10	7.1E-10
		S	0.2	3.8E-09	0.1	2.8E-09	1.6E-09	1.2E-09	1.0E-09	7.9E-10
Au-200	48.4 m	F	0.2	1.9E-10	0.1	1.2E-10	5.2E-11	3.2E-11	1.9E-11	1.6E-11
		M	0.2	3.2E-10	0.1	2.1E-10	9.3E-11	6.0E-11	4.0E-11	3.3E-11
		S	0.2	3.4E-10	0.1	2.1E-10	9.8E-11	6.3E-11	4.2E-11	3.5E-11
Au-200m	18.7 h	F	0.2	2.7E-09	0.1	2.1E-09	1.0E-09	6.4E-10	3.6E-10	2.9E-10
		M	0.2	4.8E-09	0.1	3.7E-09	1.9E-09	1.2E-09	8.4E-10	6.8E-10
		S	0.2	5.1E-09	0.1	3.9E-09	2.0E-09	1.3E-09	8.9E-10	7.2E-10
Au-201	26.4 m	F	0.2	9.0E-11	0.1	5.7E-11	2.5E-11	1.6E-11	1.0E-11	8.7E-12
		M	0.2	1.5E-10	0.1	9.6E-11	4.3E-11	2.9E-11	3.6E-11	1.7E-11
		S	0.2	1.5E-10	0.1	1.0E-10	4.5E-11	3.0E-11	2.1E-11	1.7E-11
<b>Mercury</b>										
Hg-193	3.5 h	F <sup>S</sup>	0.04	2.7E-10	0.02	2.0E-10	8.9E-11	5.5E-11	3.1E-11	2.6E-11
		M <sup>S</sup>	0.04	5.3E-10	0.02	3.8E-10	1.9E-10	1.3E-10	9.2E-11	7.5E-11
		F <sup>I</sup>	0.8	2.2E-10	0.4	1.8E-10	8.2E-11	5.0E-11	2.9E-11	2.4E-11

(continued on next page)

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Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Hg-193m	11.1 h	F <sup>§</sup>	0.04	1.1E-09	0.02	8.5E-10	4.1E-10	2.5E-10	1.4E-10	1.1E-10
		M <sup>§</sup>	0.04	1.9E-09	0.02	1.4E-09	7.2E-10	4.7E-10	3.2E-10	2.6E-10
		F <sup>¶</sup>	0.8	8.4E-10	0.4	7.6E-10	3.7E-10	2.2E-10	1.3E-10	1.0E-10
Hg-194	260 y	F <sup>¶</sup>	0.04	3.2E-08	0.02	2.9E-08	2.0E-08	1.6E-08	1.4E-08	1.3E-08
		M <sup>§</sup>	0.04	2.1E-08	0.02	1.9E-08	1.3E-08	1.0E-08	8.9E-09	8.3E-09
		F <sup>¶</sup>	0.8	4.9E-08	0.4	3.7E-08	2.4E-08	1.9E-08	1.5E-08	1.4E-08
Hg-195	9.9 h	F <sup>¶</sup>	0.04	2.7E-10	0.02	2.0E-10	9.5E-11	5.7E-11	3.1E-11	2.5E-11
		M <sup>§</sup>	0.04	5.3E-10	0.02	3.9E-10	2.0E-10	1.3E-10	9.0E-11	7.3E-11
		F <sup>¶</sup>	0.8	2.0E-10	0.4	1.8E-10	8.5E-11	5.1E-11	2.8E-11	2.3E-11
Hg-195m	41.6 h	F <sup>¶</sup>	0.04	1.6E-09	0.02	1.1E-09	5.1E-10	3.1E-10	1.7E-10	1.4E-10
		M <sup>§</sup>	0.04	3.7E-09	0.02	2.6E-09	1.4E-09	8.5E-10	6.7E-10	5.3E-10
		F <sup>¶</sup>	0.8	1.1E-09	0.4	9.7E-10	4.4E-10	2.7E-10	1.4E-10	1.2E-10
Hg-197	64.1 h	F <sup>¶</sup>	0.04	6.8E-10	0.02	4.7E-10	2.1E-10	1.3E-10	6.8E-11	5.6E-11
		M <sup>§</sup>	0.04	1.7E-09	0.02	1.2E-09	6.6E-10	4.6E-10	3.8E-10	3.0E-10
		F <sup>¶</sup>	0.8	4.7E-10	0.4	4.0E-10	1.8E-10	1.1E-10	5.8E-11	4.7E-11
Hg-197m	23.8 h	F <sup>¶</sup>	0.04	1.4E-09	0.02	9.3E-10	4.0E-10	2.5E-10	1.3E-10	1.1E-10
		M <sup>§</sup>	0.04	3.5E-09	0.02	2.5E-09	1.1E-09	8.2E-10	6.7E-10	5.3E-10
		F <sup>¶</sup>	0.8	9.3E-10	0.4	7.8E-10	3.4E-10	2.1E-10	1.1E-10	9.6E-11
Hg-199m	42.6 m	F <sup>¶</sup>	0.04	1.4E-10	0.02	9.6E-11	4.2E-11	2.7E-11	1.7E-11	1.5E-11
		M <sup>§</sup>	0.04	2.5E-10	0.02	1.7E-10	7.9E-11	5.4E-11	3.8E-11	3.2E-11
		F <sup>¶</sup>	0.8	1.4E-10	0.4	9.6E-11	4.2E-11	2.7E-11	1.7E-11	1.5E-11
Hg-203	46.60 d	F <sup>¶</sup>	0.04	4.2E-09	0.02	2.9E-09	1.4E-09	9.0E-10	5.5E-10	4.6E-10
		M <sup>§</sup>	0.04	1.0E-08	0.02	7.9E-09	4.7E-09	3.4E-09	3.0E-09	2.4E-09
		F <sup>¶</sup>	0.8	5.7E-09	0.4	3.7E-09	1.7E-09	1.1E-09	6.6E-10	5.6E-10
<b>Thallium</b>										
Tl-194	33 m	F	1.0	3.6E-11	1.0	3.0E-11	1.5E-11	9.2E-12	5.5E-12	4.4E-12
Tl-194m	32.8 m	F	1.0	1.7E-10	1.0	1.2E-10	6.1E-11	3.8E-11	2.3E-11	1.9E-11
Tl-195	1.16 h	F	1.0	1.3E-10	1.0	1.0E-10	5.3E-11	3.2E-11	1.9E-11	1.5E-11
Tl-197	2.84 h	F	1.0	1.3E-10	1.0	9.7E-11	4.7E-11	2.9E-11	1.7E-11	1.4E-11
Tl-198	5.3 h	F	1.0	4.7E-10	1.0	4.0E-10	2.1E-10	1.3E-10	7.5E-11	6.0E-11
Tl-198m	1.87 h	F	1.0	3.2E-10	1.0	2.5E-10	1.2E-10	7.5E-11	4.5E-11	3.7E-11
Tl-199	7.42 h	F	1.0	1.7E-10	1.0	1.3E-10	6.4E-11	3.9E-11	2.3E-11	1.9E-11
Tl-200	26.1 h	F	1.0	1.0E-09	1.0	8.7E-10	4.6E-10	2.8E-10	1.6E-10	1.3E-10
Tl-201	3.044 d	F	1.0	4.5E-10	1.0	3.3E-10	1.5E-10	9.4E-11	5.4E-11	4.4E-11
Tl-202	12.23 d	F	1.0	1.5E-09	1.0	1.2E-09	5.9E-10	3.8E-10	2.3E-10	1.9E-10
Tl-204	3.779 y	F	1.0	5.0E-09	1.0	3.3E-09	1.5E-09	8.8E-10	4.7E-10	3.9E-10
<b>Lead</b>										
Pb-195m	15.8 m	F	0.6	1.3E-10	0.4 <sup>‡</sup>	1.0E-10	4.9E-11	3.1E-11	1.9E-11	1.6E-11
		M	0.2	2.0E-10	0.1	1.5E-10	7.1E-11	4.6E-11	3.1E-11	2.5E-11
		S	0.02	2.1E-10	0.01	1.5E-10	7.4E-11	4.8E-11	3.2E-11	2.7E-11
Pb-198	2.4 h	F	0.6	3.4E-10	0.4 <sup>‡</sup>	2.9E-10	1.5E-10	8.9E-11	5.2E-11	4.3E-11
		M	0.2	5.0E-10	0.1	4.0E-10	2.1E-10	1.3E-10	8.3E-11	6.6E-11
		S	0.02	5.4E-10	0.01	4.2E-10	2.2E-10	1.4E-10	8.7E-11	7.0E-11
Pb-199	90 m	F	0.6	1.9E-10	0.4 <sup>‡</sup>	1.6E-10	8.2E-11	4.9E-11	2.9E-11	2.3E-11
		M	0.2	2.8E-10	0.1	2.2E-10	1.1E-10	7.1E-11	4.5E-11	3.6E-11
		S	0.02	2.9E-10	0.01	2.3E-10	1.2E-10	7.4E-11	4.7E-11	3.7E-11
Pb-200	21.5 h	F	0.6	1.1E-09	0.4 <sup>‡</sup>	9.3E-10	4.6E-10	2.8E-10	1.6E-10	1.4E-10
		M	0.2	2.2E-09	0.1	1.7E-09	8.6E-10	5.7E-10	4.1E-10	3.3E-10
		S	0.02	2.4E-09	0.01	1.8E-09	9.2E-10	6.2E-10	4.4E-10	3.5E-10
Pb-201	9.4 h	F	0.6	4.8E-10	0.4 <sup>‡</sup>	4.1E-10	2.0E-10	1.2E-10	7.1E-11	6.0E-11
		M	0.2	8.0E-10	0.1	6.4E-10	3.3E-10	2.1E-10	1.4E-10	1.1E-10
		S	0.02	8.8E-10	0.01	6.7E-10	3.5E-10	2.2E-10	1.5E-10	1.2E-10
Pb-202	3E5 y	F	0.6	1.9E-08	0.4 <sup>‡</sup>	1.3E-08	8.9E-09	1.3E-08	1.8E-08	1.1E-08
		M	0.2	1.2E-08	0.1	8.9E-09	6.2E-09	6.7E-09	8.7E-09	6.3E-09
		S	0.02	2.8E-08	0.01	2.8E-08	2.0E-08	1.4E-08	1.3E-08	1.2E-08

¶ Organic.

§ Inorganic.

Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Pb-202m	3.62 h	F	0.6	4.7E-10	0.4 <sup>‡</sup>	4.0E-10	2.1E-10	1.3E-10	7.5E-11	6.2E-11
		M	0.2	6.9E-10	0.1	5.6E-10	2.9E-10	1.9E-10	1.2E-10	9.5E-11
		S	0.02	7.3E-10	0.01	5.8E-10	3.0E-10	1.9E-10	1.3E-10	1.0E-10
Pb-203	52.05 h	F	0.6	7.2E-10	0.4 <sup>‡</sup>	5.8E-10	2.8E-10	1.7E-10	9.9E-11	8.5E-11
		M	0.2	1.3E-09	0.1	1.0E-09	5.4E-10	3.6E-10	2.5E-10	2.0E-10
		S	0.02	1.5E-09	0.01	1.1E-09	5.8E-10	3.8E-10	2.8E-10	2.2E-10
Pb-205	1.43E7 y	F	0.6	1.1E-09	0.4 <sup>‡</sup>	6.9E-10	4.0E-10	4.1E-10	4.3E-10	3.3E-10
		M	0.2	1.1E-09	0.1	7.7E-10	4.3E-10	3.2E-10	2.9E-10	2.5E-10
		S	0.02	2.9E-09	0.01	2.7E-09	1.7E-09	1.1E-09	9.2E-10	8.5E-10
Pb-209	3.253 h	F	0.6	1.8E-10	0.4 <sup>‡</sup>	1.2E-10	5.3E-11	3.4E-11	1.9E-11	1.7E-11
		M	0.2	4.0E-10	0.1	2.7E-10	1.3E-10	9.2E-11	6.9E-11	5.6E-11
		S	0.02	4.4E-10	0.01	2.9E-10	1.4E-10	9.9E-11	7.5E-11	6.1E-11
Pb-210	22.3 y	F	0.6	4.7E-06	0.4 <sup>‡</sup>	2.9E-06	1.5E-06	1.4E-06	1.3E-06	9.0E-07
		M	0.2	5.0E-06	0.1	3.7E-06	2.2E-06	1.5E-06	1.3E-06	1.1E-06
		S	0.02	1.8E-05	0.01	1.8E-05	1.1E-05	7.2E-06	5.9E-06	5.6E-06
Pb-211	36.1 m	F	0.6	2.5E-08	0.4 <sup>‡</sup>	1.7E-08	8.7E-09	6.1E-09	4.6E-09	3.9E-09
		M	0.2	6.2E-08	0.1	4.5E-08	2.5E-08	1.9E-08	1.4E-08	1.1E-08
		S	0.02	6.6E-08	0.01	4.8E-08	2.7E-08	2.0E-08	1.5E-08	1.2E-08
Pb-212	10.64 h	F	0.6	1.9E-07	0.4 <sup>‡</sup>	1.2E-07	5.4E-08	3.5E-08	2.0E-08	1.8E-08
		M	0.2	6.2E-07	0.1	4.6E-07	3.0E-07	2.2E-07	2.2E-07	1.7E-07
		S	0.02	6.7E-07	0.01	5.0E-07	3.3E-07	2.5E-07	2.4E-07	1.9E-07
Pb-214	26.8 m	F	0.6	2.2E-08	0.4 <sup>‡</sup>	1.5E-08	6.9E-09	4.8E-09	3.3E-09	2.8E-09
		M	0.2	6.4E-08	0.1	4.6E-08	2.6E-08	1.9E-08	1.4E-08	1.4E-08
		S	0.02	6.9E-08	0.01	5.0E-08	2.8E-08	2.1E-08	1.5E-08	1.5E-08
<b>Bismuth</b>										
Bi-200	36.4 m	F	0.1	1.9E-10	0.05	1.5E-10	7.4E-11	4.5E-11	2.7E-11	2.2E-11
		M	0.1	2.5E-10	0.05	1.9E-10	9.9E-11	6.3E-11	4.1E-11	3.3E-11
Bi-201	108 m	F	0.1	4.0E-10	0.05	3.1E-10	1.5E-10	9.3E-11	5.4E-11	4.4E-11
		M	0.1	5.5E-10	0.05	4.1E-10	2.0E-10	1.3E-10	8.3E-11	6.6E-11
Bi-202	1.67 h	F	0.1	3.4E-10	0.05	2.8E-10	1.5E-10	9.0E-11	5.3E-11	4.3E-11
		M	0.1	4.2E-10	0.05	3.4E-10	1.8E-10	1.1E-10	6.9E-11	5.5E-11
Bi-203	11.76 h	F	0.1	1.5E-09	0.05	1.2E-09	6.4E-10	4.0E-10	2.3E-10	1.9E-10
		M	0.1	2.0E-09	0.05	1.6E-09	8.2E-10	5.3E-10	3.3E-10	2.6E-10
Bi-205	15.31 d	F	0.1	3.0E-09	0.05	2.4E-09	1.3E-09	8.0E-10	4.7E-10	3.8E-10
		M	0.1	5.5E-09	0.05	4.4E-09	2.5E-09	1.6E-09	1.2E-09	9.3E-10
Bi-206	6.243 d	F	0.1	6.1E-09	0.05	4.8E-09	2.5E-09	1.6E-09	9.1E-10	7.4E-10
		M	0.1	1.0E-08	0.05	8.0E-09	4.4E-09	2.9E-09	2.1E-09	1.7E-09
Bi-207	38 y	F	0.1	4.3E-09	0.05	3.3E-09	1.7E-09	1.0E-09	6.0E-10	4.9E-10
		M	0.1	2.3E-08	0.05	2.0E-08	1.2E-08	8.2E-09	6.5E-09	5.6E-09
Bi-210	5.012 d	F	0.1	1.1E-08	0.05	6.9E-09	3.2E-09	2.1E-09	1.3E-09	1.1E-09
		M	0.1	3.9E-07	0.05	3.0E-07	1.9E-07	1.3E-07	1.1E-07	9.3E-08
Bi-210m	3.0E6 y	F	0.1	4.1E-07	0.05	2.6E-07	1.3E-07	8.3E-08	5.6E-08	4.6E-08
		M	0.1	1.5E-05	0.05	1.1E-05	7.0E-06	4.8E-06	4.1E-06	3.4E-06
Bi-212	60.55 m	F	0.1	6.5E-08	0.05	4.5E-08	2.1E-08	1.5E-08	1.0E-08	9.1E-09
		M	0.1	1.6E-07	0.05	1.1E-07	6.0E-08	4.4E-08	3.8E-08	3.1E-08
Bi-213	45.65 m	F	0.1	7.7E-08	0.05	5.3E-08	2.5E-08	1.7E-08	1.2E-08	1.0E-08
		M	0.1	1.6E-07	0.05	1.2E-07	6.0E-08	4.4E-08	3.6E-08	3.0E-08
Bi-214	19.9 m	F	0.1	5.0E-08	0.05	3.5E-08	1.6E-08	1.1E-08	8.2E-09	7.1E-09
		M	0.1	8.7E-08	0.05	6.1E-08	3.1E-08	2.2E-08	1.7E-08	1.4E-08
<b>Polonium</b>										
Po-203	36.7 m	F	0.2	1.9E-10	0.1	1.5E-10	7.7E-11	4.7E-11	2.8E-11	2.3E-11
		M	0.2	2.7E-10	0.1	2.1E-10	1.1E-10	6.7E-11	4.3E-11	3.5E-11
		S	0.02	2.8E-10	0.01	2.2E-10	1.1E-10	7.0E-11	4.5E-11	3.6E-11
Po-205	1.80 h	F	0.2	2.6E-10	0.1	2.1E-10	1.1E-10	6.6E-11	4.1E-11	3.3E-11
		M	0.2	4.0E-10	0.1	3.1E-10	1.7E-10	1.1E-10	8.1E-11	6.5E-11
		S	0.02	4.2E-10	0.01	3.2E-10	1.8E-10	1.2E-10	8.5E-11	6.9E-11

(continued on next page)

‡ The f<sub>1</sub> value for Type F for an adult is 0.2.

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Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Po-207	350 m	F	0.2	4.8E-10	0.1	4.0E-10	2.1E-10	1.3E-10	7.3E-11	5.8E-11
		M	0.2	6.2E-10	0.1	5.1E-10	2.6E-10	1.6E-10	9.9E-11	7.8E-11
		S	0.02	6.6E-10	0.01	5.3E-10	2.7E-10	1.7E-10	1.0E-10	8.2E-11
Po-210	138.38 d	F	0.2	7.4E-06	0.1	4.8E-06	2.2E-06	1.3E-06	7.7E-07	6.1E-07
		M	0.2	1.5E-05	0.1	1.1E-05	6.7E-06	4.6E-06	4.0E-06	3.3E-06
		S	0.02	1.8E-05	0.01	1.4E-05	8.6E-06	5.9E-06	5.1E-06	4.3E-06
<b>Astatine</b>										
At-207	1.80 h	F	1.0	2.4E-09	1.0	1.7E-09	8.9E-10	5.9E-10	4.0E-10	3.3E-10
		M	1.0	9.2E-09	1.0	6.7E-09	4.3E-09	3.1E-09	2.9E-09	2.3E-09
At-211	7.214 h	F	1.0	1.4E-07	1.0	9.7E-08	4.3E-08	2.8E-08	1.7E-08	1.6E-08
		M	1.0	5.2E-07	1.0	3.7E-07	1.9E-07	1.4E-07	1.3E-07	1.1E-07
<b>Francium</b>										
Fr-222	14.4 m	F	1.0	9.1E-08	1.0	6.3E-08	3.0E-08	2.1E-08	1.6E-08	1.4E-08
Fr-223	21.8 m	F	1.0	1.1E-08	1.0	7.3E-09	3.2E-09	1.9E-09	1.0E-09	8.9E-10
<b>Radium</b>										
Ra-223	11.434 d	F	0.6	3.0E-06	0.3 <sup>‡</sup>	1.0E-06	4.9E-07	4.0E-07	3.3E-07	1.2E-07
		M	0.2	2.8E-05	0.1	2.1E-05	1.3E-05	9.9E-06	9.4E-06	7.4E-06
		S	0.02	3.2E-05	0.01	2.4E-05	1.5E-05	1.1E-05	1.1E-05	8.7E-06
Ra-224	3.66 d	F	0.6	1.5E-06	0.3 <sup>‡</sup>	6.0E-07	2.9E-07	2.2E-07	1.7E-07	7.5E-08
		M	0.2	1.1E-05	0.1	8.2E-06	5.3E-06	3.9E-06	3.7E-06	3.0E-06
		S	0.02	1.2E-05	0.01	9.2E-06	5.9E-06	4.4E-06	4.2E-06	3.4E-06
Ra-225	14.8 d	F	0.6	4.0E-06	0.3 <sup>‡</sup>	1.2E-06	5.6E-07	4.6E-07	3.8E-07	1.3E-07
		M	0.2	2.4E-05	0.1	1.8E-05	1.1E-05	8.4E-06	7.9E-06	6.3E-06
		S	0.02	2.8E-05	0.01	2.2E-05	1.4E-05	1.0E-05	9.8E-06	7.7E-06
Ra-226	1600 y	F	0.6	2.6E-06	0.3 <sup>‡</sup>	9.4E-07	5.5E-07	7.2E-07	1.3E-06	3.6E-07
		M	0.2	1.5E-05	0.1	1.1E-05	7.0E-06	4.9E-06	4.5E-06	3.5E-06
		S	0.02	3.4E-05	0.01	2.9E-05	1.9E-05	1.2E-05	1.0E-05	9.5E-06
Ra-227	42.2 m	F	0.6	1.5E-09	0.3 <sup>‡</sup>	1.2E-09	7.8E-10	6.1E-10	5.3E-10	4.6E-10
		M	0.2	8.0E-10	0.1	6.7E-10	4.4E-10	3.2E-10	2.9E-10	2.8E-10
		S	0.02	1.0E-09	0.01	8.5E-10	4.4E-10	2.9E-10	2.4E-10	2.2E-10
Ra-228	5.75 y	F	0.6	1.7E-05	0.3 <sup>‡</sup>	5.7E-06	3.1E-06	3.6E-06	4.6E-06	9.0E-07
		M	0.2	1.5E-05	0.1	1.0E-05	6.3E-06	4.6E-06	4.4E-06	2.6E-06
		S	0.02	4.9E-05	0.01	4.8E-05	3.2E-05	2.0E-05	1.6E-05	1.6E-05
<b>Actinium</b>										
Ac-224	2.9 h	F	0.005	1.3E-07	0.0005	8.9E-08	4.7E-08	3.1E-08	1.4E-08	1.1E-08
		M	0.005	4.2E-07	0.0005	3.2E-07	2.0E-07	1.5E-07	1.4E-07	1.1E-07
		S	0.005	4.6E-07	0.0005	3.5E-07	2.2E-07	1.7E-07	1.6E-07	1.3E-07
Ac-225	10.0 d	F	0.005	1.1E-05	0.0005	7.7E-06	4.0E-06	2.6E-06	1.1E-06	8.8E-07
		M	0.005	2.8E-05	0.0005	2.1E-05	1.3E-05	1.0E-05	9.3E-06	7.4E-06
		S	0.005	3.1E-05	0.0005	2.3E-05	1.5E-05	1.1E-05	1.1E-05	8.5E-06
Ac-226	29 h	F	0.005	1.5E-06	0.0005	1.1E-06	4.0E-07	2.6E-07	1.2E-07	9.6E-08
		M	0.005	4.3E-06	0.0005	3.2E-06	2.1E-06	1.5E-06	1.5E-06	1.2E-06
		S	0.005	4.7E-06	0.0005	3.5E-06	2.3E-06	1.7E-06	1.6E-06	1.3E-06
Ac-227	21.773 y	F	0.005	1.7E-03	0.0005	1.6E-03	1.0E-03	7.2E-04	5.6E-04	5.5E-04
		M	0.005	5.7E-04	0.0005	5.5E-04	3.9E-04	2.6E-04	2.3E-04	2.2E-04
		S	0.005	2.2E-04	0.0005	2.0E-04	1.3E-04	8.7E-05	7.6E-05	7.2E-05
Ac-228	6.13 h	F	0.005	1.8E-07	0.0005	1.6E-07	9.7E-08	5.7E-08	2.9E-08	2.5E-08
		M	0.005	8.4E-08	0.0005	7.3E-08	4.7E-08	2.9E-08	2.0E-08	1.7E-08
		S	0.005	6.4E-08	0.0005	5.3E-08	3.3E-08	2.2E-08	1.9E-08	1.6E-08
<b>Thorium</b>										
Th-226	30.9 m	F	0.005	1.4E-07	0.0005	1.0E-07	4.8E-08	3.4E-08	2.5E-08	2.2E-08
		M	0.005	3.0E-07	0.0005	2.1E-07	1.1E-07	8.3E-08	7.0E-08	5.8E-08
		S	0.005	3.1E-07	0.0005	2.2E-07	1.2E-07	8.8E-08	7.5E-08	6.1E-08

‡ The  $f_1$  value for Type F for an adult is 0.2.

Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Th-227	18.718 d	F	0.005	8.4E-06	0.0005	5.2E-06	2.6E-06	1.6E-06	1.0E-06	6.7E-07
		M	0.005	3.2E-05	0.0005	2.5E-05	1.6E-05	1.1E-05	1.1E-05	8.5E-06
		S	0.005	3.9E-05	0.0005	3.0E-05	1.9E-05	1.4E-05	1.3E-05	1.0E-05
Th-228	1.9131 y	F	0.005	1.8E-04	0.0005	1.5E-04	8.3E-05	5.2E-05	3.5E-05	3.0E-05
		M	0.005	1.3E-04	0.0005	1.1E-04	6.8E-05	4.6E-05	3.9E-05	3.2E-05
		S	0.005	1.6E-04	0.0005	1.3E-04	8.2E-05	5.5E-05	4.7E-05	4.0E-05
Th-229	7340 y	F	0.005	5.4E-04	0.0005	5.1E-04	3.6E-04	2.9E-04	2.4E-04	2.4E-04
		M	0.005	2.3E-04	0.0005	2.1E-04	1.6E-04	1.2E-04	1.1E-04	1.1E-04
		S	0.005	2.1E-04	0.0005	1.9E-04	1.3E-04	8.7E-05	7.6E-05	7.1E-05
Th-230	7.7E4 y	F	0.005	2.1E-04	0.0005	2.0E-04	1.4E-04	1.1E-04	9.9E-05	1.0E-04
		M	0.005	7.7E-05	0.0005	7.4E-05	5.5E-05	4.3E-05	4.2E-05	4.3E-05
		S	0.005	4.0E-05	0.0005	3.5E-05	2.4E-05	1.6E-05	1.5E-05	1.4E-05
Th-231	25.52 h	F	0.005	1.1E-09	0.0005	7.2E-10	2.6E-10	1.6E-10	9.2E-11	7.8E-11
		M	0.005	2.2E-09	0.0005	1.6E-09	8.0E-10	4.8E-10	3.8E-10	3.1E-10
		S	0.005	2.4E-09	0.0005	1.7E-09	7.6E-10	5.2E-10	4.1E-10	3.3E-10
Th-232	1.405E1 y	F	0.005	2.3E-04	0.0005	2.2E-04	1.6E-04	1.3E-04	1.2E-04	1.1E-04
		M	0.005	8.3E-05	0.0005	8.1E-05	6.3E-05	5.0E-05	4.7E-05	4.5E-05
		S	0.005	5.4E-05	0.0005	5.0E-05	3.7E-05	2.6E-05	2.5E-05	2.5E-05
Th-234	24.10 d	F	0.005	4.0E-08	0.0005	2.5E-08	1.1E-08	6.1E-09	3.5E-09	2.5E-09
		M	0.005	3.9E-08	0.0005	2.9E-08	1.5E-08	1.0E-08	7.9E-09	6.6E-09
		S	0.005	4.1E-08	0.0005	3.1E-08	1.7E-08	1.1E-08	9.1E-09	7.7E-09
<b>Protactinium</b>										
Pa-227	38.3 m	M	0.005	3.6E-07	0.0005	2.6E-07	1.4E-07	1.0E-07	9.0E-08	7.4E-08
		S	0.005	3.8E-07	0.0005	2.8E-07	1.5E-07	1.1E-07	8.1E-08	8.0E-08
Pa-228	22 h	M	0.005	2.6E-07	0.0005	2.1E-07	1.3E-07	8.8E-08	7.7E-08	6.4E-08
		S	0.005	2.9E-07	0.0005	2.4E-07	1.5E-07	1.0E-07	9.1E-08	7.5E-08
Pa-230	17.4 d	M	0.005	2.4E-06	0.0005	1.8E-06	1.1E-06	8.3E-07	7.6E-07	6.1E-07
		S	0.005	2.9E-06	0.0005	2.2E-06	1.4E-06	1.0E-06	9.6E-07	7.6E-07
Pa-231	3.276E4 y	M	0.005	2.2E-04	0.0005	2.3E-04	1.9E-04	1.5E-04	1.5E-04	1.4E-04
		S	0.005	7.4E-05	0.0005	6.9E-05	5.2E-05	3.9E-05	3.6E-05	3.4E-05
Pa-232	1.31 d	M	0.005	1.9E-08	0.0005	1.8E-08	1.4E-08	1.1E-08	1.0E-08	1.0E-08
		S	0.005	1.0E-08	0.0005	8.7E-09	5.9E-09	4.1E-09	3.7E-09	3.5E-09
Pa-233	27.0 d	M	0.005	1.5E-08	0.0005	1.1E-08	6.5E-09	4.7E-09	4.1E-09	3.3E-09
		S	0.005	1.7E-08	0.0005	1.3E-08	7.5E-09	5.5E-09	4.9E-09	3.9E-09
Pa-234	6.70 h	M	0.005	2.8E-09	0.0005	2.0E-09	1.0E-09	6.8E-10	4.7E-10	3.8E-10
		S	0.005	2.9E-09	0.0005	2.1E-09	1.1E-09	7.1E-10	5.0E-10	4.0E-10
<b>Uranium</b>										
U-230	20.8 d	F	0.04	3.2E-06	0.02	1.5E-06	7.2E-07	5.4E-07	4.1E-07	3.8E-07
		M	0.04	4.9E-05	0.02	3.7E-05	2.4E-05	1.8E-05	1.7E-05	1.3E-05
		S	0.02	5.8E-05	0.002	4.4E-05	2.8E-05	2.1E-05	2.0E-05	1.6E-05
U-231	4.2 d	F	0.04	1.0E-09	0.02	6.8E-10	3.2E-10	1.5E-10	1.0E-10	6.4E-11
		M	0.04	2.5E-09	0.02	2.0E-09	1.0E-09	6.9E-10	5.7E-10	4.7E-10
		S	0.02	2.7E-09	0.002	2.0E-09	1.1E-09	7.7E-10	6.3E-10	5.2E-10
U-232	72 y	F	0.04	1.6E-05	0.02	1.0E-05	6.9E-06	6.8E-06	7.5E-06	4.0E-06
		M	0.04	3.0E-05	0.02	2.4E-05	1.6E-05	1.1E-05	1.0E-05	7.8E-06
		S	0.02	1.0E-04	0.002	9.7E-05	6.6E-05	4.3E-05	3.8E-05	3.7E-05
U-233	1.585E5 y	F	0.04	2.2E-06	0.02	1.4E-06	9.4E-07	8.4E-07	8.6E-07	5.8E-07
		M	0.04	1.5E-05	0.02	1.1E-05	7.2E-06	4.9E-06	4.3E-06	3.6E-06
		S	0.02	3.4E-05	0.002	3.0E-05	1.9E-05	1.2E-05	1.1E-05	9.6E-06
U-234	2.445E5 y	F	0.04	2.1E-06	0.02	1.4E-06	9.0E-07	8.0E-07	8.2E-07	5.6E-07
		M	0.04	1.5E-05	0.02	1.1E-05	7.0E-06	4.8E-06	4.2E-06	3.5E-06
		S	0.02	3.3E-05	0.002	2.9E-05	1.9E-05	1.2E-05	1.0E-05	9.4E-06
U-235	703.8E6 y	F	0.04	2.0E-06	0.02	1.3E-06	8.5E-07	7.5E-07	7.7E-07	5.2E-07
		M	0.04	1.3E-05	0.02	1.0E-05	6.3E-06	4.3E-06	3.7E-06	3.1E-06
		S	0.02	3.0E-05	0.002	2.6E-05	1.7E-05	1.1E-05	9.2E-06	8.5E-06

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Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
U-236	2.3415E7 y	F	0.04	2.0E-06	0.02	1.3E-06	8.5E-07	7.5E-07	7.8E-07	5.3E-07
		M	0.04	1.4E-05	0.02	1.0E-05	6.5E-06	4.5E-06	3.9E-06	3.2E-06
		S	0.02	3.1E-05	0.002	2.7E-05	1.8E-05	1.1E-05	9.5E-06	8.7E-06
U-237	6.75 d	F	0.04	1.8E-09	0.02	1.5E-09	6.6E-10	4.2E-10	1.9E-10	1.8E-10
		M	0.04	7.8E-09	0.02	5.7E-09	3.3E-09	2.4E-09	2.1E-09	1.7E-09
U-238	4.468E9 y	S	0.02	8.7E-09	0.002	6.4E-09	3.7E-09	2.7E-09	2.4E-09	1.9E-09
		F	0.04	1.9E-06	0.02	1.3E-06	8.2E-07	7.3E-07	7.4E-07	5.0E-07
		M	0.04	1.2E-05	0.02	9.4E-06	5.9E-06	4.0E-06	3.4E-06	2.9E-06
U-239	23.54 m	S	0.02	2.9E-05	0.002	2.5E-05	1.6E-05	1.0E-05	8.7E-06	8.0E-06
		F	0.04	1.0E-10	0.02	6.6E-11	2.9E-11	1.9E-11	1.2E-11	1.0E-11
		M	0.04	1.8E-10	0.02	1.2E-10	5.6E-11	3.8E-11	2.7E-11	2.2E-11
U-240	14.1 h	S	0.02	1.9E-10	0.002	1.2E-10	5.9E-11	4.0E-11	2.9E-11	2.4E-11
		F	0.04	2.4E-09	0.02	1.6E-09	7.1E-10	4.5E-10	2.3E-10	2.0E-10
		M	0.04	4.6E-09	0.02	3.1E-09	1.7E-09	1.1E-09	6.5E-10	5.3E-10
S	0.02	4.9E-09	0.002	3.3E-09	1.6E-09	1.1E-09	7.0E-10	5.8E-10		
<b>Neptunium</b>										
Np-232	14.7 m	F	0.005	2.0E-10	0.0005	1.9E-10	1.2E-10	1.1E-10	1.1E-10	1.2E-10
		M	0.005	8.9E-11	0.0005	8.1E-11	5.5E-11	4.5E-11	4.7E-11	5.0E-11
		S	0.005	1.2E-10	0.0005	9.7E-11	5.8E-11	3.9E-11	2.5E-11	2.4E-11
Np-233	36.2 m	F	0.005	1.1E-11	0.0005	8.7E-12	4.2E-12	2.5E-12	1.4E-12	1.1E-12
		M	0.005	1.5E-11	0.0005	1.1E-11	5.5E-12	3.3E-12	2.1E-12	1.6E-12
		S	0.005	1.5E-11	0.0005	1.2E-11	5.7E-12	3.4E-12	2.1E-12	1.7E-12
Np-234	4.4 d	F	0.005	2.9E-09	0.0005	2.2E-09	1.1E-09	7.2E-10	4.3E-10	3.5E-10
		M	0.005	3.8E-09	0.0005	3.0E-09	1.6E-09	1.0E-09	6.5E-10	5.3E-10
		S	0.005	3.9E-09	0.0005	3.1E-09	1.6E-09	1.0E-09	6.8E-10	5.5E-10
Np-235	396.1 d	F	0.005	4.2E-09	0.0005	3.5E-09	1.9E-09	1.1E-09	7.5E-10	6.3E-10
		M	0.005	2.3E-09	0.0005	1.9E-09	1.1E-09	6.8E-10	5.1E-10	4.2E-10
		S	0.005	2.6E-09	0.0005	2.2E-09	1.3E-09	8.3E-10	6.3E-10	5.2E-10
Np-236	115E3 y	F	0.005	8.9E-06	0.0005	9.1E-06	7.2E-06	7.5E-06	7.9E-06	8.0E-06
		M	0.005	3.0E-06	0.0005	3.1E-06	2.7E-06	2.7E-06	3.1E-06	3.2E-06
		S	0.005	1.6E-06	0.0005	1.6E-06	1.3E-06	1.0E-06	1.0E-06	1.0E-06
Np-236m	22.5 h	F	0.005	2.8E-08	0.0005	2.6E-08	1.5E-08	1.1E-08	8.9E-09	9.0E-09
		M	0.005	1.6E-08	0.0005	1.4E-08	8.9E-09	6.2E-09	5.6E-09	5.3E-09
		S	0.005	1.6E-08	0.0005	1.3E-08	8.5E-09	7.7E-09	4.8E-09	4.2E-09
Np-237	2.14E6 y	F	0.005	9.8E-05	0.0005	9.3E-05	6.0E-05	5.0E-05	4.7E-05	5.0E-05
		M	0.005	4.4E-05	0.0005	4.0E-05	2.8E-05	2.2E-05	2.2E-05	2.3E-05
		S	0.005	3.7E-05	0.0005	3.2E-05	2.1E-05	1.4E-05	1.3E-05	1.2E-05
Np-238	2.117 d	F	0.005	9.0E-09	0.0005	7.9E-09	4.8E-09	3.7E-09	3.3E-09	3.5E-09
		M	0.005	7.3E-09	0.0005	5.8E-09	3.4E-09	2.5E-09	2.2E-09	2.1E-09
		S	0.005	8.1E-09	0.0005	6.2E-09	3.2E-09	2.1E-09	1.7E-09	1.5E-09
Np-239	2.355 d	F	0.005	2.6E-09	0.0005	1.4E-09	6.3E-10	3.8E-10	2.1E-10	1.7E-10
		M	0.005	5.9E-09	0.0005	4.2E-09	2.0E-09	1.4E-09	1.2E-09	9.3E-10
		S	0.005	5.6E-09	0.0005	4.0E-09	2.2E-09	1.6E-09	1.3E-09	1.0E-09
Np-240	65 m	F	0.005	3.6E-10	0.0005	2.6E-10	1.2E-10	7.7E-11	4.7E-11	4.0E-11
		M	0.005	6.3E-10	0.0005	4.4E-10	2.2E-10	1.4E-10	1.0E-10	8.5E-11
		S	0.005	6.5E-10	0.0005	4.6E-10	2.3E-10	1.5E-10	1.1E-10	9.0E-11
<b>Plutonium</b>										
Pu-234	8.8 h	F	0.005	3.0E-08	0.0005	2.0E-08	9.8E-09	5.7E-09	3.6E-09	3.0E-09
		M	0.005	7.8E-08	0.0005	5.9E-08	3.7E-08	2.8E-08	2.6E-08	2.1E-08
		S	0.0001	8.7E-08	1.0E-5	6.6E-08	4.2E-08	3.1E-08	3.0E-08	2.4E-08
Pu-235	25.3 m	F	0.005	1.0E-11	0.0005	7.9E-12	3.9E-12	2.2E-12	1.3E-12	1.0E-12
		M	0.005	1.3E-11	0.0005	1.0E-11	5.0E-12	2.9E-12	1.9E-12	1.4E-12
Pu-236	2.851 y	S	0.0001	1.3E-11	1.0E-5	1.0E-11	5.1E-12	3.0E-12	1.9E-12	1.5E-12
		F	0.005	1.0E-04	0.0005	9.5E-05	6.1E-05	4.4E-05	3.7E-05	4.0E-05
		M	0.005	4.8E-05	0.0005	4.3E-05	2.9E-05	2.1E-05	1.9E-05	2.0E-05
S	0.0001	3.6E-05	1.0E-5	3.1E-05	2.0E-05	1.4E-05	1.2E-05	1.0E-05		

Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥ 1 year	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Pu-237	45.3 d	F	0.005	2.2E-09	0.0005	1.6E-09	7.9E-10	4.8E-10	2.9E-10	2.6E-10
		M	0.005	1.9E-09	0.0005	1.4E-09	8.2E-10	5.4E-10	4.3E-10	3.5E-10
		S	0.0001	2.0E-09	1.0E-5	1.5E-09	8.8E-10	5.9E-10	4.8E-10	3.9E-10
Pu-238	87.74 y	F	0.005	2.0E-04	0.0005	1.9E-04	1.4E-04	1.1E-04	1.0E-04	1.1E-04
		M	0.005	7.8E-05	0.0005	7.4E-05	5.6E-05	4.4E-05	4.3E-05	4.6E-05
		S	0.0001	4.5E-05	1.0E-5	4.0E-05	2.7E-05	1.9E-05	1.7E-05	1.6E-05
Pu-239	24065 y	F	0.005	2.1E-04	0.0005	2.0E-04	1.5E-04	1.2E-04	1.1E-04	1.2E-04
		M	0.005	8.0E-05	0.0005	7.7E-05	6.0E-05	4.8E-05	4.7E-05	5.0E-05
		S	0.0001	4.3E-05	1.0E-5	3.9E-05	2.7E-05	1.9E-05	1.7E-05	1.6E-05
Pu-240	6537 y	F	0.005	2.1E-04	0.0005	2.0E-04	1.5E-04	1.2E-04	1.1E-04	1.2E-04
		M	0.005	8.0E-05	0.0005	7.7E-05	6.0E-05	4.8E-05	4.7E-05	5.0E-05
		S	0.0001	4.3E-05	1.0E-5	3.9E-05	2.7E-05	1.9E-05	1.7E-05	1.6E-05
Pu-241	14.4 y	F	0.005	2.8E-06	0.0005	2.9E-06	2.6E-06	2.4E-06	2.2E-06	2.3E-06
		M	0.005	9.1E-07	0.0005	9.7E-07	9.2E-07	8.3E-07	8.6E-07	9.0E-07
		S	0.0001	2.2E-07	1.0E-5	2.3E-07	2.0E-07	1.7E-07	1.7E-07	1.7E-07
Pu-242	3.76E5 y	F	0.005	2.0E-04	0.0005	1.9E-04	1.4E-04	1.2E-04	1.1E-04	1.1E-04
		M	0.005	7.6E-05	0.0005	7.3E-05	5.7E-05	4.5E-05	4.5E-05	4.8E-05
		S	0.0001	4.0E-05	1.0E-5	3.6E-05	2.5E-05	1.7E-05	1.6E-05	1.5E-05
Pu-243	4.956 h	F	0.005	2.7E-10	0.0005	1.9E-10	8.8E-11	5.7E-11	3.5E-11	3.2E-11
		M	0.005	5.6E-10	0.0005	3.9E-10	1.9E-10	1.3E-10	8.7E-11	8.3E-11
		S	0.0001	6.0E-10	1.0E-5	4.1E-10	2.0E-10	1.4E-10	9.2E-11	8.6E-11
Pu-244	8.26E7 y	F	0.005	2.0E-04	0.0005	1.9E-04	1.4E-04	1.2E-04	1.1E-04	1.1E-04
		M	0.005	7.4E-05	0.0005	7.2E-05	5.6E-05	4.5E-05	4.4E-05	4.7E-05
		S	0.0001	3.9E-05	1.0E-5	3.5E-05	2.4E-05	1.7E-05	1.5E-05	1.5E-05
Pu-245	10.5 h	F	0.005	1.8E-09	0.0005	1.3E-09	5.6E-10	3.5E-10	1.9E-10	1.6E-10
		M	0.005	3.6E-09	0.0005	2.5E-09	1.2E-09	8.0E-10	5.0E-10	4.0E-10
		S	0.0001	3.8E-09	1.0E-5	2.6E-09	1.3E-09	8.5E-10	5.4E-10	4.3E-10
Pu-246	10.85 d	F	0.005	2.0E-08	0.0005	1.4E-08	7.0E-09	4.4E-09	2.8E-09	2.5E-09
		M	0.005	3.5E-08	0.0005	2.6E-08	1.5E-08	1.1E-08	9.1E-09	7.4E-09
		S	0.0001	3.8E-08	1.0E-5	2.8E-08	1.6E-08	1.2E-08	1.0E-08	8.0E-09
<b>Americium</b>										
Am-237	73.0 m	F	0.005	9.8E-11	0.0005	7.3E-11	3.5E-11	2.2E-11	1.3E-11	1.1E-11
		M	0.005	1.7E-10	0.0005	1.2E-10	6.2E-11	4.1E-11	3.0E-11	2.5E-11
		S	0.005	1.7E-10	0.0005	1.3E-10	6.5E-11	4.3E-11	3.2E-11	2.6E-11
Am-238	98 m	F	0.005	4.1E-10	0.0005	3.8E-10	2.5E-10	2.0E-10	1.8E-10	1.9E-10
		M	0.005	3.1E-10	0.0005	2.6E-10	1.3E-10	9.6E-11	8.8E-11	9.0E-11
		S	0.005	2.7E-10	0.0005	2.2E-10	1.3E-10	8.2E-11	6.1E-11	5.4E-11
Am-239	11.9 h	F	0.005	8.1E-10	0.0005	5.8E-10	2.6E-10	1.6E-10	9.1E-11	7.6E-11
		M	0.005	1.5E-09	0.0005	1.1E-09	5.6E-10	3.7E-10	2.7E-10	2.2E-10
		S	0.005	1.6E-09	0.0005	1.1E-09	5.9E-10	4.0E-10	2.5E-10	2.4E-10
Am-240	50.8 h	F	0.005	2.0E-09	0.0005	1.7E-09	8.8E-10	5.7E-10	3.6E-10	2.3E-10
		M	0.005	2.9E-09	0.0005	2.2E-09	1.2E-09	7.7E-10	5.3E-10	4.3E-10
		S	0.005	3.0E-09	0.0005	2.3E-09	1.2E-09	7.8E-10	5.3E-10	4.3E-10
Am-241	432.2 y	F	0.005	1.8E-04	0.0005	1.8E-04	1.2E-04	1.0E-04	9.2E-05	9.6E-05
		M	0.005	7.3E-05	0.0005	6.9E-05	5.1E-05	4.0E-05	4.0E-05	4.2E-05
		S	0.005	4.6E-05	0.0005	4.0E-05	2.7E-05	1.9E-05	1.7E-05	1.6E-05
Am-242	16.02 h	F	0.005	9.2E-08	0.0005	7.1E-08	3.5E-08	2.1E-08	1.4E-08	1.1E-08
		M	0.005	7.6E-08	0.0005	5.9E-08	3.6E-08	2.4E-08	2.1E-08	1.7E-08
		S	0.005	8.0E-08	0.0005	6.2E-08	3.9E-08	2.7E-08	2.4E-08	2.0E-08
Am-242m	152 y	F	0.005	1.6E-04	0.0005	1.5E-04	1.1E-04	9.4E-05	8.8E-05	9.2E-05
		M	0.005	5.2E-05	0.0005	5.3E-05	4.1E-05	3.4E-05	3.5E-05	3.7E-05
		S	0.005	2.5E-05	0.0005	2.4E-05	1.7E-05	1.2E-05	1.1E-05	1.1E-05
Am-243	7380 y	F	0.005	1.8E-04	0.0005	1.7E-04	1.2E-04	1.0E-04	9.1E-05	9.6E-05
		M	0.005	7.2E-05	0.0005	6.8E-05	5.0E-05	4.0E-05	4.0E-05	4.1E-05
		S	0.005	4.4E-05	0.0005	3.9E-05	2.6E-05	1.8E-05	1.6E-05	1.5E-05

(continued on next page)

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Table G.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Am-244	10.1 h	F	0.005	1.0E-08	0.0005	9.2E-09	5.6E-09	4.1E-09	3.5E-09	3.7E-09
		M	0.005	6.0E-09	0.0005	5.0E-09	3.2E-09	2.2E-09	2.0E-09	2.0E-09
		S	0.005	6.1E-09	0.0005	4.8E-09	2.4E-09	1.6E-09	1.4E-09	1.2E-09
Am-244m	26 m	F	0.005	4.6E-10	0.0005	4.0E-10	2.4E-10	1.8E-10	1.5E-10	1.6E-10
		M	0.005	3.3E-10	0.0005	2.1E-10	1.3E-10	9.2E-11	8.3E-11	8.4E-11
		S	0.005	3.0E-10	0.0005	2.2E-10	1.2E-10	8.1E-11	5.5E-11	5.7E-11
Am-245	2.05 h	F	0.005	2.1E-10	0.0005	1.4E-10	6.2E-11	4.0E-11	2.4E-11	2.1E-11
		M	0.005	3.9E-10	0.0005	2.6E-10	1.3E-10	8.7E-11	6.4E-11	5.3E-11
		S	0.005	4.1E-10	0.0005	2.8E-10	1.3E-10	9.2E-11	6.8E-11	5.6E-11
Am-246	39 m	F	0.005	3.0E-10	0.0005	2.0E-10	9.3E-11	6.1E-11	3.8E-11	3.3E-11
		M	0.005	5.0E-10	0.0005	3.4E-10	1.6E-10	1.1E-10	7.9E-11	6.6E-11
		S	0.005	5.3E-10	0.0005	3.6E-10	1.7E-10	1.2E-10	8.3E-11	6.9E-11
Am-246m	25.0 m	F	0.005	1.3E-10	0.0005	8.9E-11	4.2E-11	2.6E-11	1.6E-11	1.4E-11
		M	0.005	1.9E-10	0.0005	1.3E-10	6.1E-11	4.0E-11	2.6E-11	2.2E-11
		S	0.005	2.0E-10	0.0005	1.4E-10	6.4E-11	4.1E-11	2.7E-11	2.3E-11
<b>Curium</b>										
Cm-238	2.4 h	F	0.005	7.7E-09	0.0005	5.4E-09	2.6E-09	1.8E-09	9.2E-10	7.8E-10
		M	0.005	2.1E-08	0.0005	1.5E-08	7.9E-09	5.9E-09	5.6E-09	4.5E-09
		S	0.005	2.2E-08	0.0005	1.6E-08	8.6E-09	6.4E-09	6.1E-09	4.9E-09
Cm-240	27 d	F	0.005	8.3E-06	0.0005	6.3E-06	3.2E-06	2.0E-06	1.5E-06	1.3E-06
		M	0.005	1.2E-05	0.0005	9.1E-06	5.8E-06	4.2E-06	3.8E-06	3.2E-06
		S	0.005	1.3E-05	0.0005	9.9E-06	6.4E-06	4.6E-06	4.3E-06	3.5E-06
Cm-241	32.8 d	F	0.005	1.1E-07	0.0005	8.9E-08	4.9E-08	3.5E-08	2.8E-08	2.7E-08
		M	0.005	1.3E-07	0.0005	1.0E-07	6.6E-08	4.8E-08	4.4E-08	3.7E-08
		S	0.005	1.4E-07	0.0005	1.1E-07	6.9E-08	4.9E-08	4.5E-08	3.7E-08
Cm-242	162.8 d	F	0.005	2.7E-05	0.0005	2.1E-05	1.0E-05	6.1E-06	4.0E-06	3.3E-06
		M	0.005	2.2E-05	0.0005	1.8E-05	1.1E-05	7.3E-06	6.4E-06	5.2E-06
		S	0.005	2.4E-05	0.0005	1.9E-05	1.2E-05	8.2E-06	7.3E-06	5.9E-06
Cm-243	28.5 y	F	0.005	1.6E-04	0.0005	1.5E-04	9.5E-05	7.3E-05	6.5E-05	6.9E-05
		M	0.005	6.7E-05	0.0005	6.1E-05	4.2E-05	3.1E-05	3.0E-05	3.1E-05
		S	0.005	4.6E-05	0.0005	4.0E-05	2.6E-05	1.8E-05	1.6E-05	1.5E-05
Cm-244	18.11 y	F	0.005	1.5E-04	0.0005	1.3E-04	8.3E-05	6.1E-05	5.3E-05	5.7E-05
		M	0.005	6.2E-05	0.0005	5.7E-05	3.7E-05	2.7E-05	2.6E-05	2.7E-05
		S	0.005	4.4E-05	0.0005	3.8E-05	2.5E-05	1.7E-05	1.5E-05	1.3E-05
Cm-245	8500 y	F	0.005	1.9E-04	0.0005	1.8E-04	1.2E-04	1.0E-04	9.4E-05	9.9E-05
		M	0.005	7.3E-05	0.0005	6.9E-05	5.1E-05	4.1E-05	4.1E-05	4.2E-05
		S	0.005	4.5E-05	0.0005	4.0E-05	2.7E-05	1.9E-05	1.7E-05	1.6E-05
Cm-246	4730 y	F	0.005	1.9E-04	0.0005	1.8E-04	1.2E-04	1.0E-04	9.4E-05	9.8E-05
		M	0.005	7.3E-05	0.0005	6.9E-05	5.1E-05	4.1E-05	4.1E-05	4.2E-05
		S	0.005	4.6E-05	0.0005	4.0E-05	2.7E-05	1.9E-05	1.7E-05	1.6E-05
Cm-247	1.56E7 y	F	0.005	1.7E-04	0.0005	1.6E-04	1.1E-04	9.4E-05	8.6E-05	9.0E-05
		M	0.005	6.7E-05	0.0005	6.3E-05	4.7E-05	3.7E-05	3.7E-05	3.9E-05
		S	0.005	4.1E-05	0.0005	3.6E-05	2.4E-05	1.7E-05	1.5E-05	1.4E-05
Cm-248	3.39E5 y	F	0.005	6.8E-04	0.0005	6.5E-04	4.5E-04	3.7E-04	3.4E-04	3.6E-04
		M	0.005	2.5E-04	0.0005	2.4E-04	1.8E-04	1.4E-04	1.4E-04	1.5E-04
		S	0.005	1.4E-04	0.0005	1.2E-04	8.2E-05	5.6E-05	5.0E-05	4.8E-05
Cm-249	64.15 m	F	0.005	1.8E-10	0.0005	9.8E-11	5.9E-11	4.6E-11	4.0E-11	4.0E-11
		M	0.005	2.4E-10	0.0005	1.6E-10	8.2E-11	5.8E-11	3.7E-11	3.3E-11
		S	0.005	2.4E-10	0.0005	1.6E-10	7.8E-11	5.3E-11	3.9E-11	3.3E-11
Cm-250	6900 y	F	0.005	3.9E-03	0.0005	3.7E-03	2.6E-03	2.1E-03	2.0E-03	2.1E-03
		M	0.005	1.4E-03	0.0005	1.3E-03	9.9E-04	7.9E-04	7.9E-04	8.4E-04
		S	0.005	7.2E-04	0.0005	6.5E-04	4.4E-04	3.0E-04	2.7E-04	2.6E-04
<b>Berkelium</b>										
Bk-245	4.94 d	M	0.005	8.8E-09	0.0005	6.6E-09	4.0E-09	2.9E-09	2.6E-09	2.1E-09
Bk-246	1.83 d	M	0.005	2.1E-09	0.0005	1.7E-09	9.3E-10	6.0E-10	4.0E-10	3.3E-10
Bk-247	1380 y	M	0.005	1.5E-04	0.0005	1.5E-04	1.1E-04	7.9E-05	7.2E-05	6.9E-05



Compendium of Dose Coefficients based on ICRP Publication 60

Table G.1. (continued)

Nuclide	T <sub>½</sub>	Type	Infant		f <sub>1</sub> ≥1 year	e (Sv/Bq)				
			f <sub>1</sub>	e (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Bk-249	320 d	M	0.005	3.3E-07	0.0005	3.3E-07	2.4E-07	1.8E-07	1.6E-07	1.6E-07
Bk-250	3.222 h	M	0.005	3.4E-09	0.0005	3.1E-09	2.0E-09	1.3E-09	1.1E-09	1.0E-09
<b>Californium</b>										
Cf-244	19.4 m	M	0.005	7.6E-08	0.0005	5.4E-08	2.8E-08	2.0E-08	1.6E-08	1.4E-08
Cf-246	35.7 h	M	0.005	1.7E-06	0.0005	1.3E-06	8.3E-07	6.1E-07	5.7E-07	4.5E-07
Cf-248	333.5 d	M	0.005	3.8E-05	0.0005	3.2E-05	2.1E-05	1.4E-05	1.0E-05	8.8E-06
Cf-249	350.6 y	M	0.005	1.6E-04	0.0005	1.5E-04	1.1E-04	8.0E-05	7.2E-05	7.0E-05
Cf-250	13.08 y	M	0.005	1.1E-04	0.0005	9.8E-05	6.6E-05	4.2E-05	3.5E-05	3.4E-05
Cf-251	898 y	M	0.005	1.6E-04	0.0005	1.5E-04	1.1E-04	8.1E-05	7.3E-05	7.1E-05
Cf-252	2.638 y	M	0.005	9.7E-05	0.0005	8.7E-05	5.6E-05	3.2E-05	2.2E-05	2.0E-05
Cf-253	17.81 d	M	0.005	5.4E-06	0.0005	4.2E-06	2.6E-06	1.9E-06	1.7E-06	1.3E-06
Cf-254	60.5 d	M	0.005	2.5E-04	0.0005	1.9E-04	1.1E-04	7.0E-05	4.8E-05	4.1E-05
<b>Einsteinium</b>										
Es-250	2.1 h	M	0.005	2.0E-09	0.0005	1.8E-09	1.2E-09	7.8E-10	6.4E-10	6.3E-10
Es-251	33 h	M	0.005	7.9E-09	0.0005	6.0E-09	3.9E-09	2.8E-09	2.6E-09	2.1E-09
Es-253	20.47 d	M	0.005	1.1E-05	0.0005	8.0E-06	5.1E-06	3.7E-06	3.4E-06	2.7E-06
Es-254	275.7 d	M	0.005	3.7E-05	0.0005	3.1E-05	2.0E-05	1.3E-05	1.0E-05	8.6E-06
Es-254m	39.3 h	M	0.005	1.7E-06	0.0005	1.3E-06	8.4E-07	6.3E-07	5.9E-07	4.7E-07
<b>Fermium</b>										
Fm-252	22.7 h	M	0.005	1.2E-06	0.0005	9.0E-07	5.8E-07	4.3E-07	4.0E-07	3.2E-07
Fm-253	3.00 d	M	0.005	1.5E-06	0.0005	1.2E-06	7.3E-07	5.4E-07	5.0E-07	4.0E-07
Fm-254	3.240 h	M	0.005	3.2E-07	0.0005	2.3E-07	1.3E-07	9.8E-08	7.6E-08	6.1E-08
Fm-255	20.07 h	M	0.005	1.2E-06	0.0005	7.3E-07	4.7E-07	3.5E-07	3.4E-07	2.7E-07
Fm-257	100.5 d	M	0.005	3.3E-05	0.0005	2.6E-05	1.6E-05	1.1E-05	8.8E-06	7.1E-06
<b>Mendelevium</b>										
Md-257	5.2 h	M	0.005	1.0E-07	0.0005	8.2E-08	5.1E-08	3.6E-08	3.1E-08	2.5E-08
Md-258	55 d	M	0.005	2.4E-05	0.0005	1.9E-05	1.2E-05	8.6E-06	7.3E-06	5.9E-06



## ANNEX H. DOSE COEFFICIENTS FOR INHALATION OF SOLUBLE OR REACTIVE GASES AND VAPOURS FOR MEMBERS OF THE PUBLIC

Table H.1. Effective dose coefficients ( $e$ ) for inhalation of soluble or reactive gases and vapours for members of the public to 70 years of age.

Nuclide	$T_{1/2}$	Type	Infant		$f_1$	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		$\geq 1$ year	1 year	5 years	10 years	15 years
<b>Hydrogen</b>										
H-3	12.35 y	V	1 OBT	1.1E-10	1.0	1.1E-10	7.0E-11	5.5E-11	4.1E-11	4.1E-11
			1 HT	6.4E-15	1.0	4.8E-15	3.1E-15	2.3E-15	1.8E-15	1.8E-15
			1 CH <sub>3</sub> T	6.4E-13	1.0	4.8E-13	3.1E-13	2.3E-13	1.8E-13	1.8E-13
			1 HTO	6.4E-11	1.0	4.8E-11	3.1E-11	2.3E-11	1.8E-11	1.8E-11
<b>Carbon</b>										
C-11	20.38 m	V	1 CO <sub>2</sub>	1.8E-11	1.0	1.2E-11	6.5E-12	4.1E-12	2.5E-12	2.2E-12
			1 CO	1.0E-11	1.0	6.7E-12	3.5E-12	2.2E-12	1.4E-12	1.2E-12
			1 CH <sub>4</sub>	2.3E-13	1.0	1.5E-13	8.1E-14	5.1E-14	3.2E-14	2.7E-14
			1*	2.8E-11	1.0	1.8E-11	9.7E-12	6.1E-12	3.8E-12	3.2E-12
C-14	5730 y	V	1 CO <sub>2</sub>	1.9E-11	1.0	1.9E-11	1.1E-11	8.9E-12	6.3E-12	6.2E-12
			1 CO	9.1E-12	1.0	5.7E-12	2.8E-12	1.7E-12	9.9E-13	8.0E-13
			1 CH <sub>4</sub>	6.6E-12	1.0	7.8E-12	4.9E-12	4.0E-12	2.9E-12	2.9E-12
			1*	1.3E-09	1.0	1.6E-09	9.7E-10	7.9E-10	5.7E-10	5.8E-10
<b>Sulphur</b>										
S-35	87.44 d	V	1 SO <sub>2</sub>	9.4E-10	0.8	6.6E-10	3.4E-10	2.1E-10	1.3E-10	1.1E-10
			1 CS <sub>2</sub>	6.9E-09	0.8	4.8E-09	2.4E-09	1.4E-09	8.6E-10	7.0E-10
<b>Nickel</b>										
Ni-56	6.10 d	V	0.1	6.8E-09	0.05	5.2E-09	3.2E-09	2.1E-09	1.4E-09	1.2E-09
Ni-57	36.08 h	V	0.1	3.1E-09	0.05	2.3E-09	1.4E-09	9.2E-10	6.5E-10	5.6E-10
Ni-59	7.5E4 y	V	0.1	4.0E-09	0.05	3.3E-09	2.0E-09	1.3E-09	9.1E-10	8.3E-10
Ni-63	96 y	V	0.1	9.5E-09	0.05	8.0E-09	4.8E-09	3.0E-09	2.2E-09	2.0E-09
Ni-65	2.520 h	V	0.1	2.0E-09	0.05	1.4E-09	8.1E-10	5.6E-10	4.0E-10	3.6E-10
Ni-66	54.6 h	V	0.1	1.0E-08	0.05	7.1E-09	4.0E-09	2.7E-09	1.8E-09	1.6E-09
Nickel carbonyl										
<b>Ruthenium</b>										
Ru-94	51.8 m	V	0.1	5.5E-10	0.05	3.5E-10	1.8E-10	1.1E-10	7.0E-11	5.6E-11
Ru-97	2.9 d	V	0.1	8.7E-10	0.05	6.2E-10	3.4E-10	2.2E-10	1.4E-10	1.2E-10
Ru-103	39.28 d	V	0.1	9.0E-09	0.05	6.2E-09	3.3E-09	2.1E-09	1.3E-09	1.1E-09
Ru-105	4.44 h	V	0.1	1.6E-09	0.05	1.0E-09	5.3E-10	3.2E-10	2.2E-10	1.8E-10
Ru-106	368.2 d	V	0.1	1.6E-07	0.05	1.1E-07	6.1E-08	3.7E-08	2.2E-08	1.8E-08
Ruthenium tetroxide										
<b>Tellurium</b>										
Te-116	2.49 h	V	0.6	5.9E-10	0.3	4.4E-10	2.5E-10	1.6E-10	1.1E-10	8.7E-11
Te-121	17 d	V	0.6	3.0E-09	0.3	2.4E-09	1.4E-09	9.6E-10	6.7E-10	5.1E-10
Te-121m	154 d	V	0.6	3.5E-08	0.3	2.7E-08	1.6E-08	9.8E-09	6.6E-09	5.5E-09
Te-123	1E13 y	V	0.6	2.8E-08	0.3	2.5E-08	1.9E-08	1.5E-08	1.3E-08	1.2E-08
Te-123m	119.7 d	V	0.6	2.5E-08	0.3	1.8E-08	1.0E-08	5.7E-09	3.5E-09	2.9E-09
Te-125m	58 d	V	0.6	1.5E-08	0.3	1.1E-08	5.9E-09	3.2E-09	1.9E-09	1.5E-09
Te-127	9.35 h	V	0.6	6.1E-10	0.3	4.4E-10	2.3E-10	1.4E-10	9.2E-11	7.7E-11
Te-127m	109 d	V	0.6	5.3E-08	0.3	3.7E-08	1.9E-08	1.0E-08	6.1E-09	4.6E-09
Te-129	69.6 m	V	0.6	2.5E-10	0.3	1.7E-10	9.4E-11	6.2E-11	4.3E-11	3.7E-11
Te-129m	33.6 d	V	0.6	4.8E-08	0.3	3.2E-08	1.6E-08	8.5E-09	5.1E-09	3.7E-09
Te-131	25.0 m	V	0.6	5.1E-10	0.3	4.5E-10	2.6E-10	1.4E-10	9.5E-11	6.8E-11
Te-131m	30 h	V	0.6	2.1E-08	0.3	1.9E-08	1.1E-08	5.6E-09	3.7E-09	2.4E-09
Te-132	78.2 h	V	0.6	5.4E-08	0.3	4.5E-08	2.4E-08	1.2E-08	7.6E-09	5.1E-09
Te-133	12.45 m	V	0.6	5.5E-10	0.3	4.7E-10	2.5E-10	1.2E-10	8.1E-11	5.6E-11
Te-133m	55.4 m	V	0.6	2.3E-09	0.3	2.0E-09	1.1E-09	5.0E-10	3.3E-10	2.2E-10

*(continued on next page)*

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Table H.1. (continued)

Nuclide	$T_{1/2}$	Type	Infant		$f_1$ $\geq 1$ year	$e$ (Sv/Bq)				
			$f_1$	$e$ (Sv/Bq)		1 year	5 years	10 years	15 years	Adult
Te-134	41.8 m	V	0.6	6.8E-10	0.3	5.5E-10	3.0E-10	1.6E-10	1.1E-10	8.4E-11
<b>Iodine</b>										
I-120	81.0 m	V	1.0 CH <sub>3</sub> I	2.3E-09	1.0	1.9E-09	1.0E-09	4.8E-10	3.1E-10	2.0E-10
			1.0 I <sub>2</sub>	3.0E-09	1.0	2.4E-09	1.3E-09	6.4E-10	4.3E-10	3.0E-10
I-120m	53 m	V	1.0 CH <sub>3</sub> I	1.0E-09	1.0	8.7E-10	4.6E-10	2.2E-10	1.5E-10	1.0E-10
			1.0 I <sub>2</sub>	1.5E-09	1.0	1.2E-09	6.4E-10	3.4E-10	2.3E-10	1.8E-10
I-121	2.12 h	V	1.0 CH <sub>3</sub> I	4.2E-10	1.0	3.8E-10	2.2E-10	1.2E-10	8.3E-11	5.6E-11
			1.0 I <sub>2</sub>	5.7E-10	1.0	5.1E-10	3.0E-10	1.7E-10	1.2E-10	8.6E-11
I-123	13.2 h	V	1.0 CH <sub>3</sub> I	1.6E-09	1.0	1.4E-09	7.7E-10	3.6E-10	2.4E-10	1.5E-10
			1.0 I <sub>2</sub>	2.1E-09	1.0	1.8E-09	1.0E-09	4.7E-10	3.2E-10	2.1E-10
I-124	4.18 d	V	1.0 CH <sub>3</sub> I	8.5E-08	1.0	8.0E-08	4.5E-08	2.2E-08	1.4E-08	9.2E-09
			1.0 I <sub>2</sub>	1.1E-07	1.0	1.0E-07	5.8E-08	2.8E-08	1.8E-08	1.2E-08
I-125	60.14 d	V	1.0 CH <sub>3</sub> I	3.7E-08	1.0	4.0E-08	2.9E-08	2.2E-08	1.6E-08	1.1E-08
			1.0 I <sub>2</sub>	4.7E-08	1.0	5.2E-08	3.7E-08	2.8E-08	2.0E-08	1.4E-08
I-126	13.02 d	V	1.0 CH <sub>3</sub> I	1.5E-07	1.0	1.5E-07	9.0E-08	4.8E-08	3.2E-08	2.0E-08
			1.0 I <sub>2</sub>	1.9E-07	1.0	1.9E-07	1.1E-07	6.2E-08	4.1E-08	2.6E-08
I-128	24.99 m	V	1.0 CH <sub>3</sub> I	1.5E-10	1.0	1.2E-10	6.3E-11	3.0E-11	1.9E-11	1.3E-11
			1.0 I <sub>2</sub>	4.2E-10	1.0	2.8E-10	1.6E-10	1.0E-10	7.5E-11	6.5E-11
I-129	1.57E7 y	V	1.0 CH <sub>3</sub> I	1.3E-07	1.0	1.5E-07	1.2E-07	1.3E-07	9.9E-08	7.4E-08
			1.0 I <sub>2</sub>	1.7E-07	1.0	2.0E-07	1.6E-07	1.7E-07	1.3E-07	9.6E-08
I-130	12.36 h	V	1.0 CH <sub>3</sub> I	1.5E-08	1.0	1.3E-08	7.2E-09	3.3E-09	2.2E-09	1.4E-09
			1.0 I <sub>2</sub>	1.9E-08	1.0	1.7E-08	9.2E-09	4.3E-09	2.8E-09	1.9E-09
I-131	8.04 d	V	1.0 CH <sub>3</sub> I	1.3E-07	1.0	1.3E-07	7.4E-08	3.7E-08	2.4E-08	1.5E-08
			1.0 I <sub>2</sub>	1.7E-07	1.0	1.6E-07	9.4E-08	4.8E-08	3.1E-08	2.0E-08
I-132	2.30 h	V	1.0 CH <sub>3</sub> I	2.0E-09	1.0	1.8E-09	9.5E-10	4.4E-10	2.9E-10	1.9E-10
			1.0 I <sub>2</sub>	2.8E-09	1.0	2.3E-09	1.3E-09	6.4E-10	4.3E-10	3.1E-10
I-132m	83.6 m	V	1.0 CH <sub>3</sub> I	1.8E-09	1.0	1.6E-09	8.3E-10	3.9E-10	2.5E-10	1.6E-10
			1.0 I <sub>2</sub>	2.4E-09	1.0	2.1E-09	1.1E-09	5.6E-10	3.8E-10	2.7E-10
I-133	20.8 h	V	1.0 CH <sub>3</sub> I	3.5E-08	1.0	3.2E-08	1.7E-08	7.6E-09	4.9E-09	3.1E-09
			1.0 I <sub>2</sub>	4.5E-08	1.0	4.1E-08	2.1E-08	9.7E-09	6.3E-09	4.0E-09
I-134	52.6 m	V	1.0 CH <sub>3</sub> I	5.1E-10	1.0	4.3E-10	2.3E-10	1.1E-10	7.4E-11	5.0E-11
			1.0 I <sub>2</sub>	8.7E-10	1.0	6.9E-10	3.9E-10	2.2E-10	1.6E-10	1.5E-10
I-135	6.61 h	V	1.0 CH <sub>3</sub> I	7.5E-09	1.0	6.7E-09	3.5E-09	1.6E-09	1.1E-09	6.8E-10
			1.0 I <sub>2</sub>	9.7E-09	1.0	8.5E-09	4.5E-09	2.1E-09	1.4E-09	9.2E-10
<b>Mercury</b>										
Hg-193	3.5 h	V	1.0	4.2E-09	1.0	3.4E-09	2.2E-09	1.6E-09	1.2E-09	1.1E-09
Hg-193m	11.1 h	V	1.0	1.2E-08	1.0	9.4E-09	6.1E-09	4.5E-09	3.4E-09	3.1E-09
Hg-194	260 y	V	1.0	9.4E-08	1.0	8.3E-08	6.2E-08	5.0E-08	4.3E-08	4.0E-08
Hg-195	9.9 h	V	1.0	5.3E-09	1.0	4.3E-09	2.8E-09	2.1E-09	1.6E-09	1.4E-09
Hg-195m	41.6 h	V	1.0	3.0E-08	1.0	2.5E-08	1.6E-08	1.2E-08	8.8E-09	8.2E-09
Hg-197	64.1 h	V	1.0	1.6E-08	1.0	1.3E-08	8.4E-09	6.3E-09	4.7E-09	4.4E-09
Hg-197m	23.8 h	V	1.0	2.1E-08	1.0	1.7E-08	1.1E-08	8.2E-09	6.2E-09	5.8E-09
Hg-199m	42.6 m	V	1.0	6.5E-10	1.0	5.3E-10	3.4E-10	2.5E-10	1.9E-10	1.8E-10
Hg-203	46.60 d	V	1.0	3.0E-08	1.0	2.3E-08	1.5E-08	1.0E-08	7.7E-09	7.0E-09

\* Vapour.

## ANNEX I. CONVERSION COEFFICIENTS FOR AIR KERMA FREE-IN-AIR AND EFFECTIVE DOSE PER AIR KERMA FREE-IN-AIR

Table I.1. Conversion coefficients for air kerma free-in-air,  $K_a/\Phi$ , and effective dose per air kerma free-in-air,  $E/K_a$ , for mono-energetic photons incident in various geometries on an adult anthropomorphic computational model.

Photon energy (MeV)	$K_a/\Phi$ (pGy cm <sup>2</sup> )	$E/K_a$ (Sv/Gy)					
		AP	PA	LLAT	RLAT	ROT	ISO
0.01	7.60E+00	6.53E-03	2.48E-03	1.72E-03	1.72E-03	3.26E-03	2.71E-03
0.015	3.21E+00	4.02E-02	5.86E-03	5.49E-03	5.49E-03	1.53E-02	1.23E-02
0.02	1.73E+00	1.22E-01	1.81E-02	1.51E-02	1.55E-02	4.62E-02	3.62E-02
0.03	7.39E-01	4.16E-01	1.28E-01	9.08E+00	9.04E-02	1.91E-01	1.43E-01
0.04	4.38E-01	7.88E-01	3.70E-01	2.05E-01	2.41E-01	4.26E-01	3.26E-01
0.05	3.28E-01	1.11E+00	6.40E-01	3.45E-01	4.05E-01	6.61E-01	5.11E-01
0.06	2.92E-01	1.31E+00	8.46E-01	4.55E-01	5.28E-01	8.28E-01	6.42E-01
0.07	2.97E-01	1.41E+00	9.66E-01	5.22E-01	5.98E-01	9.24E-01	7.20E-01
0.08	3.08E-01	1.43E+00	1.02E+00	5.54E-01	6.28E-01	9.61E-01	7.49E-01
0.1	3.72E-01	1.39E+00	1.03E+00	5.71E-01	6.41E-01	9.60E-01	7.48E-01
0.15	6.00E-01	1.26E+00	9.59E-01	5.51E-01	6.20E-01	8.92E-01	7.00E-01
0.2	8.56E-01	1.17E+00	9.15E-01	5.49E-01	6.15E-01	8.54E-01	6.79E-01
0.3	1.38E+00	1.09E+00	8.80E-01	5.57E-01	6.15E-01	8.24E-01	6.64E-01
0.4	1.89E+00	1.06E+00	8.71E-01	5.70E-01	6.23E-01	8.14E-01	6.67E-01
0.5	2.38E+00	1.04E+00	8.69E-01	5.85E-01	6.35E-01	8.12E-01	6.75E-01
0.6	2.84E+00	1.02E+00	8.70E-01	6.00E-01	6.47E-01	8.14E-01	6.84E-01
0.8	3.69E+00	1.01E+00	8.75E-01	6.28E-01	6.70E-01	8.21E-01	7.03E-01
1.0	4.47E+00	1.00E+00	8.80E-01	6.51E-01	6.91E-01	8.31E-01	7.19E-01
2.0	7.51E+00	9.92E-01	9.01E-01	7.28E-01	7.57E-01	8.71E-01	7.74E-01
4.0	1.20E+01	9.93E-01	9.18E-01	7.96E-01	8.13E-01	9.09E-01	8.24E-01
6.0	1.58E+01	9.93E-01	9.24E-01	8.27E-01	8.36E-01	9.25E-01	8.46E-01
8.0	1.95E+01	9.91E-01	9.27E-01	8.46E-01	8.50E-01	9.34E-01	8.59E-01
10.0	2.32E+01	9.90E-01	9.29E-01	8.60E-01	8.59E-01	9.41E-01	8.68E-01

AP, antero-posterior; PA, postero-anterior; LLAT, left lateral; RLAT, right lateral; ROT, rotational; ISO, isotropic.



## ANNEX J. EFFECTIVE DOSE PER NEUTRON FLUENCE

Table J.1. Effective dose per neutron fluence,  $E/\Phi$ , for mono-energetic neutrons incident in various geometrics on an adult anthropomorphic computational model.

Neutron energy (MeV)	$E/\Phi$ (pSv cm <sup>2</sup> )					
	AP	PA	LLAT	RLAT	ROT	ISO
1.0E-09	5.24	3.52	1.36	1.68	2.99	2.40
1.0E-08	6.55	4.39	1.7	2.04	3.72	2.89
2.5E-08	7.60	5.16	1.99	2.31	4.40	3.30
1.0E-07	9.95	6.77	2.58	2.86	5.75	4.13
2.0E-07	11.2	7.63	2.92	3.21	6.43	4.59
5.0E-07	12.8	8.76	3.35	3.72	7.27	5.20
1.0E-06	13.8	9.55	3.67	4.12	7.84	5.63
2.0E-06	14.5	10.2	3.89	4.39	8.31	5.96
5.0E-06	15.0	10.7	4.08	4.66	8.72	6.28
1.0E-05	15.1	11.0	4.16	4.80	8.90	6.44
2.0E-05	15.1	11.1	4.20	4.89	8.92	6.51
5.0E-05	14.8	11.1	4.19	4.95	8.82	6.51
1.0E-04	14.6	11.0	4.15	4.95	8.69	6.45
2.0E-04	14.4	10.9	4.10	4.92	8.56	6.32
5.0E-04	14.2	10.7	4.03	4.86	8.40	6.14
0.001	14.2	10.7	4.00	4.84	8.34	6.04
0.002	14.4	10.8	4.00	4.87	8.39	6.05
0.005	15.7	11.6	4.29	5.25	9.06	6.52
0.01	18.3	13.5	5.02	6.14	10.6	7.70
0.02	23.8	17.3	6.48	7.95	13.8	10.2
0.03	29.0	21.0	7.93	9.74	16.9	12.7
0.05	38.5	27.6	10.6	13.1	22.7	17.3
0.07	47.2	33.5	13.1	16.1	27.8	21.5
0.1	59.8	41.3	16.4	20.1	34.8	27.2
0.15	80.2	52.2	21.2	25.5	45.4	35.2
0.2	99.0	61.5	25.6	30.3	54.8	42.4
0.3	133	77.1	33.4	38.6	71.6	54.7
0.5	188	103	46.8	53.2	99.4	75.0
0.7	231	124	58.3	66.6	123	92.8
0.9	267	144	69.1	79.6	144	108
1.0	282	154	74.5	86.0	154	116
1.2	310	175	85.8	99.8	173	130
2.0	383	247	129	153	234	178
3.0	432	308	171	195	283	220
4.0	458	345	198	224	315	250
5.0	474	366	217	244	335	272
6.0	483	380	232	261	348	282
7.0	490	391	244	274	358	290
8.0	494	399	253	285	366	297
9.0	497	406	261	294	373	303
10.0	499	412	268	302	378	309
12.0	499	422	278	315	385	322
14.0	496	429	286	324	390	333

*(continued on next page)*

Table J.1. (*continued*)

Neutron energy (MeV)	$E/\Phi$ (pSv cm <sup>2</sup> )					
	AP	PA	LLAT	RLAT	ROT	ISO
15.0	494	431	290	328	391	338
16.0	491	433	293	331	393	342
18.0	486	435	299	335	394	345
20.0	480	436	305	338	395	343
30.0	458	437	324	na	395	na
50.0	437	444	358	na	404	na
75.0	429	459	397	na	422	na
100.0	429	477	433	na	443	na
130.0	432	495	467	na	465	na
150.0	438	514	501	na	489	na
180.0	445	535	542	na	517	na

AP, antero-posterior; PA, postero-anterior; LLAT, left lateral; RLAT, right lateral; ROT, rotational; ISO, isotropic; na, not available.



**ANNEX K. SKIN ABSORBED DOSE PER FLUENCE AND EFFECTIVE DOSE  
PER FLUENCE FOR ELECTRONS**

Table K.1. Skin absorbed dose per fluence,  $D_T/\Phi$ , and effective dose per fluence,  $E/\Phi$ , for mono-energetic electrons incident in the antero-posterior geometry on an adult anthropomorphic computational model.

Energy (MeV)	$D_T/\Phi$ (pGy cm <sup>2</sup> )	$E/\Phi$ (pSv cm <sup>2</sup> )
0.1	8	0.1
0.4	98	1
0.6	171	1.5
1.0	154	2.7
1.5	158	5.9
2.0	153	11
4.0	150	44
10.0	165	131



## ANNEX L. GUIDE TO ATTACHED MICROSOFT EXCEL FILE

(L1) The Microsoft Excel workbook (ICRP\_2011.XLS) accompanying this report provides electronic access to the information tabulated in Annexes A–K. The workbook is organised in 11 worksheets as summarised in Table L.1.

(L2) Worksheets A1\_ICRP68, B1\_ICRP68, and C1\_ICRP68 contain the effective dose coefficients for intakes of radionuclides and exposure to inert gases by workers. Information on the chemical compounds,  $f_1$  values, and lung clearance types used in the calculations are contained in Worksheets D1\_ICRP68 and E1\_ICRP68. The coefficients were initially published in *Publication 68* (ICRP, 1994b) and were extracted from the electronic files of the ICRP Database of Dose Coefficients: Workers and Members of the Public CD1 (ICRP, 1996c).

(L3) Age-specific effective dose coefficients for ingestion and inhalation intakes of radionuclides by members of the public are contained in Worksheets F1\_ICRP72, G1\_ICRP72, and H1\_ICRP72. The coefficients were initially published in *Publication 72* (ICRP, 1996a) and were extracted from the electronic files of the ICRP Database of Dose Coefficients: Workers and Members of the Public CD1 (ICRP, 1996c).

(L4) Conversion coefficients for external photon, neutron, and electron fields are contained in Worksheets I1\_ICRP74, J1\_ICRP74, and K1\_ICRP74, respectively. These coefficients relate the effective dose to the fluence and air kerma free-in-air as tabulated in *Publication 74* (ICRP, 1996b).

(L5) The worksheets have been locked to ensure the integrity of the information. To use the dose coefficients in subsequent calculations, the user should create a new worksheet and identify the applicable dose coefficients by their cell reference preceded by the name of their worksheet and an exclamation mark. For example, in Excel the notation A1\_ICRP68!F664 references the effective dose coefficient for inhalation of particulate I-131 by a worker. The cell reference of the effective dose coefficient for inhalation of elemental I-131 is B1\_ICRP68!C73.

(L6) The folder named ‘CSV’ on the accompanying CD contains the 11 worksheets of the Excel workbook (ICRP\_2011.XLS) as comma separated value files. The folder labelled ‘ASCII’ contains the worksheets as ASCII files which can be read with a text editor (e.g. Notepad). These files should ensure electronic access to the data.

Table L.1. Worksheets within ICRP\_2011.XLS.

Worksheet	Description
A1_ICRP68	Table A.1. Effective dose coefficients for ingested and inhaled particulates (activity median aerodynamic diameters of 1 and 5 $\mu\text{m}$ ) for workers
B1_ICRP68	Table B.1. Effective dose coefficients for inhalation of soluble or reactive gas for workers
C1_ICRP68	Table C.1. Effective dose rates for exposure of workers or adult members of the public to inert gases
D1_ICRP68	Table D.1. Compounds and $f_1$ values used for the calculation of ingestion dose coefficients for workers
E1_ICRP68	Table E.1. Compounds, lung clearance types, and $f_1$ values used in the calculation of inhalation dose coefficients
F1_ICRP72	Table F.1. Effective dose coefficients for ingestion of radionuclides for members of the public to 70 years of age
G1_ICRP72	Table G.1. Effective dose coefficients for inhalation (activity median aerodynamic diameter = 1 $\mu\text{m}$ ) of radionuclides for members of the public
H1_ICRP72	Table H.1. Effective dose coefficients for inhalation of soluble or reactive gases and vapours by members of the public to 70 years of age
I1_ICRP74	Table I.1. Conversion coefficients for air kerma free-in-air, $K_a/\Phi$ , and effective dose per air kerma free-in-air, $E/K_a$ , for mono-energetic photons incident in various geometries on an adult anthropomorphic computational model
J1_ICRP74	Table J.1. Effective dose per neutron fluence, $E/\Phi$ , for mono-energetic neutrons incident in various geometries on an adult anthropomorphic computational model
K1_ICRP74	Table K.1. Skin absorbed dose per fluence, $D_T/\Phi$ , and effective dose per fluence, $E/\Phi$ , for mono-energetic electrons incident in the antero-posterior geometry on an adult anthropomorphic computational model