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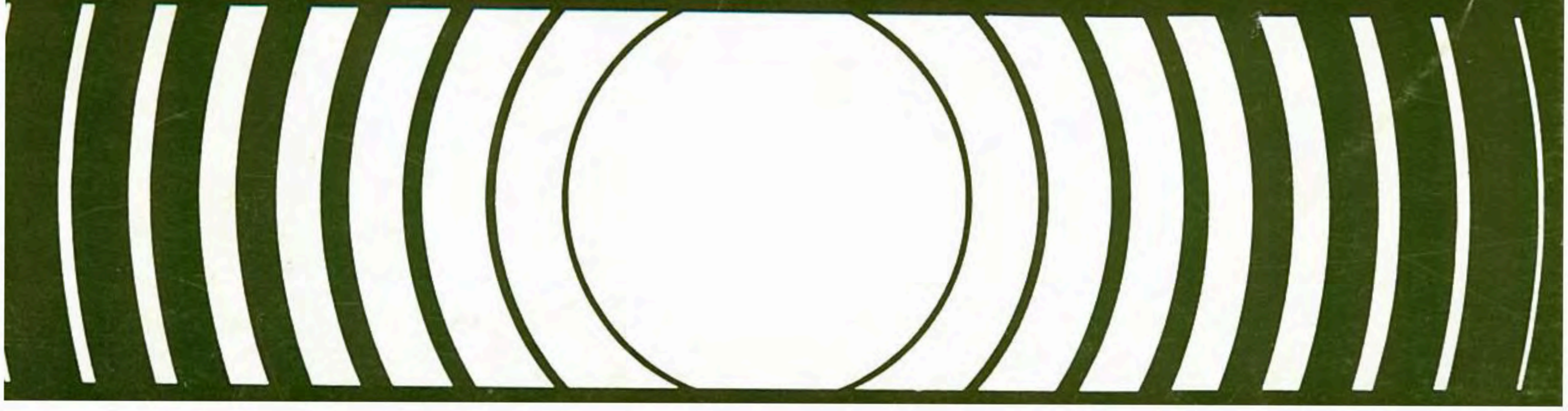
Limiting Values of Radionuclide Intake And Air Concentration

and

Dose Conversion Factors For Inhalation, Submersion, And Ingestion

Federal Guidance Report No.11



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FEDERAL GUIDANCE REPORT NO. 11

LIMITING VALUES OF RADIONUCLIDE INTAKE AND AIR CONCENTRATION AND DOSE CONVERSION FACTORS FOR INHALATION, SUBMERSION, AND INGESTION

Derived Guides for Control of Occupational Exposure and
Exposure-to-Dose Conversion Factors for General Application,
Based on the 1987 Federal Radiation Protection Guidance

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PREFACE

The Federal Radiation Council (FRC) was formed in 1959 to provide recommendations to the President for Federal policy on radiation matters affecting health. The first Federal radiation protection guidance was promulgated shortly thereafter, on May 13, 1960, and set forth basic principles for protection of both workers and members of the general population. Over the ensuing decade the FRC issued additional guidance on a number of radiation protection matters, but the general guidance issued in 1960 remained essentially unchanged.

The Council was abolished in 1970 and its functions transfered to the Administrator of the newly formed Environmental Protection Agency (EPA). In 1974 EPA initiated a review of the part of Federal guidance that then applied to occupational exposure. Two early components of this review were a re-evaluation by the National Academy of Sciences of risks from low levels of radiation (NAS 1980) and an analysis by EPA of the occupational exposures of U.S. workers (EPA 1980). These were completed and published in July and November of 1980, respectively.

In January of 1981 EPA published proposed recommendations for new Federal guidance for occupational exposure. Federal Guidance Report No. 10, issued in 1984, continued the process by presenting new numerical values for derived quantities (i.e., concentrations of radioactivity in air and water) that were obtained employing contemporary metabolic and dosimetric models, but which corresponded to the limiting annual doses recommended for workers in 1960. The values given in Report No. 10 were not implemented by Federal agencies, however, because of the anticipated adoption of new Federal guidance.

On January 20, 1987, the President approved recommendations by the Administrator of EPA for the new "Radiation Protection Guidance to Federal Agencies for Occupational Exposure." This guidance, which is consistent with (but in several ways is an extension of) current recommendations of the International Commission on Radiological Protection (ICRP), constituted a major revision of those parts of the 1960 guidance that pertained to the protection of workers.

This Federal Guidance Report No. 11, which supercedes Report No. 10, presents values for derived guides that make use of contemporary metabolic modeling and dosimetric methods and that are based upon the limits on committed dose equivalent stipulated in Recommendation 4 of the 1987 guidance. The Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) tabulated herein are numerically identical, in most cases, to those recommended by the ICRP in their Publication 30. Exceptions include values for plutonium and related elements, which are based upon information presented in ICRP Publication 48, and a few radionuclides not considered in Publication 30, for which nuclear decay data were presented in ICRP Publication 38. We plan to publish future editions of this Report on a regular basis to reflect improved information, as it becomes available and is accepted by the radiation protection community.

These new derived guides will be implemented by the various Federal agencies having regulatory responsibilities for workers in the public sector, such as the Nuclear Regulatory Commission and the Occupational Safety and Health Administration, and by Federal agencies with responsibilities for their own workers, such as the Department of Energy and the Department of Defense. Federal agencies are encouraged to reference the tables in this and future editions of this Federal Guidance Report in their regulations so as to assure a uniform and continuing application of the 1987 Federal guidance.

Recommendation 4 of the 1987 guidance is concerned not only with prospective control of the workplace through limitation of committed dose, but also with circumstances in which the conditions for control of intake have not been met for an individual worker. The present document addresses only the first of these issues; the difficult and controversial problem of future management of the over-exposed worker is not considered here. That remains primarily the responsibility of the on-site health physicist, who must account for the physical characteristics of the over-exposed individual and the unique conditions at the site.

Also tabulated in this Report are coefficients for conversion of exposure to committed effective dose equivalent, and to committed dose equivalent for individual organs. These are intended for general use in assessing average individual committed doses in any population that can be characterized adequately by Reference Man (ICRP 1975).

We gratefully acknowledge the thoughtful comments of Marvin Goldman, Roscoe M. Hall, Jr., Ronald L. Kathren, DeVaughn R. Nelson, John W. Poston, Sr., Jerome S. Puskin, Kenneth W. Skrable, J. Newell Stannard, Roy C. Thompson, Carl G. Welty, Jr., and Edward J. Vallario. Parts of Report No. 11 have been clarified and strengthened through their efforts. Its final form, however, is the sole responsibility of the Office of Radiation Programs. We would appreciate being informed of any remaining errors, so that they can be corrected in future editions. Comments should be addressed to Allan C.B. Richardson, Chief, Guides and Criteria Branch, ANR-460, U.S. Environmental Protection Agency, Washington, DC 20460.

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I. INTRODUCTION

Radiation protection programs for workers are based, in the United States, on a hierarchy of limitations stemming from Federal guidance approved by the President. This guidance, which consists of principles, policies, and numerical *primary guides*, is used by Federal agencies as the basis for developing and implementing their own regulatory standards.

The primary guides are usually expressed in terms of limiting doses to workers. The protection of workers against taking radioactive materials into the body, however, is accomplished largely through the use of regulations based on *derived guides* expressed in terms of quantities or concentrations of radionuclides. The values of these derived guides are chosen so as to assure that workers in work environments that conform to them are unlikely to receive radiation doses that exceed the primary guides.

The purpose of the present Report is to set forth derived guides that are consistent with current Federal radiation protection guidance. They are intended to serve as the basis for regulations setting upper bounds on the inhalation and ingestion of, and submersion in, radioactive materials in the workplace. The Report also includes tables of exposure-to-dose conversion factors, for general use in assessing average individual committed doses in any population that is adequately characterized by Reference Man (ICRP 1975).

Previous Guidance and Derived Guides

In 1960 President Eisenhower, acting on recommendations of the former Federal Radiation Council (FRC), established the first Federal radiation protection guidance for the United States (FRC 1960). That guidance was strongly influenced by and generally consistent with contemporary recommendations of the International Commission on Radiological Protection (ICRP) and the U.S. National Council on Radiation Protection and Measurements (NCRP). The primary guides included limits of 3 rem per quarter (and 5(N-18) rem cumulative, where N is the age of the worker) to the whole body, active blood-forming organs, and gonads; annual limits of 30 rem to thyroid and 15 rem to other organs; and a limiting body burden of 0.1 microgram of radium-226 or its equivalent for bone seeking radionuclides.

Although the FRC recognized the importance of protection against taking radioactive materials into the body, it did not publish numerical values for derived guides as part of its guidance. Rather, it endorsed the values in use by government agencies at that time. Those values were contained in National Bureau of Standards Handbook No.69 (NBS 1959) (later re-issued as NCRP Report No. 22 (NCRP 1959)), which was an abridgment of Publication 2* of the ICRP

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*Revised and additional values appeared in ICRP Publication 6 (ICRP 1964).

(ICRP 1959). These reports also formed the basis for the well-known tables issued by the Atomic Energy Commission (Appendix B of 10 CFR 20), which still constitute a basic element of the regulations of its successor, the Nuclear Regulatory Commission.

Over the intervening years, substantial advances have been made in the dosimetric and metabolic models employed to calculate derived guides. Federal Guidance Report No. 10 (EPA 1984a) presented revised values for derived guides that were based on the 1960 primary guides for workers (FRC 1960) but that were obtained employing up-to-date dosimetric and metabolic models. These new models yielded a number of values significantly different from those in ICRP Publications 2 and 6. The values in Federal Guidance Report No. 10 were not implemented by Federal agencies, however, due to the expectation of imminent approval of new Federal guidance.

Current Guidance and Derived Guides

The FRC was abolished in 1970, through Reorganization Plan No. 3, and its functions transferred to the Administrator of the newly formed Environmental Protection Agency (EPA).

The Federal guidance for occupational radiation protection now in effect in the United States consists of recommendations by the Administrator of EPA approved by the President on January 20, 1987 (EPA 1987). This new guidance sets forth general principles for the radiation protection of workers and specifies the numerical primary guides for limiting occupational exposure. It is consistent with, but an extension of, recent recommendations of the ICRP (ICRP 1977).* It applies to all workers who are exposed to radiation in the course of their work, either as employees of institutions and companies subject to Federal regulation or as Federal employees. It is estimated that, in 1985, there were 1.6 million such workers (EPA 1984b).

The complete texts of the guidance issued in 1987 and in 1960 are reproduced in Appendices A and B of this Report. Major changes introduced in 1987 were:

- The ALARA principle, which requires that doses be maintained 'as low as reasonably achievable,' was elevated to the level of a fundamental requirement, and it now forms an integral part of the basic protection framework.
- Protection against stochastic effects on health is based upon limitation of the weighted sum of dose equivalents to all irradiated tissues (the effective dose equivalent†), rather than upon the "critical organ" approach of the 1960 guidance, which limited dose to each organ or tissue separately. Additional organ-specific limits are provided to protect against non-stochastic effects.
- The maximum occupational radiation dose normally allowed a worker was reduced from the previously permitted 3 rem per quarter (dose equivalent to the whole body) to 5 rem in a year (effective dose equivalent). The 5(N-18) limitation on cumulative dose equivalent has been deleted.

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*Recommendations of the NCRP in their Report No. 91 (NCRP 1987b), in turn, are consistent with the Federal guidance.

†Effective dose equivalent, stochastic health effects, and other such entities are defined and discussed in Chapter II, Appendix C, and the Glossary.

- Maximum work-related dose equivalent to the unborn is limited to 0.5 rem during the gestation period. It is also recommended that exposure rates be maintained below the uniform monthly rate that would satisfy this limiting value.
- The establishment of administrative control levels below the limiting values is encouraged. Since such administrative control levels often involve ALARA considerations, they may be developed for specific categories of workers or work situations. Agencies should also encourage establishment of measures for assessing the effectiveness of, and for supervising, ALARA efforts.
- Recordkeeping, including cumulative (lifetime) doses, and education of workers on radiation risks and protection principles are specifically recommended for the first time.
- Control of internal exposure to radionuclides is based upon limitation of the sum of current and future doses from annual intake (i.e., the committed effective dose equivalent) rather than of annual dose. If it is found that limits on committed dose have been exceeded for an individual worker, then corrective action is required to re-establish control of the workplace and to manage future exposure of the worker. With respect to the latter requirement, provision should be made to monitor the annual dose received from radionuclides in the body as long as it remains significant.

This Report is concerned, in particular, with two types of derived guides that may be employed in the control of internal exposure to radionuclides in the workplace: the Annual Limit on Intake (ALI) and the Derived Air Concentration (DAC). An ALI is that annual intake of a radionuclide which would result in a radiation dose to Reference Man (ICRP 1975) equal to the relevant primary guide (i.e., to the limiting value of committed dose). A DAC is that concentration of a radionuclide in air which, if breathed for a work-year, would result in an intake corresponding to its ALI (or, in the case of submersion, to an external exposure corresponding to the primary guide for limiting annual dose). DACs are thus used for limiting radionuclide intake through breathing of, or submersion in, contaminated air. ALIs are used primarily for assessing doses due to accidental ingestion of radionuclides. Values of ALIs for ingestion and inhalation and of DACs are presented in Table 1 for radionuclides of interest in radiation protection.

These ALIs and DACs are based upon calculations originally carried out for the ICRP. In its Publication 30 (ICRP 1979a, 1979b, 1980, 1981a, 1981c, 1982a, 1982b), the ICRP issued revised derived limits which conform to its recommendations in Publication 26 (ICRP 1977). The derived limits in Publication 30 (which superseded those presented in ICRP Publications 2 and 6) incorporate the considerable advances in the state of knowledge of radionuclide dosimetry and biological transport in humans achieved in the past few decades. They also reflect the transition from limitation of dose to the critical organ to limitation of the weighted sum of doses to all organs. The relationship of the new to earlier derived guides is summarized in Fig. 1.

The ALI and DAC values tabulated in this first edition of Federal Guidance Report No. 11 are identical to those of ICRP 30, except for the isotopes of Np, Pu, Am, Cm, Bk, Cf, Es, Fm, and Md. For these, new values have been computed using the more recent metabolic information in

Federal Guidance

Modeling	FRC (1960)	EPA (1987)
ICRP 2 (1959)	NBS 69/NCRP 22	not applicable
ICRP 30 (1979–81)	Federal Guidance Report No. 10	Federal Guidance Report No. 11

Fig. 1. The relationship of various tabulations of derived guides to the applicable Federal guidance and to the dosimetric and metabolic models used in their derivation. For example, the tables in Report No. 10 make use of contemporary metabolic modeling, as described in ICRP Publication 30, but conform to the limits specified in the 1960 Federal guidance.

ICRP Publication 48 (ICRP 1986). We have, in addition, provided guides for a few radionuclides (Sr-82, Tc-95, Tc-95m, Sb-116, Pu-246, and Cm-250) not considered in ICRP Publication 30, but for which nuclear decay data were presented in ICRP Publication 38 (ICRP 1983).

II. THE RADIATION PROTECTION GUIDES

Federal radiation protection guidance sets forth a dose limitation system which is based on three principles. These are:

> *Justification* - There should not be any occupational exposure of workers to ionizing radiation without the expectation of an overall benefit from the activity causing the exposure;
>
> *Optimization* - A sustained effort should be made to ensure that collective doses, as well as annual, committed, and cumulative lifetime individual doses, are maintained as low as reasonably achievable (ALARA), economic and social factors being taken into account; and
>
> *Limitation* - Radiation doses received as a result of occupational exposure should not exceed specified limiting values.

Although they have been expressed in a variety of ways, these principles have guided the radiation protection activities of Federal agencies since 1960. This Report does not address the first two of them—it is concerned with the third, the limiting values for occupational exposure, which are specified by the primary guides. We shall discuss first the primary guides for limiting doses to workers and then the derived guides (in terms of quantities and concentrations) for control of exposure to radionuclides in the workplace.

PRIMARY GUIDES

For the purpose of specifying primary guides for radiation protection, health effects are separated into two categories—stochastic and non-stochastic.

Cancer and genetic disorders are classified as stochastic health effects. It is assumed that they are initiated by random ionization events and that the risk of incurring either is proportional, without threshold, to the dose in the relevant tissue. It is also assumed that the severity of any stochastic health effect is independent of the dose.

For a non-stochastic effect, by comparison, there appears to be an effective threshold below which clinically observable effects do not occur, and the degree of damage observed usually depends on the magnitude of the dose in excess of this effective threshold. Examples of non-stochastic effects include acute radiation syndrome, opacification of the lens of the eye, erythema of the skin, and temporary impairment of fertility. (All of these effects are observed at doses much higher than those incurred normally in the workplace).

Primary Guides for Assessed Dose to Individual Workers

The objective of the dose limitation system is both to minimize the risk of stochastic effects and to prevent the occurrence of non-stochastic effects. The primary guides are boundary conditions for this system. The principles of justification and optimization serve to ensure that unnecessary doses are avoided and that doses to most workers remain significantly below the limiting values specified by the primary guides.

With respect to stochastic effects, the dose limitation system has been designed with the intent that the level of risk associated with the limit be independent of whether irradiation of the body is uniform or non-uniform. The critical-organ approach of previous guidance (FRC 1960) is replaced with the method introduced by the ICRP (ICRP 1977), which utilizes a weighted sum of doses to all irradiated organs and tissues. This sum, called the "effective dose equivalent" and designated H_E, is defined as

$$H_E = \sum_T w_T H_T \,, \tag{1}$$

where w_T is a weighting factor and H_T is the mean dose equivalent to organ or tissue T. The factor w_T, normalized so that $\sum_T w_T = 1$, corresponds to the fractional contribution of organ or tissue T to the total risk of stochastic effects when the entire body is uniformly irradiated.* H_E thus reflects both the distribution of dose among the various organs and tissues of the body and their assumed relative sensitivities to stochastic effects. The primary guide for assessed dose to individual adult workers, for the purpose of protection against stochastic effects, is 5 rem (50 mSv) effective dose equivalent in a year (Recommendation 3, Appendix A).

Weighting Factors

Organ/tissue	w_T
Gonads	0.25
Breast	0.15
Red Marrow	0.12
Lungs	0.12
Thyroid	0.03
Bone Surface	0.03
Remainder†	0.30

Additional primary guides for assessed dose to individual adult workers have been established for the purpose of protection against non-stochastic effects. These guides, chosen below the assumed threshold levels for such effects, are 15 rem (150 mSv) dose equivalent in a year to the lens of the eye and 50 rem (500 mSv) to any other organ, tissue (including skin), or extremity of the body.

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*For the hypothetical case of uniform irradiation, H_E is commonly referred to as the 'whole body dose'.

†A value of $w_T = 0.06$ is applicable to each of the five remaining organs or tissues (such as liver, kidneys, spleen, brain, small intestine, upper large intestine, lower large intestine, etc., but excluding skin, lens of the eye, and the extremities) receiving the highest doses.

The *primary guides for annual assessed dose* may be summarized as:

$$H_E \leqslant 5 \text{ rem } (50 \text{ mSv}) \tag{2a}$$

for stochastic effects;

$$H_T \leqslant 50 \text{ rem } (500 \text{ mSv}) \tag{2b}$$

for all organs and tissues, except the lens of the eye; and

$$H_T \leqslant 15 \text{ rem } (150 \text{ mSv}) \tag{2c}$$

for the lens of the eye.

Primary Guides for Control of Intake of Radionucludes in the Workplace

Radionuclides enter the body through inhalation and, normally to a lesser extent, through ingestion. The principal method of controlling internal exposure to radionuclides is to contain radioactive materials so as to avoid any such intake. For situations where this is not achievable, the guidance (Recommendation 4, Appendix A) specifies primary guides for control of the workplace.

The intake of certain long-lived radionuclides may result in the continuous deposition of dose in tissues far into the future. The primary guides for control of the workplace are therefore expressed in terms of the sum of all doses projected to be received in the future from an intake in the current year. This sum, by convention taken over the 50-year period following intake,* is known as the "committed" dose. The committed effective dose equivalent, $H_{E,50}$, is defined by analogy to equation (1) as

$$H_{E,50} = \sum_T w_T H_{T,50} \ . \tag{3}$$

The committed dose equivalent to tissue or organ T, denoted $H_{T,50}$, is the total dose equivalent deposited in T over the 50-year period following intake of the radionuclide. For radionuclides that are present in the body for weeks or less, because of either short physical half-life or rapid biological elimination, the committed dose equivalent may be regarded as a single contribution to the annual dose equivalent. For very long-lived radionuclides that remain within the body indefinitely, the dose equivalent may accumulate at a nearly constant rate over the entire balance of a worker's lifetime.

To limit the risk of stochastic effects, the *primary guides for control of the workplace* specify that the committed effective dose equivalents from the intake of all radionuclides in a given year, $H_{E,50}$, plus the effective dose equivalent from any external exposure in that year, $H_{E,ext}$, should not exceed 5 rem (50 mSv), i.e.:

$$H_{E,50} + H_{E,ext} \leqslant 5 \text{ rem} \ . \tag{4a}$$

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*50 years reflects the arbitrarily-assumed remaining lifetime of a worker, rather than the maximum span of employment.

And to prevent the occurance of non-stochastic effects, the committed dose equivalent, $H_{T,50}$, to any organ or tissue T from the intake of radionuclides in a given year plus the dose equivalent, $H_{T,ext}$, from external exposure in that year should not exceed 50 rem, i.e.:

$$H_{T,50} + H_{T,ext} \leq 50\,\text{rem} \; . \tag{4b}$$

The non-stochastic limit permits a much higher committed dose in most individual organs than does the stochastic limit, under normal conditions of irradiation, but it is nonetheless the factor that determines the annual limit on intake for a number of radionuclides. This is the case typically for radionuclides that seek organs or tissues of relatively low sensitivity to stochastic effects. The actinides go to bone and irradiate bone marrow and surface endosteal cells, for example, and iodine concentrates in the thyroid. For such radionuclides the limitation system reduces to the formerly used critical organ approach, but with a 50 rem committed organ dose limit.

The primary guides for committed effective dose equivalent (and committed dose equivalents to individual organs and tissues) provide the basis for limitation of internal exposure to radioactive materials in the workplace.* They will normally be implemented through the design, operation, and monitoring of the workplace. When the primary guides for control of intake of radioactive materials have been satisfied, moreover, it is not necessary to assess contributions from such intakes to annual doses in future years. That is, for the purpose of determining compliance with the primary guide for assessed dose to individuals (Recommendation 3), the guidance provides that such doses may be assigned to the year of intake.

Recommendation 4 of the guidance also addresses the situation in which determination of the actual intake for an individual worker shows that the primary guides for control of intake have *not* been met. In that case, appropriate corrective action should be taken to assure that control is reestablished, and that future exposure of the worker is appropriately managed. In particular, provision should be made to assess annual effective dose equivalent (and dose equivalents to organs) due to radionuclides retained in the body from this intake (NCRP 1987a; NRC 1987), and to manage exposure of the worker so as to insure conformance in future years with the primary guides for assessed dose. The present Report is concerned with the prevention of such circumstances through the use of derived guides, however, and the difficult and controversial problem of the over-exposed worker will not be considered further here. But it is important to note the distinction made between the roles played by the effective dose equivalent committed in a year and by the annual effective dose equivalent.

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*The use of committed (effective) dose equivalent in determining the derived guides for workers represents a significant philosophical (but not numerical) change. Previous guidance for protection from inhalation or ingestion of radionuclides was expressed in terms of the 'limiting annual intake'–the amount which, if taken in annually for 50 years, would result in a dose rate in the 50th year equal to the primary guide. Committed dose, by contrast, makes no assumption about future intake, but does account for the dose in the future arising from intake in the current year.

Conversion from limitation of 'limiting annual intake' to limitation of committed dose equivalent has no effect on the numerical values of the derived guides. It can be shown that the committed dose to an organ over the 50-year period following a single intake of a radionuclide is numerically equal to the annual dose rate attained after 50 years of intake of that same activity each year.

Radon and its Decay Products

The primary guides are usually specified in terms of dose. In the case of exposure to the decay products of radon and thoron, however, dose is particularly difficult to calculate. For this reason, in 1967 the FRC recommended a separate guide for radon, expressed in terms of exposure to its decay products rather than dose (FRC 1967). This guide, which was developed for use in regulating the exposure of underground uranium miners, has gradually gained application to other workers as well. It has been reviewed periodically by the FRC and EPA (FRC 1969, 1970; EPA 1971a, 1971b). In 1969, the previous 12 Working Level Month (WLM) guide for the annual exposure to the short-lived decay products of ^{222}Rn was reduced, for a trial period, to 4 WLM. In 1971, EPA found that there was no adequate basis for less stringent protection, and recommended that the 4 WLM guide be retained.

The ICRP recently reviewed the epidemiological and dosimetric data for the two radon isotopes of concern in uranium mining. It recommended exposure guidance for ^{222}Rn that is comparable to the 4 WLM primary guide used in the United States. It also concluded that the risk from inhalation of the short-lived decay products of ^{220}Rn is about one-third that associated with ^{222}Rn decay products (ICRP 1981b). Although specific Federal guidance does not exist for the decay products of ^{220}Rn, the ICRP recommendation provides a basis for establishing, through comparison with the primary guide for ^{222}Rn, a guide of 12 WLM for ^{220}Rn.

The primary guides for radon isotopes and their short-lived decay products used in this report are given in the table below. There are no derived guides for radon.

Primary Guides for Radon and its Decay Products

Radon Isotope	Exposure (WLM)
Rn-222	4
Rn-220	12

DERIVED GUIDES

An Annual Limit on Intake (ALI) is defined as that activity of a radionuclide which, if inhaled or ingested by Reference Man (ICRP 1975), will result in a dose equal to the most limiting primary guide for committed dose.* The ALI for a particular radionuclide is, therefore, the largest value of annual intake, I, that satisfies the following constraints:

$$I\, h_{E,50} \leqslant 5 \text{ rem} \,, \tag{5a}$$

$$I\, h_{T,50} \leqslant 50 \text{ rem}, \quad \text{for all } T \,, \tag{5b}$$

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*For some nuclides of very low specific activity, the mass associated with an ALI is large. For example, the ALI for inhalation of ^{115}In in class D chemical form is 5×10^4 Bq (1 μCi), corresponding to a mass of 650 kg. In such cases, an intake in excess of the ALI clearly is not possible.

where the *tissue dose equivalent conversion factor*, $h_{T,50}$ is the committed dose equivalent to organ or tissue T per unit of activity of the radionuclide taken in by the specified route, and the *effective dose equivalent conversion factor*, $h_{E,50}$, is the committed effective dose equivalent per unit of activity.

A Derived Air Concentration (DAC) is defined as that concentration of radionuclide in air which, if breathed by Reference Man (ICRP 1975) for a work-year, would result in the intake of one ALI. That is, the concentration of a radionuclide in air is limited by

$$\int C(t)\, B\, dt \leqslant \mathrm{ALI}\ , \tag{6}$$

where C(t) is the concentration of the radionuclide in air at time t, B is the volume of air breathed by a worker per unit time, and the integration is carried out over a 2000 hour work-year. For the special case of constant air concentration, the DAC is related to the ALI through

$$\mathrm{DAC}\,(\mathrm{Bq/m^3}) = \mathrm{ALI}\,(\mathrm{Bq}) \,/\, 2.4 \times 10^3\,(\mathrm{m^3})\ , \tag{7}$$

based on a normal breathing rate B of 0.020 m^3/min. There are no derived guides for instantaneous or short-term values of C(t).

Some airborne radionuclides, in particular the noble gases, are not metabolized to an appreciable extent by the body. The methodology for calculating derived guides for these materials is based on consideration of the external dose, including dose to the lung, due to submersion in air containing the radionuclide. Submersion dose can also be the only significant exposure pathway for other airborne radionuclides of short half-life (i.e., a day or less) (ICRP 1984). For such situations, the DAC may be derived directly from the primary guides. Let $\dot{h}_{E,ext}$ denote the hourly dose equivalent rate from external exposure per unit concentration of airborne radionuclide. The annual average airborne concentration C must satisfy the constraints:

$$2000\, \dot{h}_{E,ext}\, C \leqslant 5\ \mathrm{rem}\ , \tag{8a}$$

$$2000\, \dot{h}_{E,ext}\, C \leqslant 50\ \mathrm{rem}\ , \quad \text{except lens , and} \tag{8b}$$

$$2000\, \dot{h}_{T,ext}\, C \leqslant 15\ \mathrm{rem}\ , \quad \text{lens ,} \tag{8c}$$

where $\dot{h}_{E,ext} = \sum_T w_T\, \dot{h}_{T,ext}$. There are 2000 hours in a work-year, and the subscripts E and T are used as before. When air concentration is limited by submersion dose, the DAC is the maximum value of C that satisfies the above inequalities.

If a worker is exposed to external sources and to more than one radionuclide, or to intake of a radionuclide by more than one route, the allowed exposure to each must be scaled appropriately to ensure that the primary guides are not exceeded:

$$H_{E,ext} + \sum_j \sum_k I_{jk}\, h^{j,k}_{E,50} \leqslant 5\ \mathrm{rem}\ , \qquad \text{and} \tag{9a}$$

$$H_{T,ext} + \sum_{j}\sum_{k} I_{jk}\, h^{j,k}_{T,50} \leq 50 \text{ rem} \ . \qquad (9b)$$

I_{jk} refers to the annual intake of the j-th radionuclide by the k-th route (ingestion or inhalation).

Numerical values of the derived guides

Numerical values of the derived guides for ingestion (ALIs) and for inhalation (ALIs and DACs) are given in Table 1, both in SI units (MBq and MBq/m^3, respectively) and in conventional units (μCi and μCi/cm^3). ALIs and DACs for the same radionuclide and chemical form are presented in the two sets of units in separate sub-tables on facing pages. Table 1.a, on the even numbered pages to the reader's left, contains the derived guides in SI units; Table 1.b, to the right, contains the ALIs and DACs for the same nuclides, expressed in conventional units.

Brief descriptions of the general features of the metabolic and dosimetric models employed are given in Chapter III and Appendix C. The values of the derived guides depend, in part, upon the chemical form of the radionuclide. Information on the classification of chemical compounds for lung clearance and on fractional absorption from the gastrointestinal tract is presented in Table 3.

Many factors affect the actual doses to individual workers, as opposed to those calculated here for Reference Man. Age, sex, physiology, and behavior all may influence the uptake and retention of radionuclides. The application of the numbers in Tables 1 and 2 to situations other than normal occupational exposure (e.g., accidental over-exposure, or exposure of the general public) requires careful consideration of the possible effects of these factors.

The derived guides in this Report relate solely to radiation doses and do not reflect chemical toxicity. The chemical effects of some materials, such as certain compounds of uranium or beryllium, may present risks significantly greater than those from irradiation. The chemical toxicity of radioactive contaminants in the workplace should therefore be examined also as part of a broad industrial radiation protection program. The recommendations of the American Conference of Governmental Industrial Hygienists (ACGIH) should be consulted for additional guidance in limiting the airborne concentration of chemical substances in the workplace (ACGIH, 1986).

Minors and the Unborn

The occupational exposure of individuals under the age of eighteen is limited by Recommendation 5 of the 1987 Federal guidance to one tenth of the values specified in Recommendations 3 and 4 for adult workers. The ALIs and DACs for these individuals are therefore one tenth the corresponding values for adults. While this course of action will not necessarily reduce the dose to workers under the age of eighteen by exactly a factor of ten, because of age dependent factors, it should suffice for regulatory purposes until more precise metabolic and dosimetric modeling is available.

The situation for pregnant workers is even less straightforward. Under Recommendation 6, the dose equivalent to an unborn as a result of occupational exposure of a woman who has declared that she is pregnant should not exceed 0.5 rem during the entire gestation period. While it is possible to estimate external dose to the fetus, including gamma irradiation due to submersion, the state of knowledge of the transfer of radionuclides from the mother to the unborn is incomplete. It is therefore advised that the prudent course of action laid out in the preamble of the guidance (page 2828) be followed—i.e., institute measures to avoid such intakes by pregnant women—until such information becomes available.

Tissue and Effective Dose Equivalent Conversion Factors

As indicated in equations 5, 8, and 9, the ALIs and DACs for any radionuclide and route of intake are determined by the limitation of non-stochastic and stochastic effects imposed by the primary guides. In many situations it is useful to know the committed dose equivalent to an organ or tissue per unit intake (independent of the occupational dose limitations), or the committed effective dose equivalent per unit intake. For each radionuclide, values for the organ dose equivalent conversion factors, $h_{T,50}$, and the effective dose equivalent conversion factor, $h_{E,50}$ (based on the weighting factors set forth by the ICRP (1977) and in the 1987 Federal guidance), are listed in Table 2.1 for inhalation, and in Table 2.2 for ingestion. The values for $\dot{h}_{E,ext}$ and $\dot{h}_{T,ext}$ for submersion are presented in Table 2.3. The conversion factor upon which the ALI or DAC depends is indicated by bold-faced type. Note that when the ALI is based on the nonstochistic limit for an organ or tissue, the conversion factor for that organ will be at least ten times greater than $h_{E,50}$ (or $\dot{h}_{E,50}$). These dose conversion factors may be used to calculate committed doses in any population that is characterized adequately by Reference Man (ICRP 1975).

III. CHANGES IN THE MODELS FOR DERIVED GUIDES

Significant improvements have been made in metabolic modeling and physiological data since the issuance of ICRP Publications 2 and 6. The most important of these have been in the model for translocation of inhaled materials from the lung and in the dosimetric model for tissues of the skeleton. The nature of these changes and their effects on the derived guides are briefly reviewed below and in Appendix C. Full details of the computational models, procedures, and data used to calculate the relationship between quantity or concentration of radionuclides and dose are presented in ICRP Publication 30, parts of which are reprinted in NCRP Report No. 84 (NCRP 1985).

TRANSFER OF INHALED MATERIAL FROM THE LUNG

The Respiratory Tract Model of ICRP 2

A simple model of the lung was used in ICRP Publication 2 to describe the translocation and retention of material by the body after inhalation. It was assumed that 25% of inhaled activity was exhaled and that 25% was deposited in the lower respiratory tract. The remaining 50% was deposited in the upper respiratory tract, subsequently cleared by means of the mucociliary mechanism, and swallowed. What happened then depended on whether the inhaled material was classified as soluble or insoluble.

Any *soluble* material deposited in the lower respiratory tract was assumed to be transferred directly to blood. Of the activity cleared from the upper respiratory tract and swallowed, a fraction f_1 entered the blood-stream via the gastro-intestinal (GI) tract. Thus $(0.25 + 0.50\ f_1)$ of the inhaled radionuclide was transferred to blood. A fraction f_2' of the activity in the blood passed to the critical organ, yielding a final fraction

$$f_a = (0.25+0.5f_1)f_2' \tag{10}$$

of the inhaled material that was transferred to the critical organ. Dose to the lung was ignored for soluble radionuclides.

It was assumed that radionuclides entering blood were delivered instantaneously to organs and that retention in an organ could be characterized by a single biological half-life. Although this approximation was known to represent the behavior of many radionuclides poorly, it was adopted for calculational convenience. To provide an element of conservatism, the longest half-life of any observed multi-exponential retention was used in the calculations.

The transfer of *insoluble* materials to blood was considered to be negligible, and the guides for these substances were based on direct irradiation of the lungs or of some segment of the GI tract. Half the activity deposited in the lower respiratory tract was assumed to be quickly cleared and swallowed, and the other half eliminated from it exponentially over time; an elimination biological half-life of 120 days was assigned to all insoluble compounds except those of plutonium and thorium, for which the values 1 and 4 years, respectively, were used.

The GI tract was represented as a series of four segments: the stomach, the small intestine, the upper large intestine, and the lower large intestine. The material reaching the stomach (after ingestion or after inhalation and clearance from the respiratory system) was assumed to reside there for 1 hour, after which it moved on to the small and large intestine. The dose to the wall of each intestine segment was calculated at the entrance to the segment.

The Respiratory Tract Model of ICRP 30

The dosimetric analysis of Publication 30 employs a more refined model of the deposition in and clearance from the respiratory tract of inhaled aerosols (ICRP 1966). Deposition of an airborne particulate form of radionuclide in the naso-pharyngeal, tracheo-bronchial, and pulmonary regions of the respiratory system is treated as a function of the AMAD* of the aerosol. Tabulated values of the derived guides are based on the assumption that the diameters of aerosol particles are distributed log-normally, with an AMAD of 1 μm. (Derived guides for other AMAD values can be computed from information in ICRP Publication 30.) Transfer of the deposited activity to the GI tract, lymphatic system, and blood is described by a set of coupled linear differential equations. Material deposited in any organ, including the lung, is assumed to be eliminated without redeposition in others. Clearance from the lung directly to blood or to the GI tract depends on the chemical form of the radionuclide (see Table 3), and is classified as D, W, and Y, respectively, for clearance times on the order of days, weeks, and years. The absorption of material from the GI tract into the body fluids, generally taken to occur within the small intestine, is parameterized by f_1.

The clearance kinetics of the Publication 30 model account for loss of material through radioactive decay. For radionuclides that form radioactive decay products, it is assumed that only the parent nuclide was inhaled. The calculated committed dose equivalent, however, does include the contribution from ingrowth of decay products over the period following intake. For simplicity, these decay products are assumed all to exhibit the same chemical characteristics as their parent nuclides.

Transit times through the segments of the GI tract and the masses of their walls and contents are as described in ICRP Publication 23 (ICRP 1975). The transport of material through the GI tract assumes exponential clearance from the segments. The dose to each segment of the tract is computed as an average over the mass of the wall of that segment.

The reader is referred to the report of the Task Group on Lung Dynamics (ICRP 1966) and subsequent ICRP publications (ICRP 1972, 1979a) for further details.

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*The Activity Median Aerodynamic Diameter (AMAD) is the diameter of a unit density sphere with the same terminal settling velocity in air as that of an aerosol particle whose activity is the median for the entire aerosol.

Comparison of Respiratory Tract Models

For the purpose of comparison, the fractional transfer of inhaled long-lived radionuclides to blood in the model of Publication 30 can be expressed in a manner analogous to that of Publication 2:

Fractional transfer of inhaled activity to blood for long-lived radionuclides

Publication 2		Publication 30	
Class	Fraction	Class	Fraction
Soluble	$0.25 + 0.50\,f_1$	D	$0.48 + 0.15\,f_1$
Insoluble	not considered	W	$0.12 + 0.51\,f_1$
		Y	$0.05 + 0.58\,f_1$

For soluble compounds with small f_1 values, the new model results in a higher transfer of activity to blood for class D compounds (0.48 vs 0.25), and a lower transfer for class W compounds. If f_1 lies near 1, the two approaches predict comparable transfers for class D and class W materials.

For insoluble materials, a useful measure of the committed dose equivalent to the lung itself is the time integral of the retained inhaled activity, normalized relative to the initial intake:

$$\frac{1}{A_0} \int_0^{50} A(t)\,dt\ . \tag{11}$$

A(t) is the activity in the lungs at time t, and the activity A_0 is inhaled at $t = 0$. In Publication 2 it was assumed that half of any insoluble radionuclide initially retained in the lower respiratory tract, i.e., 1/8 of the inhaled activity, was eliminated from it exponentially with a half-life of 120 days for all nuclides except plutonium (1 year) and thorium (4 years). The treatment of lung clearance in the new model is more complex, but the value of the integral in equation (11) depends only on the clearance class (ignoring physical decay). For a long-lived radionuclide, the time integrals of the normalized retention for the two models can be compared as:

Time integral of retention in lung for long-lived radionuclides in insoluble compounds

Publication 2		Publication 30	
Material	Integral (days*)	Class	Integral (days*)
Thorium	263	D	0.22
Plutonium	66	W	12
Other	22	Y	230

*Units: μCi-days per μCi inhaled—i.e., days.

For long-lived isotopes of plutonium in class Y compounds, the committed dose equivalent to the lungs [proportional to the integral in Eq. (11)] is about 4 times greater under the current model than under the old model (230 vs 66). For long-lived class Y radionuclides other than thorium or plutonium, the difference is even larger, a factor of 10. For compounds now in clearance class W, assignment to the insoluble form in the old model resulted in overestimations by factors of about 20, 5, and 2 for thorium, plutonium, and other radionuclides, respectively. Again, the loss of activity by radioactive decay has not been considered here.

In summary, the revised modeling of the clearance of material from the lung influenced the derived guides primarily through changes in the transfer of activity to blood and in the retention of activity in the lungs. For inhalation of soluble class D compounds with f_1 less than 10^{-2}, the current modeling indicates a transfer to blood twice that of Publications 2 and 6. For insoluble forms, the dose equivalent to the lung may have been over-estimated in Publication 2 by a factor of from 2 to 20 for class W compounds, and under-estimated by factors of from 4 to 10 for class Y compounds.

DOSIMETRY OF BONE-SEEKING RADIONUCLIDES

The dosimetric model for bone-seeking radionuclides has also been modified substantially. In the following comparison of the old and current models, the total activity present in the skeleton is assumed to be the same.

The Bone Dosimetry of Publication 2

The bone dosimetry model of Publication 2 compared the effective energy absorbed in the skeleton from a bone-seeking radionuclide with that for a body burden of 0.1 μCi of ^{226}Ra. It considered the dose to the 7 kg of marrow-free skeletal bone delivered by the radioactive material resident within the bone, but included only indirectly the effects on endosteal tissue of radionuclides that accumulate on bone surface.

The specific effective energy SEE(T ← S) is defined as the energy (in MeV), suitably modified with a radiation quality factor (Q), absorbed per gram of target tissue (T), per nuclear transformation occuring in the source tissue (S). Although the term 'SEE' was not used in Publication 2, an expression appropriate for that model would be of the form

$$\mathrm{SEE} = n\,Q\,E\,/\,m\ , \tag{12}$$

where the energy E emitted per disintegration was deposited entirely within the bone, of total mass m (7 kg). The quality factor Q was taken to be 1 for gamma-rays, X-rays, and beta particles; and 10 for alpha particles. The value of the 'relative damage factor,' n, was 1 for isotopes of radium and for pure gamma emitters, and 5 for other radionuclides that emit alpha or beta radiation; n was, in essence, a factor to account for additional damage that could be caused by radionuclides that, unlike radium, might be surface-seeking.

The Bone Dosimetry of Publication 30

In contrast to the old model, in which dose is averaged over the bone, the current model contains separate calculations of the dose equivalent to the active haematopoietic tissue within the cavities of trabecular bone, and to osteogenic cells, in particular those on the endosteal surfaces of bone.

Developing blood cells are found in various stages of maturation within the red marrow, which is therefore of concern with respect to the radiation induction of leukemia. The need to limit the dose to this tissue was recognised in Publication 2, but was not explicitly addressed in developing the recommendations for bone-seeking radionuclides.

The osteogenic cells are the precursors of cells involved in the formation of new bone (osteoblasts) and in the resorption of bone (osteoclasts), and are of concern with respect to carcinogenisis in bone. The location of the osteogenic cells in the skeleton is not well defined; for the purpose of calculating the derived guides, the average dose equivalent is determined over a 10 μm thick layer of soft tissue adjacent to the surface of the bone. The following discussion is limited to the example of particulate (alpha and beta) irradiation of endosteal tissues.

Energy deposition in endosteal tissues is averaged over a layer of cells near the bone surfaces, the mass m of which is taken to be 120 g. We distinguish between radionuclides that reside on bone surfaces and those that are distributed throughout the bone volume. The specific effective energy for endosteal tissue from a radionuclide distributed uniformly on bone surface may be expressed as

$$\mathrm{SEE^S(BS \leftarrow Bone) = [F^S(CB)\,AF^S(BS \leftarrow CB) + F^S(TB)\,AF^S(BS \leftarrow TB)]\,Q\,E/m}\ , \qquad (13)$$

where

E is the energy emitted per disintegration;

$F^S(CB)$ and $F^S(TB)$ denote the fractions of activity in the skeleton residing on the surfaces (^{S}) of cortical bone (CB) and trabecular bone (TB), and $F^S(CB) + F^S(TB) = 1$. Cortical and trabecular bone are defined as bone with a surface/volume ratio less than and greater than 60 $cm^2\,cm^{-3}$, respectively.

$AF^S(BS \leftarrow CB)$ and $AF^S(BS \leftarrow TB)$ are the fractions of the energy emitted from the surfaces of cortical and trabecular bone that are absorbed by the endosteal tissue at the bone surface (BS). $AF^S(BS \leftarrow CB)$ is normally smaller than $AF^S(BS \leftarrow TB)$ because of the greater absorption of radiation by the bone itself.

A corresponding equation can be written for $SEE^V(BS \leftarrow Bone)$ for radionuclides that deposit within bone volume (^{V}); $F^V(CB)$ would then be the fraction of activity that is dispersed evenly throughout cortical bone, and so on.

Values of parameters for the above formulation are contained in ICRP 30 (see Chapter 5 of ICRP 1979a). The quality factor Q for alpha radiation is taken to be 20, rather than 10 as in ICRP 2, and the 'relative damage factor' n is no longer used.

The two dosimetric models are compared in the table below. Since SEE is proportional to E in both, it is convenient to make the comparison in terms of the specific effective energy normalized with respect to energy, SEE/E. This is the fraction of emitted energy that is deposited in the target tissue, modified to account for radiation quality and for the spatial distribution of the radionuclide in the source tissue; as such, it is a measure of the relative degree of harm inflicted by a radionuclide upon the target tissues.

Effective energy deposited by bone-seeking radionuclides

Publication 2		Publication 30	
Radiation/Nuclide	SEE/E(gm^{-1})	Radiation/Nuclide	SEE/E(gm^{-1})
Alpha		Alpha	
Radium	1.4×10^{-3}	Volume emitters	2.2×10^{-3}
Other radionuclides	7.1×10^{-3}	Surface emitters	8.3×10^{-2}
Beta		Beta	
Radium	1.4×10^{-4}	Volume emitters	1.4×10^{-4}
Other radionuclides	7.1×10^{-4}	Surface emitters	
		$E < 0.2$ MeV	4.2×10^{-3}
		$E \geqslant 0.2$ MeV	3.3×10^{-4}

For radium-226, which is a volume seeker, the normalized specific effective energy (and thus the dose equivalent) to endosteal tissue under the new model is 1.6 ($2.2 \times 10^{-3}/1.4 \times 10^{-3}$) times greater than was the SEE/E to bone under the old; that is, the 0.1 μg ^{226}Ra skeletal burden considered in Publication 2 to result in a dose rate to bone of 30 rem/yr (0.3 Sv/yr) would, under the current model, deliver 50 rem/yr (0.5 Sv/yr) to endosteal tissue. For volume-distributed alpha emitters other than radium-226,* the dose equivalent to endosteal tissue under the new model is three times lower than that to bone as determined before. For surface-seeking alpha emitters, the corresponding ratio of calculated dose equivalents is 12.

The use of the new bone dosimetry model thus has a potentially major impact on the derived guides for alpha and low-energy beta emitters, particularly those that are surface-seekers.

SUBMERSION IN AIR

The old model considered the dose from an airborne concentration of inert radioactive materials (such as noble gas radioisotopes). Body shielding and attenuation in air were taken into account by assuming that only photon radiation and beta particles of energy greater than 0.1 MeV contribute to the whole body dose. For low energy beta emitters, only dose to skin was considered.

The new model considers the shielding of organs by overlying tissues and the degradation of the photon spectrum through scatter and attenuation by air. The dose from beta particles is

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*Because of its short half-life (3.66 d), ^{224}Ra has little time to diffuse into bone volume, and such a comparison would be misleading.

evaluated at a depth of 0.07 mm for skin, and at a depth of 3 mm for the lens of the eye. The worker is assumed to be immersed in pure parent radionuclide, and no radiation from airborne progeny is considered. In most cases, the concentration limit for submersion in a radioactive semi-infinite cloud is based on external irradiation of the body; it does not take into account either absorbed gas within the body or the inhalation of radioactive decay products. Exceptions are elemental tritium and ^{37}Ar, for which direct exposure of the lungs by inhaled activity limits (stochastically) concentration in air.

IV. MAGNITUDES AND SOURCES OF CHANGES IN THE DERIVED GUIDES

Comparison of the derived guides in this Report (Table 1) with those in ICRP Publications 2 and 6 reveals some substantial changes. Systematic comparisons are not made easily, however, because the chemical forms of inhaled materials are now characterized in a manner (by clearance class) different from that used previously (soluble vs. insoluble). The identification of specific causes of changes is further complicated by the large number of factors used in the calculations. Nonetheless, an attempt has been made to characterize the overall magnitudes and sources of changes, to identify those radionuclides for which the numerical derived guides are altered most significantly, and to determine the factors most responsible.

The following conventions were adopted for making these comparisons:

The derived guides of Publications 2 and 6 were tabulated as Maximum Permissible Concentrations (MPC) in air and water. The current derived guides are presented in terms of ALIs for inhalation or ingestion, and DACs for inhalation (or submersion). For a radionuclide whose derived guide does not change, the DAC is numerically equal to the old MPC in air.

For *inhalation* exposure: (a) The MPCs in air for soluble forms were compared with the DACs for compounds of lung clearance class D. In the cases where no DAC is calculated for class D compounds of a radionuclide, then the comparison was made with the DAC for class W compounds. It was considered inappropriate to compare soluble and class Y compounds. (b) The MPCs for the insoluble forms were compared with the DACs for class Y compounds. If no DAC is calculated for class Y compounds, then the comparison was made with the DAC for class W compounds, unless a class W compound had already been compared to the soluble compound.

For *ingestion* exposure: It is assumed that a worker ingests 1.1 liters of contaminated water each day, resulting in an intake of (50 wk/yr × 5 d/wk × 1100 cm^3/d × MPC $\mu Ci/cm^3$) μCi/yr. (a) If a radionuclide is assigned a single f_1 value, then the ALI was compared to the MPC in water for soluble compounds; (b) If compounds of the radionuclide are assigned two f_1 values, then the ALI for the higher value of f_1 was compared with the MPC for soluble compounds, and the low-f_1 ALI was compared with the MPC for the insoluble form.

Cases in which specific chemical forms (rather than lung class) are listed in Table 1, such as certain compounds of hydrogen, carbon, and nitrogen, were omitted from the comparison.

INHALATION

A comparison was made of the DACs and MPCs in air for all the radionuclides considered in this study, and the results appear in Fig. 2. The solid histogram shows the relative numbers of

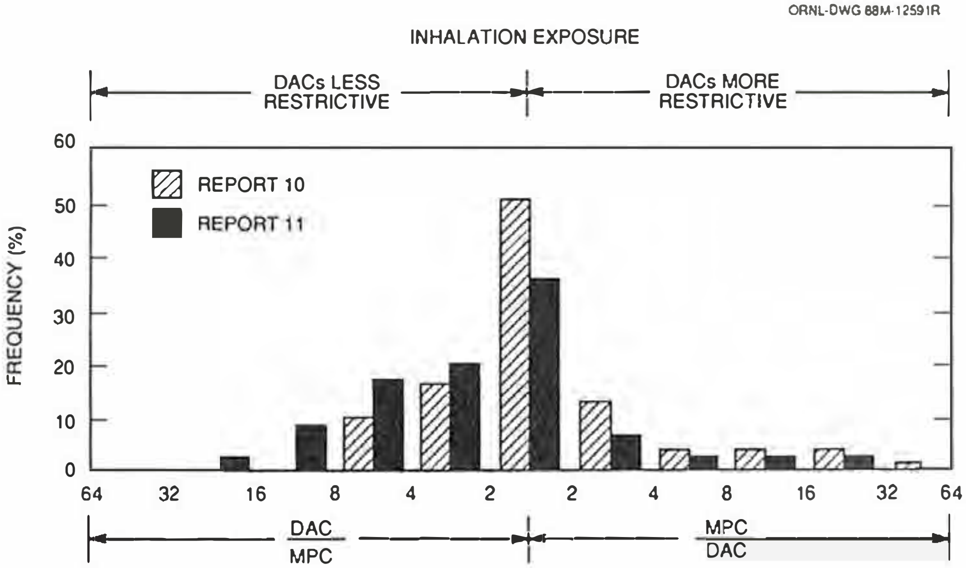

Fig. 2. Comparison of the old and new derived guides for inhalation. The solid histogram indicates the fraction of radionuclides for which the DAC listed in this report differs from the former MPC by a factor of between 1 and 2, 2 and 4, 4 and 8, etc. The hatched histogram shows the fraction of radionuclides for which the DAC changed by various factors solely as a consequence of new metabolic modeling and physiologic data, but with the old (1960) Federal guidance.

cases in which the value of the DAC is different from that of the MPC by a factor of between 1 and 2, 2 and 4, 4 and 8, and so on. (Note the logarithmic scale on the abscissa.) In about 65% of the cases, the values differ by less than a factor of four, and in one third, by less than a factor of two.

The hatched histogram of Fig. 2 (reproduced from Federal Guidance Report No. 10) shows the relative number of cases in which DACs changed solely because of revision of the metabolic modeling and physiologic data. The closeness of the two curves in Fig. 2 suggests that the differences between the current and the previous derived guides are attributable primarily to improved metabolic modeling and physiologic data, and only secondarily to the adoption of new values for the primary guides.

Each radionuclide for which the DAC is at least a factor of 16 different from its corresponding MPC is listed below. The MPCs that are based on the limits of FRC 1 (and the models of ICRP 2), and the relevant critical organs, comprise the first column. The middle column presents the derived guides, taken from Federal Guidance Report No. 10, that would be obtained with contemporary metabolic modeling and physiological data, but using the 1960 primary guides. The current DAC appears in the third column of numbers, and if the value of this DAC is determined by the non-stochastic 50 rem limit for any organ, then that organ is also noted. The changes for these radionuclides support the above observation that the revisions in the derived guides are due principally to improved modeling and data, rather than to the adoption of new primary guides.

Substantially changed derived guides for inhalation

Nuclide	MPC* ICRP 2 (μCi/cm^3)		DAC* Report 10 (μCi/cm^3)		DAC† Report 11 (μCi/cm^3)	
Revised guide more restrictive by factor >16:						
Zr-93	1×10^{-7} (S)	Bone	3×10^{-9}	B. surface	3×10^{-9} (D)	B. surface
	3×10^{-7} (I)	Lung	2×10^{-8}	B. surface	2×10^{-8} (Y)	B. surface
In-115	2×10^{-7} (S)	Kidney	2×10^{-10}	R. marrow	6×10^{-10} (D)	
	3×10^{-8} (I)	Lung	6×10^{-10}	R. marrow	2×10^{-9} (W)	
Ac-227	3×10^{-11} (I)	Lung	1×10^{-12}	Lung	2×10^{-12} (Y)	
Ac-228	8×10^{-8} (S)	Liver	4×10^{-9}	B. surface	4×10^{-9} (D)	B. surface
Pa-231	1×10^{-10} (I)	Lung	2×10^{-12}	B. surface	2×10^{-12} (Y)	B. surface
Pu-241	4×10^{-8} (I)	Lung	3×10^{-10}	B. surface	3×10^{-10} (Y)	B. surface
Am-244	4×10^{-6} (S)	Bone	7×10^{-8}	B. surface	8×10^{-8} (W)	B. surface
Cf-249	1×10^{-10} (I)	Lung	5×10^{-12}	Lung	4×10^{-12} (Y)	B. surface
Revised guide less restrictive by factor >16:						
C-14‡	4×10^{-6}	Fat	9×10^{-5}	Gonad	9×10^{-5}	
S-35	3×10^{-7} (S)	Testis	8×10^{-6}	Lung	7×10^{-6} (D)	
Mn-56	5×10^{-7} (I)	LLI	3×10^{-6}	Lung	9×10^{-6} (W)	
Ni-65	5×10^{-7} (I)	ULI	4×10^{-6}	Lung	1×10^{-5} (W)	
I-134	5×10^{-7} (S)	Thyroid	1×10^{-5}	Thyroid	2×10^{-5} (D)	
Re-187	5×10^{-7} (I)	Lung	2×10^{-5}	Lung	4×10^{-5} (W)	
Bi-210	6×10^{-9} (S)	Kidney	3×10^{-8}	Kidney	1×10^{-7} (D)	Kidney

[*] The chemical form is denoted S or I for soluble and insoluble, respectively; the organ listed is the critical organ.

[†] The lung clearance class is denoted D, W, or Y. If no organ is listed, the DAC is limited by the primary guide for stochastic effects; if an organ is listed, the DAC is based on limiting non-stochastic effects in the listed organ.

[‡] In the form of CO_2.

With the exceptions of ^{115}In and ^{227}Ac, all cases in which the current DACs are *more* restrictive than the MPCs (i.e., where the DACs are numerically *smaller* than the MPCs) involve the primary guide for non-stochastic effects at bone surfaces. All of these radionuclides, except ^{115}In, deposit on the surface of mineral bone (indium is taken up by the active marrow), but this is only part of the reason the revised values are more restrictive.

The DAC for ^{93}Zr is more restrictive primarily because of a change in the metabolic model: retention in bone is found to be eight times greater than was assumed earlier, and there is an increase in the transfer to the skeleton (due to increased clearance of class D compounds to blood, and consequent increased deposition in the skeleton). Other radiosotopes of zirconium are sufficiently short-lived that the greater skeletal retention does not substantially change their DACs.

The old metabolic model assumed that 4% of ^{115}In entering blood was translocated to the kidney (the critical organ), where it was retained with a biological half-time of 60 days. The current model assumes that 30% of indium entering the body fluids goes to the red marrow, where it is bound permanently. The DAC for ^{115}In (half-life of 5.1×10^{15} years) is of academic interest only, since its specific activity is so low that a concentration corresponding to the DAC could not be airborne. The other radioisotopes of indium are sufficiently short-lived that the new assumption of permanent retention in red marrow has no bearing on their DACs.

The more restrictive DAC for class Y compounds of ^{227}Ac results both from increased retention under the current lung model and from the increased quality factor Q (20 vs. 10) for alpha radiation. Members of the ^{227}Ac decay chain are sufficiently short-lived, relative to their parent, that the committed dose equivalent is proportional to the residence time in lung of the parent nuclide.

This, however, is not the case for the ^{228}Ac chain, where the first daughter, ^{228}Th, is long-lived relative to the parent. The source of the 20-fold more restrictive value is complex. In the old model, the ratio of activity of the first daughter to that of the parent in the critical organ (liver) was about 1, while the current model yields a ratio of 3 in the limiting organ (bone surface). The SEE for endosteal tissue at bone surface is about 14 times that for the liver, and the current lung model results in an increased transfer to blood (0.45 vs. 0.25). Finally, the current primary guide for bone surface (50 rem or 0.5 Sv) is about three times higher than the previous primary guide for liver (15 rem).

For ^{231}Pa, ^{241}Pu, and ^{249}Cf, clearance of insoluble material from the lung to the various organs was not considered previously. The current model, however, includes the transfer and uptake of activity for class Y compounds; this results in DACs limited by the dose equivalent to bone surfaces.

The DAC for ^{244}Am is more restrictive partly because of an error in the original MPC (ICRP 1964). The lowest lying nuclear state, with a half-life of 10.1 hours, was inadvertently assigned the 26 minute half-life of the metastable state. (^{244m}Am itself was not included in the tabulation of MPCs). The error was significant, since it is the physical half-life of ^{244}Am, and not its rate of biological clearance, that governs its retention in the body.

The DAC for $^{14}CO_2$ is 23 times *less* restrictive than the corresponding MPC mainly because retention decreased by a factor of 10. Also, in the current model the committed effective dose equivalent is determined over the total body mass, and subject to a 5 rem primary guide, rather than over the 10 kg of body fat, which had been the critical tissue with a 15 rem primary guide.

Current models project a much more rapid loss of ^{35}S from the body than was previously assumed. In the older model, 0.13% of the sulfur entering blood was transferred to the testes, the critical organ, where it was retained with a half-time of 623 days. The current model indicates that 80% of the sulfur introduced into body fluids is excreted promptly, 15% is retained with a biological half-time of 20 days, and the remaining 5% has a half-time of 2000 days.

The DACs for class W compounds of ^{56}Mn and ^{65}Ni are based primarily on dose to the lung, rather than to the GI tract as in the previous analysis. This, together with the change in the primary guides, results in the new values being less restrictive.

The old model assumed that a fraction of the inhaled activity of soluble radionuclides is transferred instantaneously to systemic organs, and considered neither radioactive decay nor the kinetics of clearance from the lung and uptake by the organs. The current model accounts for radiological decay during the finite time needed for lung clearance and transfer. This is of relevance for iodine which, after entering the transfer compartment (the body fluid), is translocated from it with a half-time of 6 hours. The physical half-life of ^{134}I (52.6 minutes), by comparison, is short; the 8-fold lower uptake by the thyroid, together with radiological decay during clearance from the lung, result in a DAC 40 times less restrictive than before.

The radionuclide ^{187}Re, like ^{115}In, is a low-specific activity radionuclide, with a half-life of 5×10^{10} years. The lung retains about the same amounts (to within a factor of 2) of inhaled class W and insoluble compounds, but the effective beta energy per disintegration is now evaluated as 6.6×10^{-4} MeV, rather than 0.012 MeV. This new decay energy evaluation for ^{187}Re is the main source of the factor of 40 increase in its DAC.

The DAC for ^{210}Bi is less restrictive because revised metabolic modeling of daughter radionuclides results in a factor of 10 lower residence time for the daughter ^{210}Po, the alpha emissions of which dominate the calculation of dose equivalent. In addition, the DAC is now based on application of the non-stochastic guide of 50 rem to the kidney, as opposed to the previous 15 rem guide for the same (critical) organ. The change in quality factor (20 vs. 10) for the ^{210}Po alpha emissions acts in the opposite direction.

Changes in Derived Guides for Some Important Radionuclides

In the table on the following page, we compare derived air concentrations for some of the most commonly encountered radionuclides. The first three columns of numbers list the MPCs derived for conformance to the 1960 primary guides, the derived guides from Federal Guidance Report No. 10, and the current DACs, respectively. The fourth column shows, for each radionuclide and lung clearance class, the factor q_m by which the 1960 derived guide must be multiplied to obtain that of Report No. 10. Because both of these correspond to the 1960 primary guide, q_m is a measure of the change brought about solely by improvements in the metabolic modeling and physiological data. Similarly, the fifth column presents the factors, q_g, needed to convert the derived guides of Report No. 10 into those consistent with the 1987 guidance; these factors reflect solely the effect of changes in the primary guides. Finally, to provide a measure of the relative significance of the two events (new modeling vs. new primary guides), the sixth column lists for each case the ratio of the magnitudes* of the shifts brought about by the two changes.

There is no simple way of comparing the overall impact of improved modeling with that of new primary guides. Some sense of the general trends can be obtained, however, from various averages of the q_m and q_g factors. The geometric and arithmetic means of the magnitudes of the factors q_m due to improved modeling are 2.8 and 4.1, respectively; and 1.9 and 2.1 for the factors q_g arises from the adoption of the new primary guides. This is suggestive that the changes brought about by improved modeling average a factor of about 2 times greater than those attributable to adoption of new primary guides, and is consistent with the histograms of Fig. 2.

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*The 'magnitude in the shift' due to new modeling is defined to be a number greater than or equal to one (i.e., the 'magnitude of q_m' is q_m if $q_m > 1$, and $1/q_m$ if $q_m < 1$). So also for q_g. 'ratio' = (magnitude of q_m)/(magnitude of q_g).

Changes in derived guides for inhalation for some important radionuclides

Nuclide/class		MPC (μCi/cm^3) ICRP 2	DAC (μCi/cm^3)				
			Report 10	Report 11	q_m	q_g	ratio*
P-32	D	7×10^{-8}	9×10^{-8}	4×10^{-7}	1.29	4.44	0.29
	W	8×10^{-8}	7×10^{-8}	2×10^{-7}	0.88	2.86	0.40
Mn-54	D	4×10^{-7}	3×10^{-7}	4×10^{-7}	0.75	1.33	1.0
	W	4×10^{-8}	3×10^{-7}	3×10^{-7}	7.50	1.00	7.5
Mn-56	D	8×10^{-7}	4×10^{-6}	6×10^{-6}	5.00	1.50	3.3
	W	5×10^{-7}	3×10^{-6}	9×10^{-6}	6.00	3.00	2.0
Co-58	W	8×10^{-7}	2×10^{-7}	5×10^{-7}	0.25	2.50	1.6
	Y	5×10^{-8}	1×10^{-7}	3×10^{-7}	2.00	3.00	0.67
Co-60	W	3×10^{-7}	5×10^{-8}	7×10^{-8}	0.17	1.40	4.3
	Y	9×10^{-9}	5×10^{-9}	1×10^{-8}	0.56	2.00	0.90
Sr-89	D	3×10^{-8}	1×10^{-7}	4×10^{-7}	3.33	4.00	0.83
	Y	4×10^{-8}	2×10^{-8}	6×10^{-8}	0.50	3.00	0.67
Sr-90	D	3×10^{-10}	2×10^{-9}	8×10^{-9}	6.67	4.00	1.7
	Y	5×10^{-9}	6×10^{-10}	2×10^{-9}	0.12	3.33	2.5
Zr-95	D	1×10^{-7}	4×10^{-8}	5×10^{-8}	0.40	1.25	2.0
	Y	3×10^{-8}	4×10^{-8}	1×10^{-7}	1.33	2.50	0.53
Nb-95	W	5×10^{-7}	3×10^{-7}	5×10^{-7}	0.60	1.67	1.0
	Y	1×10^{-7}	2×10^{-7}	5×10^{-7}	2.00	2.50	0.80
Mo-99	D	7×10^{-7}	9×10^{-7}	1×10^{-6}	1.29	1.11	1.2
	Y	2×10^{-7}	3×10^{-7}	6×10^{-7}	1.50	2.00	0.75
I-129	D	2×10^{-9}	2×10^{-9}	4×10^{-9}	1.00	2.00	0.50
I-131	D	9×10^{-9}	1×10^{-8}	2×10^{-8}	1.11	2.00	0.56
I-133	D	3×10^{-8}	7×10^{-8}	1×10^{-7}	2.33	1.43	1.6
Cs-134	D	4×10^{-8}	4×10^{-8}	4×10^{-8}	1.00	1.00	1.0
Cs-137	D	6×10^{-8}	6×10^{-8}	6×10^{-8}	1.00	1.00	1.0
Ce-144	W	1×10^{-8}	7×10^{-9}	1×10^{-8}	0.70	1.43	1.0
	Y	6×10^{-9}	2×10^{-9}	6×10^{-9}	0.33	3.00	1.0
Ra-226	W	3×10^{-11}	1×10^{-10}	3×10^{-10}	3.33	3.00	1.1
Th-228	W	9×10^{-12}	4×10^{-12}	4×10^{-12}	0.44	1.00	2.3
	Y	6×10^{-12}	2×10^{-12}	7×10^{-12}	0.33	3.50	0.86
Th-232	W	2×10^{-12}	5×10^{-13}	5×10^{-13}	0.25	1.00	4.0
	Y	1×10^{-11}	1×10^{-12}	1×10^{-12}	0.10	1.00	10
U-234	D	6×10^{-10}	4×10^{-10}	5×10^{-10}	0.67	1.25	1.2
	Y	1×10^{-10}	6×10^{-12}	2×10^{-11}	0.06	3.33	5.0
U-235	D	5×10^{-10}	4×10^{-10}	6×10^{-10}	0.80	1.50	0.83
	Y	1×10^{-10}	6×10^{-12}	2×10^{-11}	0.06	3.33	5.0
U-238	D	7×10^{-11}	4×10^{-10}	6×10^{-10}	5.71	1.50	3.8
	Y	1×10^{-10}	6×10^{-12}	2×10^{-11}	0.06	3.33	5.0
Pu-238	W	2×10^{-12}	3×10^{-12}	3×10^{-12}	1.50	1.00	1.5
	Y	3×10^{-11}	5×10^{-12}	8×10^{-12}	0.17	1.60	3.7
Pu-239	W	2×10^{-12}	2×10^{-12}	3×10^{-12}	1.00	1.50	0.7
	Y	4×10^{-11}	5×10^{-12}	7×10^{-12}	0.13	1.40	5.5
Am-241	W	6×10^{-12}	2×10^{-12}	3×10^{-12}	0.33	1.50	2.0

*q_m, q_g, and "ratio" are defined in the text.

INGESTION

For exposure by ingestion, a comparison of the MPCs for water with the ALIs for ingestion is shown as the solid histogram of Fig. 3. The values differ by less than a factor of four in about 80% of the cases, and by less than a factor of two for 30%. Comparison with the hatched histogram indicates that, as with inhalation, changes in the derived guides arise mainly because of updated metabolic modeling and physiologic data, and only secondarily because of the new primary guides.

The nuclides whose guides are substantially changed are tabulated on the next page. As with inhalation, the radionuclides whose revised values for ingestion have become *more* restrictive are primarily those for which bone surface (endosteal tissue) is the (non-stochastically) limiting organ. Here, too, all except ^{115}In deposit on bone.

Revision of the metabolic model has generally yielded greater uptake of these radionuclides from the gastrointestinal tract to blood (i.e., a larger f_1 parameter), and this has tended to be the dominant factor governing the changes in the ALIs. Other changes in the metabolic models, involving an increased fraction deposited in bone but lower skeletal retention, have had less effect. Adoption of the new dosimetric model, separating bone-seekers into surface- and volume-seekers, has contributed significantly to the changes.

For ^{115}In, in particular, the change in the retention within the body, discussed previously, is partly responsible for its revised value being more restrictive.

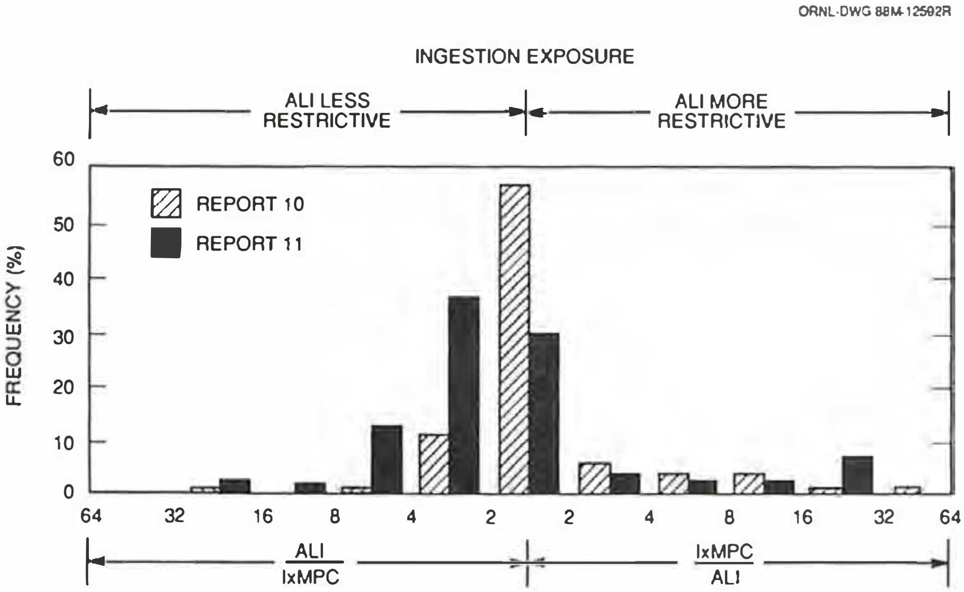

Fig. 3. Comparison of the old and new derived guides for ingestion. The solid and hatched histograms describe the same quantities as in Fig. 2. 'I' refers to intake for a work-year (1.1 l/d × 250 d/yr).

Substantially changed derived guides for ingestion

Nuclide	from MPC* ICRP 2 (μCi)		ALI Report No. 11 (μCi)	
Revised guide more restictive by factor >16				
In-115	800	LLI	40	
Sm-147	500	Bone	20	B. surface
Ac-227	20	Bone	0.2	B. surface
Pa-231	8	Bone	0.2	B. surface
Np-237	20	Bone	0.5	B. surface
Cf-250	100	Bone	1	B. surface
Revised guide less restictive by factor >16				
S-35	500	Testis	1×10^4	
Ca-45	80	Bone	2×10^3	
Ni-63	200	Bone	9×10^3	
Ge-71	1×10^4	LLI	5×10^5	
I-134	1×10^3	Thyroid	2×10^4	Thyroid
Re-187	2×10^4	LLI	6×10^5	
Ra-226	0.1	Bone	2	B. surface

*Quantity ingested in a year at the MPC. For all the MPCs, the soluble form is involved. The listed organ is the critical organ.

The derived standards for ^{45}Ca, ^{63}Ni, and ^{226}Ra are *less* restrictive. With the old metabolic model, half the ^{63}Ni that reached blood was transferred to bone, where it was retained with an 800 day half-time. With the current model, 68% of the nickel entering the transfer compartment is excreted, and 30% is distributed throughout the total body and retained with a 1,200 day biological half-life; the remaining 2% is transferred to the kidney, where it resides with a half-time of 0.2 days. With the lower uptake from the gastrointestinal tract (see the f_1 values listed in Table 3), the ALI is now limited by the 5 rem stochastic constraint on committed effective dose equivalent.

The old model took the biological half-life for ^{45}Ca in the skeleton to be 162 days, and 1.6×10^4 days for ^{226}Ra. Assuming that 90% of the calcium activity entering the blood is transferred to the skeleton, and 10% of the radium, then the time integrals of the skeletal retention of these radionuclides (as in equation 11) would be 210 and 1.3×10^3 days, respectively. Under the alkaline earth model of ICRP Publication 20 (ICRP 1973a), however, both integrals are approximately 100 days. This decreased retention of ^{45}Ca and ^{226}Ra in the skeleton is largely responsible for their higher (less restrictive) ALIs. Changes in the bone dosimetry (^{226}Ra is an alpha emitter, and ^{45}Ca is a low energy beta emitter; both are volume seekers), and the slightly reduced absorption from the gastrointestinal tract, also contribute to the changes.

SUBMERSION

Only a limited number of comparisons are possible for submersion, as this mode of exposure is of concern principally for noble gas radionuclides. Those that can be made are shown below:

Substantially changed derived guides for submersion

Nuclide	MPC ICRP 2 (μCi/cm^3)		DAC Report No. 11 (μCi/cm^3)	
H-3*	2×10^{-3}	Skin	5×10^{-1}	
Ar-37	6×10^{-3}	Skin	1	
Ar-41	2×10^{-6}	W. body	3×10^{-6}	
Kr-85m	6×10^{-6}	W. body	2×10^{-5}	
Kr-85	1×10^{-5}	W. body	1×10^{-4}	Skin
Kr-87	1×10^{-6}	W. body	5×10^{-6}	
Xe-131m	2×10^{-5}	W. body	4×10^{-4}	Skin
Xe-133	1×10^{-5}	W. body	1×10^{-4}	
Xe-135	4×10^{-6}	W. body	1×10^{-5}	

*elemental

For the most part, these DACs are less restrictive than the previous MPCs because the dosimetric model now takes into account the shielding of body organs by overlying tissues. Both ^{3}H and ^{37}Ar emit radiations that are too weak to penetrate the outer skin layer, and (stochastic) limitation is based on radionuclide content in the lungs. The DAC for ^{85}Kr also has been relaxed considerably since its beta emission only irradiates the skin. The DAC is based on limitation of non-stochastic effects in the skin; the MPC was derived assuming that beta particles of energy greater than 0.1 MeV contributed to the whole body dose.

SUMMARY

This Report presents new tables of derived guides for protection against the intake of radionuclides in the workplace. This revision has been necessitated both by improvements over the past several decades in the metabolic modeling of radionuclides and by the issuance of new Federal radiation protection guidance in 1987.

Comparison of the new derived guides with those that have been in use for nearly three decades indicates that, for about 70% of all radionuclides, the differences are not substantial, i.e., are less than a factor of four.

The use of revised metabolic and dosimetric models does, however, cause major alteration in the derived guides of some radionuclides. Of particular importance have been improvements in the lung and bone dosimetry models. New estimates of nuclear decay characteristics, uptake of body fluids, retention in lung and body tissues, and energy deposition have also been of significance. Changes in these parameters and models have been discussed in this Report for specific radionuclides only when they led to sizable revisions in the guides themselves; it should therefore not be concluded that the components of a radionuclide's dosimetric analysis have remained the same simply because the value of the guide has.

The tables of derived guides presented in Federal Guidance Report No. 10 and the present Report were obtained using, in most cases, the same metabolic models and physiological data, but different limiting values for dose. Comparisons between these, and with the tables of ICRP Publications 2 and 6, indicate that conversion to the 1987 Federal guidance has had an overall effect on the numerical values of the guides about half as great as that due to improvements in the metabolic modeling and physiological data.

TABLE 1

Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) for Occupational Exposure

Explanation of Entries

Units for ALIs and DACs:

ALIs and DACs for the various radionuclides and their chemical forms are expressed in Table 1 both in SI units (MBq and MBq/m^3, respectively) and in conventional units (μCi and μCi/cm^3). Table 1.a, on the even numbered pages to the reader's left, contains ALIs and DACs in SI units; Table 1.b, on the facing pages, contains the derived guides for the same nuclides, but expressed in conventional units.

Radionuclide/Half-life:

For each element, radionuclides of significance for radiation protection and their half-lives are listed in the first column. The symbols m, h, d, and y refer to minutes, hours, days, and years, respectively. The radionuclide designation follows conventional practice, with the symbol m denoting a metastable state. In some instances, such as with ^{182}Re, it is necessary to refer to the half-life to identify the radionuclide unambiguously.

Lung class, f_1, and Compounds:

These data characterize the chemical form assumed in the calculations. In the case of inhalation, the lung clearance class [D (days), W (weeks), or Y (years)] and the fractional uptake from the small intestine to blood (f_1) are shown, as well as the identification of assigned compounds. In the case of ingestion, only f_1 is shown. Table 3 provides information on the assignment of chemical compounds to clearance classes and f_1 values.

'Sub' denotes situations in which exposure is submersion-limited. Elements in 'Vapor' form deposited in lung are assumed to be totally taken up by blood.

Table 1.a. Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) for Occupational Exposure

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Hydrogen[†]					
H-3	Water, Vapor	3000	0.8	1	3000
12.35 y	Elemental, Sub		2 10^4		
Beryllium					
Be-7	W 0.005	800	0.3	0.005	2000
53.3 d	Y 0.005	700	0.3		
Be-10	W 0.005	6	0.002	0.005	40
1.6 10^6 y	Y 0.005	0.5	2 10^{-4}		
Carbon					
C-11	cmpds[*]	2 10^4	6	1	2 10^4
20.38 m	CO	4 10^4	20		
	CO_2	2 10^4	10		
C-14	cmpds[*]	90	0.04	1	90
5730 y	CO	6 10^4	30		
	CO_2	8000	3		
Fluorine					
F-18	D 1	3000	1	1	2000
109.77 m	W 1	3000	1		
	Y 1	3000	1		
Sodium					
Na-22	D 1	20	0.01	1	20
2.602 y					
Na-24	D 1	200	0.08	1	100
15.00 h					
Magnesium					
Mg-28	D 0.5	60	0.03	0.5	20
20.91 h	W 0.5	50	0.02		
Aluminum					
Al-26	D 0.01	2	0.001	0.01	10
7.16 10^5 y	W 0.01	3	0.001		
Silicon					
Si-31	D 0.01	900	0.4	0.01	300
157.3 m	W 0.01	1000	0.5		
	Y 0.01	1000	0.4		
Si-32	D 0.01	9	0.004	0.01	80
450 y	W 0.01	4	0.002		
	Y 0.01	0.2	8 10^{-5}		
Phosphorus					
P-32	D 0.8	30	0.01	0.8	20
14.29 d	W 0.8	10	0.006		

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[*] Labelled organic compounds.

[†] ALIs and DACs are not available for other tritiated compounds. Under normal environmental conditions, hydrogen gas may rapidly convert to the water vapor form.

Table 1.b. Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) for Occupational Exposure

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Hydrogen[†]					
H-3	Water, Vapor	8 10^4	2 10^{-5}	1	8 10^4
12.35 y	Elemental, Sub		0.5		
Beryllium					
Be-7	W 0.005	2 10^4	9 10^{-6}	0.005	4 10^4
53.3 d	Y 0.005	2 10^4	8 10^{-6}		
Be-10	W 0.005	200	6 10^{-8}	0.005	1000
1.6 10^6 y	Y 0.005	10	6 10^{-9}		
Carbon					
C-11	cmpds[*]	4 10^5	2 10^{-4}	1	4 10^5
20.38 m	CO	1 10^6	5 10^{-4}		
	CO_2	6 10^5	3 10^{-4}		
C-14	cmpds[*]	2000	1 10^{-6}	1	2000
5730 y	CO	2 10^6	7 10^{-4}		
	CO_2	2 10^5	9 10^{-5}		
Fluorine					
F-18	D 1	7 10^4	3 10^{-5}	1	5 10^4
109.77 m	W 1	9 10^4	4 10^{-5}		
	Y 1	8 10^4	3 10^{-5}		
Sodium					
Na-22	D 1	600	3 10^{-7}	1	400
2.602 y					
Na-24	D 1	5000	2 10^{-6}	1	4000
15.00 h					
Magnesium					
Mg-28	D 0.5	2000	7 10^{-7}	0.5	700
20.91 h	W 0.5	1000	5 10^{-7}		
Aluminum					
Al-26	D 0.01	60	3 10^{-8}	0.01	400
7.16 10^5 y	W 0.01	90	4 10^{-8}		
Silicon					
Si-31	D 0.01	3 10^4	1 10^{-5}	0.01	9000
157.3 m	W 0.01	3 10^4	1 10^{-5}		
	Y 0.01	3 10^4	1 10^{-5}		
Si-32	D 0.01	200	1 10^{-7}	0.01	2000
450 y	W 0.01	100	5 10^{-8}		
	Y 0.01	5	2 10^{-9}		
Phosphorus					
P-32	D 0.8	900	4 10^{-7}	0.8	600
14.29 d	W 0.8	400	2 10^{-7}		

[*] Labelled organic compounds.

[†] ALIs and DACs are not available for other tritiated compounds. Under normal environmental conditions, hydrogen gas may rapidly convert to the water vapor form.

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
P-33	D 0.8	300	0.1	0.8	200
25.4 d	W 0.8	100	0.04		
Sulphur					
S-35	D 0.8	600	0.3	0.8	400
87.44 d	W 0.8	80	0.03	0.1	200
	Vapor	500	0.2		
Chlorine					
Cl-36	D 1	90	0.04	1	60
3.01 10^5 y	W 1	9	0.004		
Cl-38	D 1	2000	0.6	1	600
37.21 m	W 1	2000	0.7		
Cl-39	D 1	2000	0.8	1	800
55.6 m	W 1	2000	0.9		
Argon					
Ar-37	Sub		5 10^4		
35.02 d					
Ar-39	Sub		7		
269 y					
Ar-41	Sub		0.1		
1.827 h					
Potassium					
K-40	D 1	10	0.006	1	10
1.28 10^9 y					
K-42	D 1	200	0.07	1	200
12.36 h					
K-43	D 1	300	0.1	1	200
22.6 h					
K-44	D 1	2000	1	1	800
22.13 m					
K-45	D 1	4000	2	1	1000
20 m					
Calcium					
Ca-41	W 0.3	100	0.06	0.3	100
1.4 10^5 y					
Ca-45	W 0.3	30	0.01	0.3	60
163 d					
Ca-47	W 0.3	30	0.01	0.3	30
4.53 d					
Scandium					
Sc-43	Y 1 10^{-4}	800	0.4	1 10^{-4}	300
3.891 h					

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	µCi	µCi/cm^3	f_1	µCi
P-33	D 0.8	8000	$4\ 10^{-6}$	0.8	6000
25.4 d	W 0.8	3000	$1\ 10^{-6}$		
Sulphur					
S-35	D 0.8	$2\ 10^{4}$	$7\ 10^{-6}$	0.8	$1\ 10^{4}$
87.44 d	W 0.8	2000	$9\ 10^{-7}$	0.1	6000
	Vapor	$1\ 10^{4}$	$6\ 10^{-6}$		
Chlorine					
Cl-36	D 1	2000	$1\ 10^{-6}$	1	2000
3.01 10^{5} y	W 1	200	$1\ 10^{-7}$		
Cl-38	D 1	$4\ 10^{4}$	$2\ 10^{-5}$	1	$2\ 10^{4}$
37.21 m	W 1	$5\ 10^{4}$	$2\ 10^{-5}$		
Cl-39	D 1	$5\ 10^{4}$	$2\ 10^{-5}$	1	$2\ 10^{4}$
55.6 m	W 1	$6\ 10^{4}$	$2\ 10^{-5}$		
Argon					
Ar-37	Sub		1		
35.02 d					
Ar-39	Sub		$2\ 10^{-4}$		
269 y					
Ar-41	Sub		$3\ 10^{-6}$		
1.827 h					
Potassium					
K-40	D 1	400	$2\ 10^{-7}$	1	300
1.28 10^{9} y					
K-42	D 1	5000	$2\ 10^{-6}$	1	5000
12.36 h					
K-43	D 1	9000	$4\ 10^{-6}$	1	6000
22.6 h					
K-44	D 1	$7\ 10^{4}$	$3\ 10^{-5}$	1	$2\ 10^{4}$
22.13 m					
K-45	D 1	$1\ 10^{5}$	$5\ 10^{-5}$	1	$3\ 10^{4}$
20 m					
Calcium					
Ca-41	W 0.3	4000	$2\ 10^{-6}$	0.3	3000
1.4 10^{5} y					
Ca-45	W 0.3	800	$4\ 10^{-7}$	0.3	2000
163 d					
Ca-47	W 0.3	900	$4\ 10^{-7}$	0.3	800
4.53 d					
Scandium					
Sc-43	Y 1 10^{-4}	$2\ 10^{4}$	$9\ 10^{-6}$	1 10^{-4}	7000
3.891 h					

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Sc-44	Y $1\ 10^{-4}$	400	0.2	$1\ 10^{-4}$	100
3.927 h					
Sc-44m	Y $1\ 10^{-4}$	30	0.01	$1\ 10^{-4}$	20
58.6 h					
Sc-46	Y $1\ 10^{-4}$	9	0.004	$1\ 10^{-4}$	30
83.83 d					
Sc-47	Y $1\ 10^{-4}$	100	0.05	$1\ 10^{-4}$	80
3.351 d					
Sc-48	Y $1\ 10^{-4}$	50	0.02	$1\ 10^{-4}$	30
43.7 h					
Sc-49	Y $1\ 10^{-4}$	2000	0.8	$1\ 10^{-4}$	800
57.4 m					
Titanium					
Ti-44	D 0.01	0.4	$2\ 10^{-4}$	0.01	10
47.3 y	W 0.01	1	$4\ 10^{-4}$		
	Y 0.01	0.2	$9\ 10^{-5}$		
Ti-45	D 0.01	900	0.4	0.01	300
3.08 h	W 0.01	1000	0.5		
	Y 0.01	1000	0.4		
Vanadium					
V-47	D 0.01	3000	1	0.01	1000
32.6 m	W 0.01	4000	2		
V-48	D 0.01	40	0.02	0.01	20
16.238 d	W 0.01	20	0.009		
V-49	D 0.01	1000	0.5	0.01	3000
330 d	W 0.01	700	0.3		
Chromium					
Cr-48	D 0.1	400	0.2	0.1	200
22.96 h	W 0.1	300	0.1	0.01	200
	Y 0.1	300	0.1		
Cr-49	D 0.1	3000	1	0.1	1000
42.09 m	W 0.1	4000	2	0.01	1000
	Y 0.1	3000	1		
Cr-51	D 0.1	2000	0.7	0.1	1000
27.704 d	W 0.1	900	0.4	0.01	1000
	Y 0.1	700	0.3		
Manganese					
Mn-51	D 0.1	2000	0.8	0.1	700
46.2 m	W 0.1	2000	0.9		
Mn-52	D 0.1	40	0.02	0.1	30
5.591 d	W 0.1	30	0.01		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Sc-44	Y 1 10^{-4}	1 10^{4}	5 10^{-6}	1 10^{-4}	4000
3.927 h					
Sc-44m	Y 1 10^{-4}	700	3 10^{-7}	1 10^{-4}	500
58.6 h					
Sc-46	Y 1 10^{-4}	200	1 10^{-7}	1 10^{-4}	900
83.83 d					
Sc-47	Y 1 10^{-4}	3000	1 10^{-6}	1 10^{-4}	2000
3.351 d					
Sc-48	Y 1 10^{-4}	1000	6 10^{-7}	1 10^{-4}	800
43.7 h					
Sc-49	Y 1 10^{-4}	5 10^{4}	2 10^{-5}	1 10^{-4}	2 10^{4}
57.4 m					
Titanium					
Ti-44	D 0.01	10	5 10^{-9}	0.01	300
47.3 y	W 0.01	30	1 10^{-8}		
	Y 0.01	6	2 10^{-9}		
Ti-45	D 0.01	3 10^{4}	1 10^{-5}	0.01	9000
3.08 h	W 0.01	4 10^{4}	1 10^{-5}		
	Y 0.01	3 10^{4}	1 10^{-5}		
Vanadium					
V-47	D 0.01	8 10^{4}	3 10^{-5}	0.01	3 10^{4}
32.6 m	W 0.01	1 10^{5}	4 10^{-5}		
V-48	D 0.01	1000	5 10^{-7}	0.01	600
16.238 d	W 0.01	600	3 10^{-7}		
V-49	D 0.01	3 10^{4}	1 10^{-5}	0.01	7 10^{4}
330 d	W 0.01	2 10^{4}	8 10^{-6}		
Chromium					
Cr-48	D 0.1	1 10^{4}	5 10^{-6}	0.1	6000
22.96 h	W 0.1	7000	3 10^{-6}	0.01	6000
	Y 0.1	7000	3 10^{-6}		
Cr-49	D 0.1	8 10^{4}	4 10^{-5}	0.1	3 10^{4}
42.09 m	W 0.1	1 10^{5}	4 10^{-5}	0.01	3 10^{4}
	Y 0.1	9 10^{4}	4 10^{-5}		
Cr-51	D 0.1	5 10^{4}	2 10^{-5}	0.1	4 10^{4}
27.704 d	W 0.1	2 10^{4}	1 10^{-5}	0.01	4 10^{4}
	Y 0.1	2 10^{4}	8 10^{-6}		
Manganese					
Mn-51	D 0.1	5 10^{4}	2 10^{-5}	0.1	2 10^{4}
46.2 m	W 0.1	6 10^{4}	3 10^{-5}		
Mn-52	D 0.1	1000	5 10^{-7}	0.1	700
5.591 d	W 0.1	900	4 10^{-7}		

Table 1.a, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Mn-52m	D 0.1	3000	1	0.1	1000
21.1 m	W 0.1	4000	2		
Mn-53	D 0.1	500	0.2	0.1	2000
3.7 10^6 y	W 0.1	400	0.2		
Mn-54	D 0.1	30	0.01	0.1	70
312.5 d	W 0.1	30	0.01		
Mn-56	D 0.1	600	0.2	0.1	200
2.5785 h	W 0.1	800	0.3		
Iron					
Fe-52	D 0.1	100	0.05	0.1	30
8.275 h	W 0.1	90	0.04		
Fe-55	D 0.1	70	0.03	0.1	300
2.7 y	W 0.1	200	0.06		
Fe-59	D 0.1	10	0.005	0.1	30
44.529 d	W 0.1	20	0.008		
Fe-60	D 0.1	0.2	1 10^{-4}	0.1	1
1 10^5 y	W 0.1	0.7	3 10^{-4}		
Cobalt					
Co-55	W 0.05	100	0.04	0.05	40
17.54 h	Y 0.05	100	0.04	0.3	60
Co-56	W 0.05	10	0.005	0.05	20
78.76 d	Y 0.05	7	0.003	0.3	20
Co-57	W 0.05	100	0.04	0.05	300
270.9 d	Y 0.05	20	0.01	0.3	200
Co-58	W 0.05	40	0.02	0.05	60
70.80 d	Y 0.05	30	0.01	0.3	50
Co-58m	W 0.05	3000	1	0.05	2000
9.15 h	Y 0.05	2000	1	0.3	2000
Co-60	W 0.05	6	0.003	0.05	20
5.271 y	Y 0.05	1	5 10^{-4}	0.3	7
Co-60m	W 0.05	1 10^5	60	0.05	4 10^4
10.47 m	Y 0.05	1 10^5	40	0.3	4 10^4
Co-61	W 0.05	2000	1	0.05	700
1.65 h	Y 0.05	2000	0.9	0.3	800
Co-62m	W 0.05	6000	3	0.05	1000
13.91 m	Y 0.05	6000	2	0.3	1000
Nickel					
Ni-56	D 0.05	70	0.03	0.05	50
6.10 d	W 0.05	50	0.02		
	Vapor	40	0.02		

Table 1.b, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Mn-52m	D 0.1	$9\ 10^4$	$4\ 10^{-5}$	0.1	$3\ 10^4$
21.1 m	W 0.1	$1\ 10^5$	$4\ 10^{-5}$		
Mn-53	D 0.1	$1\ 10^4$	$5\ 10^{-6}$	0.1	$5\ 10^4$
$3.7\ 10^6$ y	W 0.1	$1\ 10^4$	$5\ 10^{-6}$		
Mn-54	D 0.1	900	$4\ 10^{-7}$	0.1	2000
312.5 d	W 0.1	800	$3\ 10^{-7}$		
Mn-56	D 0.1	$2\ 10^4$	$6\ 10^{-6}$	0.1	5000
2.5785 h	W 0.1	$2\ 10^4$	$9\ 10^{-6}$		
Iron					
Fe-52	D 0.1	3000	$1\ 10^{-6}$	0.1	900
8.275 h	W 0.1	2000	$1\ 10^{-6}$		
Fe-55	D 0.1	2000	$8\ 10^{-7}$	0.1	9000
2.7 y	W 0.1	4000	$2\ 10^{-6}$		
Fe-59	D 0.1	300	$1\ 10^{-7}$	0.1	800
44.529 d	W 0.1	500	$2\ 10^{-7}$		
Fe-60	D 0.1	6	$3\ 10^{-9}$	0.1	30
$1\ 10^5$ y	W 0.1	20	$8\ 10^{-9}$		
Cobalt					
Co-55	W 0.05	3000	$1\ 10^{-6}$	0.05	1000
17.54 h	Y 0.05	3000	$1\ 10^{-6}$	0.3	2000
Co-56	W 0.05	300	$1\ 10^{-7}$	0.05	500
78.76 d	Y 0.05	200	$8\ 10^{-8}$	0.3	400
Co-57	W 0.05	3000	$1\ 10^{-6}$	0.05	8000
270.9 d	Y 0.05	700	$3\ 10^{-7}$	0.3	4000
Co-58	W 0.05	1000	$5\ 10^{-7}$	0.05	2000
70.80 d	Y 0.05	700	$3\ 10^{-7}$	0.3	1000
Co-58m	W 0.05	$9\ 10^4$	$4\ 10^{-5}$	0.05	$6\ 10^4$
9.15 h	Y 0.05	$6\ 10^4$	$3\ 10^{-5}$	0.3	$7\ 10^4$
Co-60	W 0.05	200	$7\ 10^{-8}$	0.05	500
5.271 y	Y 0.05	30	$1\ 10^{-8}$	0.3	200
Co-60m	W 0.05	$4\ 10^6$	0.002	0.05	$1\ 10^6$
10.47 m	Y 0.05	$3\ 10^6$	0.001	0.3	$1\ 10^6$
Co-61	W 0.05	$6\ 10^4$	$3\ 10^{-5}$	0.05	$2\ 10^4$
1.65 h	Y 0.05	$6\ 10^4$	$2\ 10^{-5}$	0.3	$2\ 10^4$
Co-62m	W 0.05	$2\ 10^5$	$7\ 10^{-5}$	0.05	$4\ 10^4$
13.91 m	Y 0.05	$2\ 10^5$	$6\ 10^{-5}$	0.3	$4\ 10^4$
Nickel					
Ni-56	D 0.05	2000	$8\ 10^{-7}$	0.05	1000
6.10 d	W 0.05	1000	$5\ 10^{-7}$		
	Vapor	1000	$5\ 10^{-7}$		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Ni-57 36.08 h	D 0.05	200	0.07	0.05	60
	W 0.05	100	0.05		
	Vapor	200	0.1		
Ni-59 7.5 10^4 y	D 0.05	100	0.06	0.05	900
	W 0.05	300	0.1		
	Vapor	70	0.03		
Ni-63 96 y	D 0.05	60	0.02	0.05	300
	W 0.05	100	0.04		
	Vapor	30	0.01		
Ni-65 2.520 h	D 0.05	900	0.4	0.05	300
	W 0.05	1000	0.5		
	Vapor	600	0.3		
Ni-66 54.6 h	D 0.05	60	0.02	0.05	10
	W 0.05	20	0.01		
	Vapor	100	0.05		
Copper					
Cu-60 23.2 m	D 0.5	3000	1	0.5	1000
	W 0.5	4000	2		
	Y 0.5	4000	2		
Cu-61 3.408 h	D 0.5	1000	0.5	0.5	500
	W 0.5	2000	0.6		
	Y 0.5	1000	0.5		
Cu-64 12.701 h	D 0.5	1000	0.5	0.5	400
	W 0.5	900	0.4		
	Y 0.5	800	0.3		
Cu-67 61.86 h	D 0.5	300	0.1	0.5	200
	W 0.5	200	0.08		
	Y 0.5	200	0.07		
Zinc					
Zn-62 9.26 h	Y 0.5	100	0.04	0.5	50
Zn-63 38.1 m	Y 0.5	3000	1	0.5	900
Zn-65 243.9 d	Y 0.5	10	0.004	0.5	10
Zn-69 57 m	Y 0.5	5000	2	0.5	2000
Zn-69m 13.76 h	Y 0.5	300	0.1	0.5	200
Zn-71m 3.92 h	Y 0.5	600	0.3	0.5	200

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	µCi	µCi/cm^3	f_1	µCi
Ni-57	D 0.05	5000	$2\ 10^{-6}$	0.05	2000
36.08 h	W 0.05	3000	$1\ 10^{-6}$		
	Vapor	6000	$3\ 10^{-6}$		
Ni-59	D 0.05	4000	$2\ 10^{-6}$	0.05	$2\ 10^{4}$
$7.5\ 10^{4}$ y	W 0.05	7000	$3\ 10^{-6}$		
	Vapor	2000	$8\ 10^{-7}$		
Ni-63	D 0.05	2000	$7\ 10^{-7}$	0.05	9000
96 y	W 0.05	3000	$1\ 10^{-6}$		
	Vapor	800	$3\ 10^{-7}$		
Ni-65	D 0.05	$2\ 10^{4}$	$1\ 10^{-5}$	0.05	8000
2.520 h	W 0.05	$3\ 10^{4}$	$1\ 10^{-5}$		
	Vapor	$2\ 10^{4}$	$7\ 10^{-6}$		
Ni-66	D 0.05	2000	$7\ 10^{-7}$	0.05	400
54.6 h	W 0.05	600	$3\ 10^{-7}$		
	Vapor	3000	$1\ 10^{-6}$		
Copper					
Cu-60	D 0.5	$9\ 10^{4}$	$4\ 10^{-5}$	0.5	$3\ 10^{4}$
23.2 m	W 0.5	$1\ 10^{5}$	$5\ 10^{-5}$		
	Y 0.5	$1\ 10^{5}$	$4\ 10^{-5}$		
Cu-61	D 0.5	$3\ 10^{4}$	$1\ 10^{-5}$	0.5	$1\ 10^{4}$
3.408 h	W 0.5	$4\ 10^{4}$	$2\ 10^{-5}$		
	Y 0.5	$4\ 10^{4}$	$1\ 10^{-5}$		
Cu-64	D 0.5	$3\ 10^{4}$	$1\ 10^{-5}$	0.5	$1\ 10^{4}$
12.701 h	W 0.5	$2\ 10^{4}$	$1\ 10^{-5}$		
	Y 0.5	$2\ 10^{4}$	$9\ 10^{-6}$		
Cu-67	D 0.5	8000	$3\ 10^{-6}$	0.5	5000
61.86 h	W 0.5	5000	$2\ 10^{-6}$		
	Y 0.5	5000	$2\ 10^{-6}$		
Zinc					
Zn-62	Y 0.5	3000	$1\ 10^{-6}$	0.5	1000
9.26 h					
Zn-63	Y 0.5	$7\ 10^{4}$	$3\ 10^{-5}$	0.5	$2\ 10^{4}$
38.1 m					
Zn-65	Y 0.5	300	$1\ 10^{-7}$	0.5	400
243.9 d					
Zn-69	Y 0.5	$1\ 10^{5}$	$6\ 10^{-5}$	0.5	$6\ 10^{4}$
57 m					
Zn-69m	Y 0.5	7000	$3\ 10^{-6}$	0.5	4000
13.76 h					
Zn-71m	Y 0.5	$2\ 10^{4}$	$7\ 10^{-6}$	0.5	6000
3.92 h					

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Zn-72 46.5 h	Y 0.5	40	0.02	0.5	40
Gallium					
Ga-65 15.2 m	D 0.001 W 0.001	6000 7000	3 3	0.001	2000
Ga-66 9.40 h	D 0.001 W 0.001	100 100	0.05 0.04	0.001	40
Ga-67 78.26 h	D 0.001 W 0.001	500 400	0.2 0.2	0.001	300
Ga-68 68.0 m	D 0.001 W 0.001	2000 2000	0.6 0.8	0.001	600
Ga-70 21.15 m	D 0.001 W 0.001	6000 7000	3 3	0.001	2000
Ga-72 14.1 h	D 0.001 W 0.001	100 100	0.05 0.05	0.001	40
Ga-73 4.91 h	D 0.001 W 0.001	600 600	0.2 0.2	0.001	200
Germanium					
Ge-66 2.27 h	D 1 W 1	1000 700	0.4 0.3	1	900
Ge-67 18.7 m	D 1 W 1	3000 4000	1 2	1	1000
Ge-68 288 d	D 1 W 1	100 4	0.06 0.002	1	200
Ge-69 39.05 h	D 1 W 1	600 300	0.2 0.1	1	500
Ge-71 11.8 d	D 1 W 1	2 10^4 2000	7 0.7	1	2 10^4
Ge-75 82.78 m	D 1 W 1	3000 3000	1 1	1	2000
Ge-77 11.30 h	D 1 W 1	400 200	0.2 0.09	1	300
Ge-78 87 m	D 1 W 1	800 800	0.3 0.3	1	800
Arsenic					
As-69 15.2 m	W 0.5	4000	2	0.5	1000
As-70 52.6 m	W 0.5	2000	0.8	0.5	500
As-71 64.8 h	W 0.5	200	0.07	0.5	100

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^{3}	f_1	μCi
Zn-72 46.5 h	Y 0.5	1000	$5\ 10^{-7}$	0.5	1000
Gallium					
Ga-65 15.2 m	D 0.001 W 0.001	$2\ 10^{5}$ $2\ 10^{5}$	$7\ 10^{-5}$ $8\ 10^{-5}$	0.001	$5\ 10^{4}$
Ga-66 9.40 h	D 0.001 W 0.001	4000 3000	$1\ 10^{-6}$ $1\ 10^{-6}$	0.001	1000
Ga-67 78.26 h	D 0.001 W 0.001	$1\ 10^{4}$ $1\ 10^{4}$	$6\ 10^{-6}$ $4\ 10^{-6}$	0.001	7000
Ga-68 68.0 m	D 0.001 W 0.001	$4\ 10^{4}$ $5\ 10^{4}$	$2\ 10^{-5}$ $2\ 10^{-5}$	0.001	$2\ 10^{4}$
Ga-70 21.15 m	D 0.001 W 0.001	$2\ 10^{5}$ $2\ 10^{5}$	$7\ 10^{-5}$ $8\ 10^{-5}$	0.001	$5\ 10^{4}$
Ga-72 14.1 h	D 0.001 W 0.001	4000 3000	$1\ 10^{-6}$ $1\ 10^{-6}$	0.001	1000
Ga-73 4.91 h	D 0.001 W 0.001	$2\ 10^{4}$ $2\ 10^{4}$	$6\ 10^{-6}$ $6\ 10^{-6}$	0.001	5000
Germanium					
Ge-66 2.27 h	D 1 W 1	$3\ 10^{4}$ $2\ 10^{4}$	$1\ 10^{-5}$ $8\ 10^{-6}$	1	$2\ 10^{4}$
Ge-67 18.7 m	D 1 W 1	$9\ 10^{4}$ $1\ 10^{5}$	$4\ 10^{-5}$ $4\ 10^{-5}$	1	$3\ 10^{4}$
Ge-68 288 d	D 1 W 1	4000 100	$2\ 10^{-6}$ $4\ 10^{-8}$	1	5000
Ge-69 39.05 h	D 1 W 1	$2\ 10^{4}$ 8000	$6\ 10^{-6}$ $3\ 10^{-6}$	1	$1\ 10^{4}$
Ge-71 11.8 d	D 1 W 1	$4\ 10^{5}$ $4\ 10^{4}$	$2\ 10^{-4}$ $2\ 10^{-5}$	1	$5\ 10^{5}$
Ge-75 82.78 m	D 1 W 1	$8\ 10^{4}$ $8\ 10^{4}$	$3\ 10^{-5}$ $4\ 10^{-5}$	1	$4\ 10^{4}$
Ge-77 11.30 h	D 1 W 1	$1\ 10^{4}$ 6000	$4\ 10^{-6}$ $2\ 10^{-6}$	1	9000
Ge-78 87 m	D 1 W 1	$2\ 10^{4}$ $2\ 10^{4}$	$9\ 10^{-6}$ $9\ 10^{-6}$	1	$2\ 10^{4}$
Arsenic					
As-69 15.2 m	W 0.5	$1\ 10^{5}$	$5\ 10^{-5}$	0.5	$3\ 10^{4}$
As-70 52.6 m	W 0.5	$5\ 10^{4}$	$2\ 10^{-5}$	0.5	$1\ 10^{4}$
As-71 64.8 h	W 0.5	5000	$2\ 10^{-6}$	0.5	4000

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
As-72 26.0 h	W 0.5	50	0.02	0.5	30
As-73 80.30 d	W 0.5	60	0.03	0.5	300
As-74 17.76 d	W 0.5	30	0.01	0.5	60
As-76 26.32 h	W 0.5	50	0.02	0.5	40
As-77 38.8 h	W 0.5	200	0.08	0.5	200
As-78 90.7 m	W 0.5	800	0.3	0.5	300
Selenium					
Se-70	D 0.8	1000	0.6	0.8	600
41.0 m	W 0.8	2000	0.7	0.05	400
Se-73	D 0.8	500	0.2	0.8	300
7.15 h	W 0.8	600	0.2	0.05	100
Se-73m	D 0.8	6000	2	0.8	2000
39 m	W 0.8	5000	2	0.05	1000
Se-75	D 0.8	30	0.01	0.8	20
119.8 d	W 0.8	20	0.009	0.05	100
Se-79	D 0.8	30	0.01	0.8	20
65000 y	W 0.8	20	0.009	0.05	200
Se-81	D 0.8	8000	3	0.8	2000
18.5 m	W 0.8	9000	4	0.05	2000
Se-81m	D 0.8	3000	1	0.8	1000
57.25 m	W 0.8	3000	1	0.05	900
Se-83	D 0.8	4000	2	0.8	2000
22.5 m	W 0.8	5000	2	0.05	1000
Bromine					
Br-74	D 1	3000	1	1	800
25.3 m	W 1	3000	1		
Br-74m	D 1	1000	0.6	1	500
41.5 m	W 1	2000	0.6		
Br-75	D 1	2000	0.7	1	1000
98 m	W 1	2000	0.8		
Br-76	D 1	200	0.07	1	100
16.2 h	W 1	200	0.07		
Br-77	D 1	900	0.4	1	600
56 h	W 1	700	0.3		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
As-72	W 0.5	1000	6 10^{-7}	0.5	900
26.0 h					
As-73	W 0.5	2000	7 10^{-7}	0.5	8000
80.30 d					
As-74	W 0.5	800	3 10^{-7}	0.5	1000
17.76 d					
As-76	W 0.5	1000	6 10^{-7}	0.5	1000
26.32 h					
As-77	W 0.5	5000	2 10^{-6}	0.5	4000
38.8 h					
As-78	W 0.5	2 10^{4}	9 10^{-6}	0.5	8000
90.7 m					
Selenium					
Se-70	D 0.8	4 10^{4}	2 10^{-5}	0.8	2 10^{4}
41.0 m	W 0.8	4 10^{4}	2 10^{-5}	0.05	1 10^{4}
Se-73	D 0.8	1 10^{4}	5 10^{-6}	0.8	7000
7.15 h	W 0.8	2 10^{4}	7 10^{-6}	0.05	3000
Se-73m	D 0.8	2 10^{5}	6 10^{-5}	0.8	6 10^{4}
39 m	W 0.8	1 10^{5}	6 10^{-5}	0.05	3 10^{4}
Se-75	D 0.8	700	3 10^{-7}	0.8	500
119.8 d	W 0.8	600	3 10^{-7}	0.05	3000
Se-79	D 0.8	800	3 10^{-7}	0.8	600
65000 y	W 0.8	600	2 10^{-7}	0.05	5000
Se-81	D 0.8	2 10^{5}	9 10^{-5}	0.8	6 10^{4}
18.5 m	W 0.8	2 10^{5}	1 10^{-4}	0.05	6 10^{4}
Se-81m	D 0.8	7 10^{4}	3 10^{-5}	0.8	4 10^{4}
57.25 m	W 0.8	7 10^{4}	3 10^{-5}	0.05	2 10^{4}
Se-83	D 0.8	1 10^{5}	5 10^{-5}	0.8	4 10^{4}
22.5 m	W 0.8	1 10^{5}	5 10^{-5}	0.05	3 10^{4}
Bromine					
Br-74	D 1	7 10^{4}	3 10^{-5}	1	2 10^{4}
25.3 m	W 1	8 10^{4}	4 10^{-5}		
Br-74m	D 1	4 10^{4}	2 10^{-5}	1	1 10^{4}
41.5 m	W 1	4 10^{4}	2 10^{-5}		
Br-75	D 1	5 10^{4}	2 10^{-5}	1	3 10^{4}
98 m	W 1	5 10^{4}	2 10^{-5}		
Br-76	D 1	5000	2 10^{-6}	1	4000
16.2 h	W 1	4000	2 10^{-6}		
Br-77	D 1	2 10^{4}	1 10^{-5}	1	2 10^{4}
56 h	W 1	2 10^{4}	8 10^{-6}		

Table 1.a, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Br-80	D 1	7000	3	1	2000
17.4 m	W 1	8000	3		
Br-80m	D 1	600	0.3	1	800
4.42 h	W 1	500	0.2		
Br-82	D 1	200	0.06	1	100
35.30 h	W 1	100	0.06		
Br-83	D 1	2000	1	1	2000
2.39 h	W 1	2000	1		
Br-84	D 1	2000	0.9	1	700
31.80 m	W 1	2000	1		
Krypton					
Kr-74	Sub		0.1		
11.50 m					
Kr-76	Sub		0.3		
14.8 h					
Kr-77	Sub		0.1		
74.7 m					
Kr-79	Sub		0.6		
35.04 h					
Kr-81	Sub		20		
$2.1\ 10^5$ y					
Kr-83m	Sub		400		
1.83 h					
Kr-85m	Sub		0.8		
4.48 h					
Kr-85	Sub		5		
10.72 y					
Kr-87	Sub		0.2		
76.3 m					
Kr-88	Sub		0.07		
2.84 h					
Rubidium					
Rb-79	D 1	4000	2	1	1000
22.9 m					
Rb-81	D 1	2000	0.8	1	1000
4.58 h					
Rb-81m	D 1	$1\ 10^4$	5	1	9000
32 m					
Rb-82m	D 1	700	0.3	1	400
6.2 h					

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Br-80	D 1	2 10^{5}	8 10^{-5}	1	5 10^{4}
17.4 m	W 1	2 10^{5}	9 10^{-5}		
Br-80m	D 1	2 10^{4}	7 10^{-6}	1	2 10^{4}
4.42 h	W 1	1 10^{4}	6 10^{-6}		
Br-82	D 1	4000	2 10^{-6}	1	3000
35.30 h	W 1	4000	2 10^{-6}		
Br-83	D 1	6 10^{4}	3 10^{-5}	1	5 10^{4}
2.39 h	W 1	6 10^{4}	3 10^{-5}		
Br-84	D 1	6 10^{4}	2 10^{-5}	1	2 10^{4}
31.80 m	W 1	6 10^{4}	3 10^{-5}		
Krypton					
Kr-74 11.50 m	Sub		3 10^{-6}		
Kr-76 14.8 h	Sub		9 10^{-6}		
Kr-77 74.7 m	Sub		4 10^{-6}		
Kr-79 35.04 h	Sub		2 10^{-5}		
Kr-81 2.1 10^{5} y	Sub		7 10^{-4}		
Kr-83m 1.83 h	Sub		0.01		
Kr-85m 4.48 h	Sub		2 10^{-5}		
Kr-85 10.72 y	Sub		1 10^{-4}		
Kr-87 76.3 m	Sub		5 10^{-6}		
Kr-88 2.84 h	Sub		2 10^{-6}		
Rubidium					
Rb-79 22.9 m	D 1	1 10^{5}	5 10^{-5}	1	4 10^{4}
Rb-81 4.58 h	D 1	5 10^{4}	2 10^{-5}	1	4 10^{4}
Rb-81m 32 m	D 1	3 10^{5}	1 10^{-4}	1	2 10^{5}
Rb-82m 6.2 h	D 1	2 10^{4}	7 10^{-6}	1	1 10^{4}

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f$_1$	MBq	MBq/m^3	f$_1$	MBq
Rb-83	D 1	40	0.02	1	20
86.2 d					
Rb-84	D 1	30	0.01	1	20
32.77 d					
Rb-86	D 1	30	0.01	1	20
18.66 d					
Rb-87	D 1	60	0.02	1	40
$4.7\ 10^{10}$ y					
Rb-88	D 1	2000	1	1	700
17.8 m					
Rb-89	D 1	5000	2	1	1000
15.2 m					
Strontium					
Sr-80	D 0.3	400	0.2	0.3	200
100 m	Y 0.01	500	0.2	0.01	200
Sr-81	D 0.3	3000	1	0.3	900
25.5 m	Y 0.01	3000	1	0.01	900
Sr-82	D 0.3	10	0.006	0.3	10
25 d	Y 0.01	3	0.001	0.01	7
Sr-83	D 0.3	300	0.1	0.3	100
32.4 h	Y 0.01	100	0.05	0.01	80
Sr-85	D 0.3	100	0.04	0.3	90
64.84 d	Y 0.01	60	0.02	0.01	100
Sr-85m	D 0.3	$2\ 10^{4}$	9	0.3	8000
69.5 m	Y 0.01	$3\ 10^{4}$	10	0.01	8000
Sr-87m	D 0.3	5000	2	0.3	2000
2.805 h	Y 0.01	6000	2	0.01	1000
Sr-89	D 0.3	30	0.01	0.3	20
50.5 d	Y 0.01	5	0.002	0.01	20
Sr-90	D 0.3	0.7	$3\ 10^{-4}$	0.3	1
29.12 y	Y 0.01	0.1	$6\ 10^{-5}$	0.01	20
Sr-91	D 0.3	200	0.09	0.3	80
9.5 h	Y 0.01	100	0.05	0.01	60
Sr-92	D 0.3	300	0.1	0.3	100
2.71 h	Y 0.01	200	0.1	0.01	100
Yttrium					
Y-86	W $1\ 10^{-4}$	100	0.05	$1\ 10^{-4}$	50
14.74 h	Y $1\ 10^{-4}$	100	0.05		
Y-86m	W $1\ 10^{-4}$	2000	0.9	$1\ 10^{-4}$	800
48 m	Y $1\ 10^{-4}$	2000	0.8		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Rb-83	D 1	1000	$4\ 10^{-7}$	1	600
86.2 d					
Rb-84	D 1	800	$3\ 10^{-7}$	1	500
32.77 d					
Rb-86	D 1	800	$3\ 10^{-7}$	1	500
18.66 d					
Rb-87	D 1	2000	$6\ 10^{-7}$	1	1000
$4.7\ 10^{10}$ y					
Rb-88	D 1	$6\ 10^{4}$	$3\ 10^{-5}$	1	$2\ 10^{4}$
17.8 m					
Rb-89	D 1	$1\ 10^{5}$	$6\ 10^{-5}$	1	$4\ 10^{4}$
15.2 m					
Strontium					
Sr-80	D 0.3	$1\ 10^{4}$	$5\ 10^{-6}$	0.3	4000
100 m	Y 0.01	$1\ 10^{4}$	$5\ 10^{-6}$	0.01	4000
Sr-81	D 0.3	$8\ 10^{4}$	$3\ 10^{-5}$	0.3	$3\ 10^{4}$
25.5 m	Y 0.01	$8\ 10^{4}$	$3\ 10^{-5}$	0.01	$2\ 10^{4}$
Sr-82	D 0.3	400	$2\ 10^{-7}$	0.3	300
25 d	Y 0.01	90	$4\ 10^{-8}$	0.01	200
Sr-83	D 0.3	7000	$3\ 10^{-6}$	0.3	3000
32.4 h	Y 0.01	4000	$1\ 10^{-6}$	0.01	2000
Sr-85	D 0.3	3000	$1\ 10^{-6}$	0.3	3000
64.84 d	Y 0.01	2000	$6\ 10^{-7}$	0.01	4000
Sr-85m	D 0.3	$6\ 10^{5}$	$3\ 10^{-4}$	0.3	$2\ 10^{5}$
69.5 m	Y 0.01	$8\ 10^{5}$	$4\ 10^{-4}$	0.01	$2\ 10^{5}$
Sr-87m	D 0.3	$1\ 10^{5}$	$5\ 10^{-5}$	0.3	$5\ 10^{4}$
2.805 h	Y 0.01	$2\ 10^{5}$	$6\ 10^{-5}$	0.01	$4\ 10^{4}$
Sr-89	D 0.3	800	$4\ 10^{-7}$	0.3	600
50.5 d	Y 0.01	100	$6\ 10^{-8}$	0.01	500
Sr-90	D 0.3	20	$8\ 10^{-9}$	0.3	30
29.12 y	Y 0.01	4	$2\ 10^{-9}$	0.01	400
Sr-91	D 0.3	6000	$2\ 10^{-6}$	0.3	2000
9.5 h	Y 0.01	4000	$1\ 10^{-6}$	0.01	2000
Sr-92	D 0.3	9000	$4\ 10^{-6}$	0.3	3000
2.71 h	Y 0.01	7000	$3\ 10^{-6}$	0.01	3000
Yttrium					
Y-86	W $1\ 10^{-4}$	3000	$1\ 10^{-6}$	$1\ 10^{-4}$	1000
14.74 h	Y $1\ 10^{-4}$	3000	$1\ 10^{-6}$		
Y-86m	W $1\ 10^{-4}$	$6\ 10^{4}$	$2\ 10^{-5}$	$1\ 10^{-4}$	$2\ 10^{4}$
48 m	Y $1\ 10^{-4}$	$5\ 10^{4}$	$2\ 10^{-5}$		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Y-87	W 1 10^{-4}	100	0.05	1 10^{-4}	80
80.3 h	Y 1 10^{-4}	100	0.05		
Y-88	W 1 10^{-4}	9	0.004	1 10^{-4}	40
106.64 d	Y 1 10^{-4}	9	0.004		
Y-90	W 1 10^{-4}	30	0.01	1 10^{-4}	20
64.0 h	Y 1 10^{-4}	20	0.009		
Y-90m	W 1 10^{-4}	500	0.2	1 10^{-4}	300
3.19 h	Y 1 10^{-4}	400	0.2		
Y-91	W 1 10^{-4}	6	0.003	1 10^{-4}	20
58.51 d	Y 1 10^{-4}	4	0.002		
Y-91m	W 1 10^{-4}	9000	4	1 10^{-4}	5000
49.71 m	Y 1 10^{-4}	6000	2		
Y-92	W 1 10^{-4}	300	0.1	1 10^{-4}	100
3.54 h	Y 1 10^{-4}	300	0.1		
Y-93	W 1 10^{-4}	100	0.04	1 10^{-4}	40
10.1 h	Y 1 10^{-4}	90	0.04		
Y-94	W 1 10^{-4}	3000	1	1 10^{-4}	800
19.1 m	Y 1 10^{-4}	3000	1		
Y-95	W 1 10^{-4}	6000	2	1 10^{-4}	1000
10.7 m	Y 1 10^{-4}	5000	2		
Zirconium					
Zr-86	D 0.002	100	0.06	0.002	50
16.5 h	W 0.002	100	0.04		
	Y 0.002	90	0.04		
Zr-88	D 0.002	8	0.003	0.002	100
83.4 d	W 0.002	20	0.007		
	Y 0.002	10	0.005		
Zr-89	D 0.002	100	0.05	0.002	60
78.43 h	W 0.002	90	0.04		
	Y 0.002	90	0.04		
Zr-93	D 0.002	0.2	1 10^{-4}	0.002	50
1.53 10^{6} y	W 0.002	0.9	4 10^{-4}		
	Y 0.002	2	9 10^{-4}		
Zr-95	D 0.002	5	0.002	0.002	50
63.98 d	W 0.002	10	0.006		
	Y 0.002	10	0.004		
Zr-97	D 0.002	70	0.03	0.002	20
16.90 h	W 0.002	50	0.02		
	Y 0.002	50	0.02		
Niobium					
Nb-88	W 0.01	8000	4	0.01	2000
14.3 m	Y 0.01	8000	3		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Y-87	W 1 10^{-4}	3000	1 10^{-6}	1 10^{-4}	2000
80.3 h	Y 1 10^{-4}	3000	1 10^{-6}		
Y-88	W 1 10^{-4}	300	1 10^{-7}	1 10^{-4}	1000
106.64 d	Y 1 10^{-4}	200	1 10^{-7}		
Y-90	W 1 10^{-4}	700	3 10^{-7}	1 10^{-4}	400
64.0 h	Y 1 10^{-4}	600	3 10^{-7}		
Y-90m	W 1 10^{-4}	1 10^{4}	5 10^{-6}	1 10^{-4}	8000
3.19 h	Y 1 10^{-4}	1 10^{4}	5 10^{-6}		
Y-91	W 1 10^{-4}	200	7 10^{-8}	1 10^{-4}	500
58.51 d	Y 1 10^{-4}	100	5 10^{-8}		
Y-91m	W 1 10^{-4}	2 10^{5}	1 10^{-4}	1 10^{-4}	1 10^{5}
49.71 m	Y 1 10^{-4}	2 10^{5}	7 10^{-5}		
Y-92	W 1 10^{-4}	9000	4 10^{-6}	1 10^{-4}	3000
3.54 h	Y 1 10^{-4}	8000	3 10^{-6}		
Y-93	W 1 10^{-4}	3000	1 10^{-6}	1 10^{-4}	1000
10.1 h	Y 1 10^{-4}	2000	1 10^{-6}		
Y-94	W 1 10^{-4}	8 10^{4}	3 10^{-5}	1 10^{-4}	2 10^{4}
19.1 m	Y 1 10^{-4}	8 10^{4}	3 10^{-5}		
Y-95	W 1 10^{-4}	2 10^{5}	6 10^{-5}	1 10^{-4}	4 10^{4}
10.7 m	Y 1 10^{-4}	1 10^{5}	6 10^{-5}		
Zirconium					
Zr-86	D 0.002	4000	2 10^{-6}	0.002	1000
16.5 h	W 0.002	3000	1 10^{-6}		
	Y 0.002	2000	1 10^{-6}		
Zr-88	D 0.002	200	9 10^{-8}	0.002	4000
83.4 d	W 0.002	500	2 10^{-7}		
	Y 0.002	300	1 10^{-7}		
Zr-89	D 0.002	4000	1 10^{-6}	0.002	2000
78.43 h	W 0.002	2000	1 10^{-6}		
	Y 0.002	2000	1 10^{-6}		
Zr-93	D 0.002	6	3 10^{-9}	0.002	1000
1.53 10^{6} y	W 0.002	20	1 10^{-8}		
	Y 0.002	60	2 10^{-8}		
Zr-95	D 0.002	100	5 10^{-8}	0.002	1000
63.98 d	W 0.002	400	2 10^{-7}		
	Y 0.002	300	1 10^{-7}		
Zr-97	D 0.002	2000	8 10^{-7}	0.002	600
16.90 h	W 0.002	1000	6 10^{-7}		
	Y 0.002	1000	5 10^{-7}		
Niobium					
Nb-88	W 0.01	2 10^{5}	9 10^{-5}	0.01	5 10^{4}
14.3 m	Y 0.01	2 10^{5}	9 10^{-5}		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Nb-89	W 0.01	700	0.3	0.01	200
122 m	Y 0.01	600	0.2		
Nb-89	W 0.01	2000	0.6	0.01	400
66 m	Y 0.01	1000	0.6		
Nb-90	W 0.01	100	0.04	0.01	40
14.60 h	Y 0.01	90	0.04		
Nb-93m	W 0.01	70	0.03	0.01	300
13.6 y	Y 0.01	6	0.003		
Nb-94	W 0.01	7	0.003	0.01	40
$2.03\ 10^4$ y	Y 0.01	0.6	$2\ 10^{-4}$		
Nb-95	W 0.01	50	0.02	0.01	80
35.15 d	Y 0.01	40	0.02		
Nb-95m	W 0.01	100	0.04	0.01	80
86.6 h	Y 0.01	80	0.03		
Nb-96	W 0.01	100	0.04	0.01	40
23.35 h	Y 0.01	90	0.04		
Nb-97	W 0.01	3000	1	0.01	800
72.1 m	Y 0.01	3000	1		
Nb-98	W 0.01	2000	0.8	0.01	500
51.5 m	Y 0.01	2000	0.8		
Molybdenum					
Mo-90	D 0.8	300	0.1	0.8	200
5.67 h	Y 0.05	200	0.07	0.05	70
Mo-93	D 0.8	200	0.08	0.8	100
$3.5\ 10^3$ y	Y 0.05	7	0.003	0.05	900
Mo-93m	D 0.8	700	0.3	0.8	300
6.85 h	Y 0.05	500	0.2	0.05	200
Mo-99	D 0.8	100	0.04	0.8	60
66.0 h	Y 0.05	50	0.02	0.05	40
Mo-101	D 0.8	5000	2	0.8	2000
14.62 m	Y 0.05	6000	2	0.05	2000
Technetium					
Tc-93	D 0.8	3000	1	0.8	1000
2.75 h	W 0.8	4000	2		
Tc-93m	D 0.8	6000	2	0.8	3000
43.5 m	W 0.8	$1\ 10^4$	5		
Tc-94	D 0.8	700	0.3	0.8	300
293 m	W 0.8	900	0.4		
Tc-94m	D 0.8	2000	0.7	0.8	700
52 m	W 0.8	2000	0.9		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Nb-89	W 0.01	2 10^4	8 10^{-6}	0.01	5000
122 m	Y 0.01	2 10^4	6 10^{-6}		
Nb-89	W 0.01	4 10^4	2 10^{-5}	0.01	1 10^4
66 m	Y 0.01	4 10^4	2 10^{-5}		
Nb-90	W 0.01	3000	1 10^{-6}	0.01	1000
14.60 h	Y 0.01	2000	1 10^{-6}		
Nb-93m	W 0.01	2000	8 10^{-7}	0.01	9000
13.6 y	Y 0.01	200	7 10^{-8}		
Nb-94	W 0.01	200	8 10^{-8}	0.01	900
2.03 10^4 y	Y 0.01	20	6 10^{-9}		
Nb-95	W 0.01	1000	5 10^{-7}	0.01	2000
35.15 d	Y 0.01	1000	5 10^{-7}		
Nb-95m	W 0.01	3000	1 10^{-6}	0.01	2000
86.6 h	Y 0.01	2000	9 10^{-7}		
Nb-96	W 0.01	3000	1 10^{-6}	0.01	1000
23.35 h	Y 0.01	2000	1 10^{-6}		
Nb-97	W 0.01	8 10^4	3 10^{-5}	0.01	2 10^4
72.1 m	Y 0.01	7 10^4	3 10^{-5}		
Nb-98	W 0.01	5 10^4	2 10^{-5}	0.01	1 10^4
51.5 m	Y 0.01	5 10^4	2 10^{-5}		
Molybdenum					
Mo-90	D 0.8	7000	3 10^{-6}	0.8	4000
5.67 h	Y 0.05	5000	2 10^{-6}	0.05	2000
Mo-93	D 0.8	5000	2 10^{-6}	0.8	4000
3.5 10^3 y	Y 0.05	200	8 10^{-8}	0.05	2 10^4
Mo-93m	D 0.8	2 10^4	7 10^{-6}	0.8	9000
6.85 h	Y 0.05	1 10^4	6 10^{-6}	0.05	4000
Mo-99	D 0.8	3000	1 10^{-6}	0.8	2000
66.0 h	Y 0.05	1000	6 10^{-7}	0.05	1000
Mo-101	D 0.8	1 10^5	6 10^{-5}	0.8	4 10^4
14.62 m	Y 0.05	1 10^5	6 10^{-5}	0.05	4 10^4
Technetium					
Tc-93	D 0.8	7 10^4	3 10^{-5}	0.8	3 10^4
2.75 h	W 0.8	1 10^5	4 10^{-5}		
Tc-93m	D 0.8	2 10^5	6 10^{-5}	0.8	7 10^4
43.5 m	W 0.8	3 10^5	1 10^{-4}		
Tc-94	D 0.8	2 10^4	8 10^{-6}	0.8	9000
293 m	W 0.8	2 10^4	1 10^{-5}		
Tc-94m	D 0.8	4 10^4	2 10^{-5}	0.8	2 10^4
52 m	W 0.8	6 10^4	2 10^{-5}		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Tc-95	D 0.8	800	0.3	0.8	400
20 h	W 0.8	700	0.3		
Tc-95m	D 0.8	200	0.08	0.8	100
61 d	W 0.8	70	0.03		
Tc-96	D 0.8	100	0.05	0.8	70
4.28 d	W 0.8	80	0.03		
Tc-96m	D 0.8	1 10^4	4	0.8	6000
51.5 m	W 0.8	9000	4		
Tc-97	D 0.8	2000	0.8	0.8	1000
2.6 10^6 y	W 0.8	200	0.09		
Tc-97m	D 0.8	200	0.1	0.8	200
87 d	W 0.8	40	0.02		
Tc-98	D 0.8	60	0.02	0.8	40
4.2 10^6 y	W 0.8	10	0.005		
Tc-99	D 0.8	200	0.08	0.8	100
2.13 10^5 y	W 0.8	20	0.01		
Tc-99m	D 0.8	6000	2	0.8	3000
6.02 h	W 0.8	9000	4		
Tc-101	D 0.8	1 10^4	5	0.8	3000
14.2 m	W 0.8	1 10^4	6		
Tc-104	D 0.8	3000	1	0.8	800
18.2 m	W 0.8	3000	1		
Ruthenium					
Ru-94	D 0.05	2000	0.7	0.05	600
51.8 m	W 0.05	2000	1		
	Y 0.05	2000	0.9		
Ru-97	D 0.05	700	0.3	0.05	300
2.9 d	W 0.05	500	0.2		
	Y 0.05	400	0.2		
Ru-103	D 0.05	60	0.03	0.05	70
39.28 d	W 0.05	40	0.02		
	Y 0.05	20	0.01		
Ru-105	D 0.05	500	0.2	0.05	200
4.44 h	W 0.05	500	0.2		
	Y 0.05	400	0.2		
Ru-106	D 0.05	3	0.001	0.05	7
368.2 d	W 0.05	2	8 10^{-4}		
	Y 0.05	0.4	2 10^{-4}		
Rhodium					
Rh-99	D 0.05	100	0.05	0.05	90
16 d	W 0.05	80	0.03		
	Y 0.05	70	0.03		

Table 1.b, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Tc-95	D 0.8	2 10^{4}	9 10^{-6}	0.8	1 10^{4}
20 h	W 0.8	2 10^{4}	8 10^{-6}		
Tc-95m	D 0.8	5000	2 10^{-6}	0.8	4000
61 d	W 0.8	2000	8 10^{-7}		
Tc-96	D 0.8	3000	1 10^{-6}	0.8	2000
4.28 d	W 0.8	2000	9 10^{-7}		
Tc-96m	D 0.8	3 10^{5}	1 10^{-4}	0.8	2 10^{5}
51.5 m	W 0.8	2 10^{5}	1 10^{-4}		
Tc-97	D 0.8	5 10^{4}	2 10^{-5}	0.8	4 10^{4}
2.6 10^{6} y	W 0.8	6000	2 10^{-6}		
Tc-97m	D 0.8	7000	3 10^{-6}	0.8	5000
87 d	W 0.8	1000	5 10^{-7}		
Tc-98	D 0.8	2000	7 10^{-7}	0.8	1000
4.2 10^{6} y	W 0.8	300	1 10^{-7}		
Tc-99	D 0.8	5000	2 10^{-6}	0.8	4000
2.13 10^{5} y	W 0.8	700	3 10^{-7}		
Tc-99m	D 0.8	2 10^{5}	6 10^{-5}	0.8	8 10^{4}
6.02 h	W 0.8	2 10^{5}	1 10^{-4}		
Tc-101	D 0.8	3 10^{5}	1 10^{-4}	0.8	9 10^{4}
14.2 m	W 0.8	4 10^{5}	2 10^{-4}		
Tc-104	D 0.8	7 10^{4}	3 10^{-5}	0.8	2 10^{4}
18.2 m	W 0.8	9 10^{4}	4 10^{-5}		
Ruthenium					
Ru-94	D 0.05	4 10^{4}	2 10^{-5}	0.05	2 10^{4}
51.8 m	W 0.05	6 10^{4}	3 10^{-5}		
	Y 0.05	6 10^{4}	2 10^{-5}		
Ru-97	D 0.05	2 10^{4}	8 10^{-6}	0.05	8000
2.9 d	W 0.05	1 10^{4}	5 10^{-6}		
	Y 0.05	1 10^{4}	5 10^{-6}		
Ru-103	D 0.05	2000	7 10^{-7}	0.05	2000
39.28 d	W 0.05	1000	4 10^{-7}		
	Y 0.05	600	3 10^{-7}		
Ru-105	D 0.05	1 10^{4}	6 10^{-6}	0.05	5000
4.44 h	W 0.05	1 10^{4}	6 10^{-6}		
	Y 0.05	1 10^{4}	5 10^{-6}		
Ru-106	D 0.05	90	4 10^{-8}	0.05	200
368.2 d	W 0.05	50	2 10^{-8}		
	Y 0.05	10	5 10^{-9}		
Rhodium					
Rh-99	D 0.05	3000	1 10^{-6}	0.05	2000
16 d	W 0.05	2000	9 10^{-7}		
	Y 0.05	2000	8 10^{-7}		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Rh-99m 4.7 h	D 0.05	2000	0.9	0.05	700
	W 0.05	3000	1		
	Y 0.05	2000	1		
Rh-100 20.8 h	D 0.05	200	0.08	0.05	60
	W 0.05	100	0.06		
	Y 0.05	100	0.06		
Rh-101 3.2 y	D 0.05	20	0.008	0.05	80
	W 0.05	30	0.01		
	Y 0.05	6	0.002		
Rh-101m 4.34 d	D 0.05	400	0.2	0.05	200
	W 0.05	300	0.1		
	Y 0.05	300	0.1		
Rh-102 2.9 y	D 0.05	3	0.001	0.05	20
	W 0.05	7	0.003		
	Y 0.05	2	9 10^{-4}		
Rh-102m 207 d	D 0.05	20	0.008	0.05	50
	W 0.05	10	0.006		
	Y 0.05	4	0.002		
Rh-103m 56.12 m	D 0.05	4 10^4	20	0.05	2 10^4
	W 0.05	5 10^4	20		
	Y 0.05	4 10^4	20		
Rh-105 35.36 h	D 0.05	400	0.2	0.05	100
	W 0.05	200	0.1		
	Y 0.05	200	0.09		
Rh-106m 132 m	D 0.05	900	0.4	0.05	300
	W 0.05	1000	0.6		
	Y 0.05	1000	0.5		
Rh-107 21.7 m	D 0.05	9000	4	0.05	3000
	W 0.05	1 10^4	4		
	Y 0.05	9000	4		
Palladium					
Pd-100 3.63 d	D 0.005	50	0.02	0.005	50
	W 0.005	50	0.02		
	Y 0.005	50	0.02		
Pd-101 8.27 h	D 0.005	1000	0.5	0.005	500
	W 0.005	1000	0.5		
	Y 0.005	1000	0.5		
Pd-103 16.96 d	D 0.005	200	0.1	0.005	200
	W 0.005	200	0.07		
	Y 0.005	100	0.05		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Rh-99m	D 0.05	6 10^{4}	2 10^{-5}	0.05	2 10^{4}
4.7 h	W 0.05	8 10^{4}	3 10^{-5}		
	Y 0.05	7 10^{4}	3 10^{-5}		
Rh-100	D 0.05	5000	2 10^{-6}	0.05	2000
20.8 h	W 0.05	4000	2 10^{-6}		
	Y 0.05	4000	2 10^{-6}		
Rh-101	D 0.05	500	2 10^{-7}	0.05	2000
3.2 y	W 0.05	800	3 10^{-7}		
	Y 0.05	200	6 10^{-8}		
Rh-101m	D 0.05	1 10^{4}	5 10^{-6}	0.05	6000
4.34 d	W 0.05	8000	4 10^{-6}		
	Y 0.05	8000	3 10^{-6}		
Rh-102	D 0.05	90	4 10^{-8}	0.05	600
2.9 y	W 0.05	200	7 10^{-8}		
	Y 0.05	60	2 10^{-8}		
Rh-102m	D 0.05	500	2 10^{-7}	0.05	1000
207 d	W 0.05	400	2 10^{-7}		
	Y 0.05	100	5 10^{-8}		
Rh-103m	D 0.05	1 10^{6}	5 10^{-4}	0.05	4 10^{5}
56.12 m	W 0.05	1 10^{6}	5 10^{-4}		
	Y 0.05	1 10^{6}	5 10^{-4}		
Rh-105	D 0.05	1 10^{4}	5 10^{-6}	0.05	4000
35.36 h	W 0.05	6000	3 10^{-6}		
	Y 0.05	6000	2 10^{-6}		
Rh-106m	D 0.05	3 10^{4}	1 10^{-5}	0.05	8000
132 m	W 0.05	4 10^{4}	2 10^{-5}		
	Y 0.05	4 10^{4}	1 10^{-5}		
Rh-107	D 0.05	2 10^{5}	1 10^{-4}	0.05	7 10^{4}
21.7 m	W 0.05	3 10^{5}	1 10^{-4}		
	Y 0.05	3 10^{5}	1 10^{-4}		
Palladium					
Pd-100	D 0.005	1000	6 10^{-7}	0.005	1000
3.63 d	W 0.005	1000	5 10^{-7}		
	Y 0.005	1000	6 10^{-7}		
Pd-101	D 0.005	3 10^{4}	1 10^{-5}	0.005	1 10^{4}
8.27 h	W 0.005	3 10^{4}	1 10^{-5}		
	Y 0.005	3 10^{4}	1 10^{-5}		
Pd-103	D 0.005	6000	3 10^{-6}	0.005	6000
16.96 d	W 0.005	4000	2 10^{-6}		
	Y 0.005	4000	1 10^{-6}		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Pd-107	D 0.005	800	0.3	0.005	1000
6.5 10^6 y	W 0.005	300	0.1		
	Y 0.005	10	0.006		
Pd-109	D 0.005	200	0.1	0.005	90
13.427 h	W 0.005	200	0.09		
	Y 0.005	200	0.07		
Silver					
Ag-102	D 0.05	7000	3	0.05	2000
12.9 m	W 0.05	8000	3		
	Y 0.05	7000	3		
Ag-103	D 0.05	4000	2	0.05	1000
65.7 m	W 0.05	5000	2		
	Y 0.05	4000	2		
Ag-104	D 0.05	3000	1	0.05	800
69.2 m	W 0.05	5000	2		
	Y 0.05	6000	2		
Ag-104m	D 0.05	4000	1	0.05	1000
33.5 m	W 0.05	5000	2		
	Y 0.05	4000	2		
Ag-105	D 0.05	40	0.02	0.05	100
41.0 d	W 0.05	60	0.03		
	Y 0.05	60	0.03		
Ag-106	D 0.05	7000	3	0.05	2000
23.96 m	W 0.05	8000	3		
	Y 0.05	7000	3		
Ag-106m	D 0.05	30	0.01	0.05	30
8.41 d	W 0.05	30	0.01		
	Y 0.05	30	0.01		
Ag-108m	D 0.05	7	0.003	0.05	20
127 y	W 0.05	9	0.004		
	Y 0.05	0.9	4 10^{-4}		
Ag-110m	D 0.05	5	0.002	0.05	20
249.9 d	W 0.05	7	0.003		
	Y 0.05	3	0.001		
Ag-111	D 0.05	60	0.02	0.05	30
7.45 d	W 0.05	30	0.01		
	Y 0.05	30	0.01		
Ag-112	D 0.05	300	0.1	0.05	100
3.12 h	W 0.05	400	0.2		
	Y 0.05	300	0.1		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Pd-107	D 0.005	2 10^4	9 10^{-6}	0.005	3 10^4
6.5 10^6 y	W 0.005	7000	3 10^{-6}		
	Y 0.005	400	2 10^{-7}		
Pd-109	D 0.005	6000	3 10^{-6}	0.005	2000
13.427 h	W 0.005	5000	2 10^{-6}		
	Y 0.005	5000	2 10^{-6}		
Silver					
Ag-102	D 0.05	2 10^5	8 10^{-5}	0.05	5 10^4
12.9 m	W 0.05	2 10^5	9 10^{-5}		
	Y 0.05	2 10^5	8 10^{-5}		
Ag-103	D 0.05	1 10^5	4 10^{-5}	0.05	4 10^4
65.7 m	W 0.05	1 10^5	5 10^{-5}		
	Y 0.05	1 10^5	5 10^{-5}		
Ag-104	D 0.05	7 10^4	3 10^{-5}	0.05	2 10^4
69.2 m	W 0.05	1 10^5	6 10^{-5}		
	Y 0.05	1 10^5	6 10^{-5}		
Ag-104m	D 0.05	9 10^4	4 10^{-5}	0.05	3 10^4
33.5 m	W 0.05	1 10^5	5 10^{-5}		
	Y 0.05	1 10^5	5 10^{-5}		
Ag-105	D 0.05	1000	4 10^{-7}	0.05	3000
41.0 d	W 0.05	2000	7 10^{-7}		
	Y 0.05	2000	7 10^{-7}		
Ag-106	D 0.05	2 10^5	8 10^{-5}	0.05	6 10^4
23.96 m	W 0.05	2 10^5	9 10^{-5}		
	Y 0.05	2 10^5	8 10^{-5}		
Ag-106m	D 0.05	700	3 10^{-7}	0.05	800
8.41 d	W 0.05	900	4 10^{-7}		
	Y 0.05	900	4 10^{-7}		
Ag-108m	D 0.05	200	8 10^{-8}	0.05	600
127 y	W 0.05	300	1 10^{-7}		
	Y 0.05	20	1 10^{-8}		
Ag-110m	D 0.05	100	5 10^{-8}	0.05	500
249.9 d	W 0.05	200	8 10^{-8}		
	Y 0.05	90	4 10^{-8}		
Ag-111	D 0.05	2000	6 10^{-7}	0.05	900
7.45 d	W 0.05	900	4 10^{-7}		
	Y 0.05	900	4 10^{-7}		
Ag-112	D 0.05	8000	3 10^{-6}	0.05	3000
3.12 h	W 0.05	1 10^4	4 10^{-6}		
	Y 0.05	9000	4 10^{-6}		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Ag-115	D 0.05	3000	1	0.05	1000
20.0 m	W 0.05	3000	1		
	Y 0.05	3000	1		
Cadmium					
Cd-104	D 0.05	2000	1	0.05	800
57.7 m	W 0.05	4000	2		
	Y 0.05	4000	2		
Cd-107	D 0.05	2000	0.8	0.05	800
6.49 h	W 0.05	2000	0.9		
	Y 0.05	2000	0.8		
Cd-109	D 0.05	1	$5\ 10^{-4}$	0.05	10
464 d	W 0.05	4	0.002		
	Y 0.05	4	0.002		
Cd-113	D 0.05	0.08	$3\ 10^{-5}$	0.05	0.8
$9.3\ 10^{15}$ y	W 0.05	0.3	$1\ 10^{-4}$		
	Y 0.05	0.5	$2\ 10^{-4}$		
Cd-113m	D 0.05	0.09	$4\ 10^{-5}$	0.05	0.9
13.6 y	W 0.05	0.3	$1\ 10^{-4}$		
	Y 0.05	0.5	$2\ 10^{-4}$		
Cd-115	D 0.05	50	0.02	0.05	30
53.46 h	W 0.05	50	0.02		
	Y 0.05	50	0.02		
Cd-115m	D 0.05	2	$8\ 10^{-4}$	0.05	10
44.6 d	W 0.05	5	0.002		
	Y 0.05	5	0.002		
Cd-117	D 0.05	400	0.2	0.05	200
2.49 h	W 0.05	600	0.3		
	Y 0.05	500	0.2		
Cd-117m	D 0.05	500	0.2	0.05	200
3.36 h	W 0.05	600	0.3		
	Y 0.05	500	0.2		
Indium					
In-109	D 0.02	2000	0.7	0.02	700
4.2 h	W 0.02	2000	1		
In-110	D 0.02	600	0.3	0.02	200
4.9 h	W 0.02	700	0.3		
In-110	D 0.02	2000	0.7	0.02	600
69.1 m	W 0.02	2000	0.9		
In-111	D 0.02	200	0.1	0.02	200
2.83 d	W 0.02	200	0.1		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Ag-115	D 0.05	9 10^{4}	4 10^{-5}	0.05	3 10^{4}
20.0 m	W 0.05	9 10^{4}	4 10^{-5}		
	Y 0.05	8 10^{4}	3 10^{-5}		
Cadmium					
Cd-104	D 0.05	7 10^{4}	3 10^{-5}	0.05	2 10^{4}
57.7 m	W 0.05	1 10^{5}	5 10^{-5}		
	Y 0.05	1 10^{5}	5 10^{-5}		
Cd-107	D 0.05	5 10^{4}	2 10^{-5}	0.05	2 10^{4}
6.49 h	W 0.05	6 10^{4}	2 10^{-5}		
	Y 0.05	5 10^{4}	2 10^{-5}		
Cd-109	D 0.05	40	1 10^{-8}	0.05	300
464 d	W 0.05	100	5 10^{-8}		
	Y 0.05	100	5 10^{-8}		
Cd-113	D 0.05	2	9 10^{-10}	0.05	20
9.3 10^{15} y	W 0.05	8	3 10^{-9}		
	Y 0.05	10	6 10^{-9}		
Cd-113m	D 0.05	2	1 10^{-9}	0.05	20
13.6 y	W 0.05	8	4 10^{-9}		
	Y 0.05	10	5 10^{-9}		
Cd-115	D 0.05	1000	6 10^{-7}	0.05	900
53.46 h	W 0.05	1000	5 10^{-7}		
	Y 0.05	1000	6 10^{-7}		
Cd-115m	D 0.05	50	2 10^{-8}	0.05	300
44.6 d	W 0.05	100	5 10^{-8}		
	Y 0.05	100	6 10^{-8}		
Cd-117	D 0.05	1 10^{4}	5 10^{-6}	0.05	5000
2.49 h	W 0.05	2 10^{4}	7 10^{-6}		
	Y 0.05	1 10^{4}	6 10^{-6}		
Cd-117m	D 0.05	1 10^{4}	5 10^{-6}	0.05	5000
3.36 h	W 0.05	2 10^{4}	7 10^{-6}		
	Y 0.05	1 10^{4}	6 10^{-6}		
Indium					
In-109	D 0.02	4 10^{4}	2 10^{-5}	0.02	2 10^{4}
4.2 h	W 0.02	6 10^{4}	3 10^{-5}		
In-110	D 0.02	2 10^{4}	7 10^{-6}	0.02	5000
4.9 h	W 0.02	2 10^{4}	8 10^{-6}		
In-110	D 0.02	4 10^{4}	2 10^{-5}	0.02	2 10^{4}
69.1 m	W 0.02	6 10^{4}	2 10^{-5}		
In-111	D 0.02	6000	3 10^{-6}	0.02	4000
2.83 d	W 0.02	6000	3 10^{-6}		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
In-112 14.4 m	D 0.02 W 0.02	$2\ 10^4$ $3\ 10^4$	10 10	0.02	6000
In-113m 1.658 h	D 0.02 W 0.02	5000 7000	2 3	0.02	2000
In-114m 49.51 d	D 0.02 W 0.02	2 4	0.001 0.002	0.02	10
In-115 $5.1\ 10^{15}$ y	D 0.02 W 0.02	0.05 0.2	$2\ 10^{-5}$ $8\ 10^{-5}$	0.02	1
In-115m 4.486 h	D 0.02 W 0.02	2000 2000	0.7 0.7	0.02	500
In-116m 54.15 m	D 0.02 W 0.02	3000 4000	1 2	0.02	900
In-117 43.8 m	D 0.02 W 0.02	6000 8000	3 3	0.02	2000
In-117m 116.5 m	D 0.02 W 0.02	1000 2000	0.5 0.7	0.02	400
In-119m 18.0 m	D 0.02 W 0.02	5000 5000	2 2	0.02	1000
Tin					
Sn-110 4.0 h	D 0.02 W 0.02	400 400	0.2 0.2	0.02	100
Sn-111 35.3 m	D 0.02 W 0.02	8000 $1\ 10^4$	3 4	0.02	3000
Sn-113 115.1 d	D 0.02 W 0.02	50 20	0.02 0.009	0.02	60
Sn-117m 13.61 d	D 0.02 W 0.02	50 50	0.02 0.02	0.02	60
Sn-119m 293.0 d	D 0.02 W 0.02	90 40	0.04 0.02	0.02	100
Sn-121 27.06 h	D 0.02 W 0.02	600 400	0.2 0.2	0.02	200
Sn-121m 55 y	D 0.02 W 0.02	30 20	0.01 0.008	0.02	100
Sn-123 129.2 d	D 0.02 W 0.02	20 6	0.01 0.003	0.02	20
Sn-123m 40.08 m	D 0.02 W 0.02	4000 5000	2 2	0.02	2000
Sn-125 9.64 d	D 0.02 W 0.02	30 10	0.01 0.005	0.02	10
Sn-126 $1.0\ 10^5$ y	D 0.02 W 0.02	2 2	$9\ 10^{-4}$ 0.001	0.02	10

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^{3}	f_1	μCi
In-112	D 0.02	$6\ 10^{5}$	$3\ 10^{-4}$	0.02	$2\ 10^{5}$
14.4 m	W 0.02	$7\ 10^{5}$	$3\ 10^{-4}$		
In-113m	D 0.02	$1\ 10^{5}$	$6\ 10^{-5}$	0.02	$5\ 10^{4}$
1.658 h	W 0.02	$2\ 10^{5}$	$8\ 10^{-5}$		
In-114m	D 0.02	60	$3\ 10^{-8}$	0.02	300
49.51 d	W 0.02	100	$4\ 10^{-8}$		
In-115	D 0.02	1	$6\ 10^{-10}$	0.02	40
5.1 10^{15} y	W 0.02	5	$2\ 10^{-9}$		
In-115m	D 0.02	$4\ 10^{4}$	$2\ 10^{-5}$	0.02	$1\ 10^{4}$
4.486 h	W 0.02	$5\ 10^{4}$	$2\ 10^{-5}$		
In-116m	D 0.02	$8\ 10^{4}$	$3\ 10^{-5}$	0.02	$2\ 10^{4}$
54.15 m	W 0.02	$1\ 10^{5}$	$5\ 10^{-5}$		
In-117	D 0.02	$2\ 10^{5}$	$7\ 10^{-5}$	0.02	$6\ 10^{4}$
43.8 m	W 0.02	$2\ 10^{5}$	$9\ 10^{-5}$		
In-117m	D 0.02	$3\ 10^{4}$	$1\ 10^{-5}$	0.02	$1\ 10^{4}$
116.5 m	W 0.02	$4\ 10^{4}$	$2\ 10^{-5}$		
In-119m	D 0.02	$1\ 10^{5}$	$5\ 10^{-5}$	0.02	$4\ 10^{4}$
18.0 m	W 0.02	$1\ 10^{5}$	$6\ 10^{-5}$		
Tin					
Sn-110	D 0.02	$1\ 10^{4}$	$5\ 10^{-6}$	0.02	4000
4.0 h	W 0.02	$1\ 10^{4}$	$5\ 10^{-6}$		
Sn-111	D 0.02	$2\ 10^{5}$	$9\ 10^{-5}$	0.02	$7\ 10^{4}$
35.3 m	W 0.02	$3\ 10^{5}$	$1\ 10^{-4}$		
Sn-113	D 0.02	1000	$5\ 10^{-7}$	0.02	2000
115.1 d	W 0.02	500	$2\ 10^{-7}$		
Sn-117m	D 0.02	1000	$5\ 10^{-7}$	0.02	2000
13.61 d	W 0.02	1000	$6\ 10^{-7}$		
Sn-119m	D 0.02	2000	$1\ 10^{-6}$	0.02	3000
293.0 d	W 0.02	1000	$4\ 10^{-7}$		
Sn-121	D 0.02	$2\ 10^{4}$	$6\ 10^{-6}$	0.02	6000
27.06 h	W 0.02	$1\ 10^{4}$	$5\ 10^{-6}$		
Sn-121m	D 0.02	900	$4\ 10^{-7}$	0.02	3000
55 y	W 0.02	500	$2\ 10^{-7}$		
Sn-123	D 0.02	600	$3\ 10^{-7}$	0.02	500
129.2 d	W 0.02	200	$7\ 10^{-8}$		
Sn-123m	D 0.02	$1\ 10^{5}$	$5\ 10^{-5}$	0.02	$5\ 10^{4}$
40.08 m	W 0.02	$1\ 10^{5}$	$6\ 10^{-5}$		
Sn-125	D 0.02	900	$4\ 10^{-7}$	0.02	400
9.64 d	W 0.02	400	$1\ 10^{-7}$		
Sn-126	D 0.02	60	$2\ 10^{-8}$	0.02	300
1.0 10^{5} y	W 0.02	70	$3\ 10^{-8}$		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Sn-127	D 0.02	700	0.3	0.02	300
2.10 h	W 0.02	700	0.3		
Sn-128	D 0.02	1000	0.4	0.02	400
59.1 m	W 0.02	1000	0.6		
Antimony					
Sb-115	D 0.1	9000	4	0.1	3000
31.8 m	W 0.01	$1\ 10^4$	5	0.01	3000
Sb-116	D 0.1	$1\ 10^4$	4	0.1	3000
15.8 m	W 0.01	$1\ 10^4$	5	0.01	3000
Sb-116m	D 0.1	3000	1	0.1	800
60.3 m	W 0.01	5000	2	0.01	800
Sb-117	D 0.1	8000	3	0.1	3000
2.80 h	W 0.01	$1\ 10^4$	4	0.01	3000
Sb-118m	D 0.1	700	0.3	0.1	200
5.00 h	W 0.01	800	0.3	0.01	200
Sb-119	D 0.1	2000	0.7	0.1	600
38.1 h	W 0.01	1000	0.4	0.01	500
Sb-120	D 0.1	$2\ 10^4$	7	0.1	4000
15.89 m	W 0.01	$2\ 10^4$	8	0.01	4000
Sb-120	D 0.1	80	0.03	0.1	40
5.76 d	W 0.01	50	0.02	0.01	30
Sb-122	D 0.1	90	0.04	0.1	30
2.70 d	W 0.01	40	0.02	0.01	30
Sb-124	D 0.1	30	0.01	0.1	20
60.20 d	W 0.01	9	0.004	0.01	20
Sb-124m	D 0.1	$3\ 10^4$	10	0.1	9000
93 s	W 0.01	$2\ 10^4$	9	0.01	9000
Sb-125	D 0.1	90	0.04	0.1	80
2.77 y	W 0.01	20	0.008	0.01	70
Sb-126	D 0.1	40	0.02	0.1	20
12.4 d	W 0.01	20	0.008	0.01	20
Sb-126m	D 0.1	7000	3	0.1	2000
19.0 m	W 0.01	7000	3	0.01	2000
Sb-127	D 0.1	80	0.03	0.1	30
3.85 d	W 0.01	30	0.01	0.01	30
Sb-128	D 0.1	$1\ 10^4$	6	0.1	3000
10.4 m	W 0.01	$2\ 10^4$	7	0.01	3000
Sb-128	D 0.1	200	0.07	0.1	50
9.01 h	W 0.01	100	0.05	0.01	40
Sb-129	D 0.1	300	0.1	0.1	100
4.32 h	W 0.01	300	0.1	0.01	100

Table 1.b, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Sn-127	D 0.02	2 10^4	8 10^{-6}	0.02	7000
2.10 h	W 0.02	2 10^4	8 10^{-6}		
Sn-128	D 0.02	3 10^4	1 10^{-5}	0.02	9000
59.1 m	W 0.02	4 10^4	1 10^{-5}		
Antimony					
Sb-115	D 0.1	2 10^5	1 10^{-4}	0.1	8 10^4
31.8 m	W 0.01	3 10^5	1 10^{-4}	0.01	8 10^4
Sb-116	D 0.1	3 10^5	1 10^{-4}	0.1	7 10^4
15.8 m	W 0.01	3 10^5	1 10^{-4}	0.01	7 10^4
Sb-116m	D 0.1	7 10^4	3 10^{-5}	0.1	2 10^4
60.3 m	W 0.01	1 10^5	6 10^{-5}	0.01	2 10^4
Sb-117	D 0.1	2 10^5	9 10^{-5}	0.1	7 10^4
2.80 h	W 0.01	3 10^5	1 10^{-4}	0.01	7 10^4
Sb-118m	D 0.1	2 10^4	8 10^{-6}	0.1	6000
5.00 h	W 0.01	2 10^4	9 10^{-6}	0.01	5000
Sb-119	D 0.1	5 10^4	2 10^{-5}	0.1	2 10^4
38.1 h	W 0.01	3 10^4	1 10^{-5}	0.01	1 10^4
Sb-120	D 0.1	4 10^5	2 10^{-4}	0.1	1 10^5
15.89 m	W 0.01	5 10^5	2 10^{-4}	0.01	1 10^5
Sb-120	D 0.1	2000	9 10^{-7}	0.1	1000
5.76 d	W 0.01	1000	5 10^{-7}	0.01	900
Sb-122	D 0.1	2000	1 10^{-6}	0.1	800
2.70 d	W 0.01	1000	4 10^{-7}	0.01	700
Sb-124	D 0.1	900	4 10^{-7}	0.1	600
60.20 d	W 0.01	200	1 10^{-7}	0.01	500
Sb-124m	D 0.1	8 10^5	4 10^{-4}	0.1	3 10^5
93 s	W 0.01	6 10^5	2 10^{-4}	0.01	2 10^5
Sb-125	D 0.1	2000	1 10^{-6}	0.1	2000
2.77 y	W 0.01	500	2 10^{-7}	0.01	2000
Sb-126	D 0.1	1000	5 10^{-7}	0.1	600
12.4 d	W 0.01	500	2 10^{-7}	0.01	500
Sb-126m	D 0.1	2 10^5	8 10^{-5}	0.1	5 10^4
19.0 m	W 0.01	2 10^5	8 10^{-5}	0.01	5 10^4
Sb-127	D 0.1	2000	9 10^{-7}	0.1	800
3.85 d	W 0.01	900	4 10^{-7}	0.01	700
Sb-128	D 0.1	4 10^5	2 10^{-4}	0.1	8 10^4
10.4 m	W 0.01	4 10^5	2 10^{-4}	0.01	8 10^4
Sb-128	D 0.1	4000	2 10^{-6}	0.1	1000
9.01 h	W 0.01	3000	1 10^{-6}	0.01	1000
Sb-129	D 0.1	9000	4 10^{-6}	0.1	3000
4.32 h	W 0.01	9000	4 10^{-6}	0.01	3000

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Sb-130 40 m	D 0.1 W 0.01	2000 3000	1 1	0.1 0.01	700 700
Sb-131 23 m	D 0.1 W 0.01	900 900	0.4 0.4	0.1 0.01	600 600
Tellurium					
Te-116 2.49 h	D 0.2 W 0.2	800 1000	0.3 0.5	0.2	300
Te-121 17 d	D 0.2 W 0.2	200 100	0.06 0.05	0.2	100
Te-121m 154 d	D 0.2 W 0.2	7 20	0.003 0.006	0.2	20
Te-123 1 10^{13} y	D 0.2 W 0.2	7 20	0.003 0.007	0.2	20
Te-123m 119.7 d	D 0.2 W 0.2	8 20	0.003 0.008	0.2	20
Te-125m 58 d	D 0.2 W 0.2	20 30	0.006 0.01	0.2	40
Te-127 9.35 h	D 0.2 W 0.2	800 600	0.3 0.3	0.2	300
Te-127m 109 d	D 0.2 W 0.2	10 9	0.004 0.004	0.2	20
Te-129 69.6 m	D 0.2 W 0.2	2000 3000	1 1	0.2	1000
Te-129m 33.6 d	D 0.2 W 0.2	20 9	0.01 0.004	0.2	20
Te-131 25.0 m	D 0.2 W 0.2	200 200	0.08 0.08	0.2	100
Te-131m 30 h	D 0.2 W 0.2	20 10	0.006 0.006	0.2	10
Te-132 78.2 h	D 0.2 W 0.2	9 8	0.004 0.003	0.2	8
Te-133 12.45 m	D 0.2 W 0.2	800 800	0.4 0.4	0.2	500
Te-133m 55.4 m	D 0.2 W 0.2	200 200	0.08 0.08	0.2	100
Te-134 41.8 m	D 0.2 W 0.2	900 900	0.4 0.4	0.2	600
Iodine					
I-120 81.0 m	D 1	300	0.1	1	100

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	µCi	µCi/cm^{3}	f_1	µCi
Sb-130	D 0.1	6 10^{4}	3 10^{-5}	0.1	2 10^{4}
40 m	W 0.01	8 10^{4}	3 10^{-5}	0.01	2 10^{4}
Sb-131	D 0.1	2 10^{4}	1 10^{-5}	0.1	1 10^{4}
23 m	W 0.01	2 10^{4}	1 10^{-5}	0.01	1 10^{4}
Tellurium					
Te-116	D 0.2	2 10^{4}	9 10^{-6}	0.2	8000
2.49 h	W 0.2	3 10^{4}	1 10^{-5}		
Te-121	D 0.2	4000	2 10^{-6}	0.2	3000
17 d	W 0.2	3000	1 10^{-6}		
Te-121m	D 0.2	200	8 10^{-8}	0.2	500
154 d	W 0.2	400	2 10^{-7}		
Te-123	D 0.2	200	8 10^{-8}	0.2	500
1 10^{13} y	W 0.2	400	2 10^{-7}		
Te-123m	D 0.2	200	9 10^{-8}	0.2	600
119.7 d	W 0.2	500	2 10^{-7}		
Te-125m	D 0.2	400	2 10^{-7}	0.2	1000
58 d	W 0.2	700	3 10^{-7}		
Te-127	D 0.2	2 10^{4}	9 10^{-6}	0.2	7000
9.35 h	W 0.2	2 10^{4}	7 10^{-6}		
Te-127m	D 0.2	300	1 10^{-7}	0.2	600
109 d	W 0.2	300	1 10^{-7}		
Te-129	D 0.2	6 10^{4}	3 10^{-5}	0.2	3 10^{4}
69.6 m	W 0.2	7 10^{4}	3 10^{-5}		
Te-129m	D 0.2	600	3 10^{-7}	0.2	500
33.6 d	W 0.2	200	1 10^{-7}		
Te-131	D 0.2	5000	2 10^{-6}	0.2	3000
25.0 m	W 0.2	5000	2 10^{-6}		
Te-131m	D 0.2	400	2 10^{-7}	0.2	300
30 h	W 0.2	400	2 10^{-7}		
Te-132	D 0.2	200	9 10^{-8}	0.2	200
78.2 h	W 0.2	200	9 10^{-8}		
Te-133	D 0.2	2 10^{4}	9 10^{-6}	0.2	1 10^{4}
12.45 m	W 0.2	2 10^{4}	9 10^{-6}		
Te-133m	D 0.2	5000	2 10^{-6}	0.2	3000
55.4 m	W 0.2	5000	2 10^{-6}		
Te-134	D 0.2	2 10^{4}	1 10^{-5}	0.2	2 10^{4}
41.8 m	W 0.2	2 10^{4}	1 10^{-5}		
Iodine					
I-120	D 1	9000	4 10^{-6}	1	4000
81.0 m					

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
I-120m 53 m	D 1	800	0.3	1	400
I-121 2.12 h	D 1	700	0.3	1	400
I-123 13.2 h	D 1	200	0.09	1	100
I-124 4.18 d	D 1	3	0.001	1	2
I-125 60.14 d	D 1	2	0.001	1	1
I-126 13.02 d	D 1	1	$5\ 10^{-4}$	1	0.8
I-128 24.99 m	D 1	4000	2	1	2000
I-129 $1.57\ 10^{7}$ y	D 1	0.3	$1\ 10^{-4}$	1	0.2
I-130 12.36 h	D 1	30	0.01	1	10
I-131 8.04 d	D 1	2	$7\ 10^{-4}$	1	1
I-132 2.30 h	D 1	300	0.1	1	100
I-132m 83.6 m	D 1	300	0.1	1	100
I-133 20.8 h	D 1	10	0.004	1	5
I-134 52.6 m	D 1	2000	0.7	1	800
I-135 6.61 h	D 1	60	0.02	1	30
Xenon					
Xe-120 40 m	Sub		0.4		
Xe-121 40.1 m	Sub		0.08		
Xe-122 20.1 h	Sub		3		
Xe-123 2.08 h	Sub		0.2		
Xe-125 17.0 h	Sub		0.6		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
I-120m 53 m	D 1	2 10^4	9 10^{-6}	1	1 10^4
I-121 2.12 h	D 1	2 10^4	8 10^{-6}	1	1 10^4
I-123 13.2 h	D 1	6000	3 10^{-6}	1	3000
I-124 4.18 d	D 1	80	3 10^{-8}	1	50
I-125 60.14 d	D 1	60	3 10^{-8}	1	40
I-126 13.02 d	D 1	40	1 10^{-8}	1	20
I-128 24.99 m	D 1	1 10^5	5 10^{-5}	1	4 10^4
I-129 1.57 10^7 y	D 1	9	4 10^{-9}	1	5
I-130 12.36 h	D 1	700	3 10^{-7}	1	400
I-131 8.04 d	D 1	50	2 10^{-8}	1	30
I-132 2.30 h	D 1	8000	3 10^{-6}	1	4000
I-132m 83.6 m	D 1	8000	4 10^{-6}	1	4000
I-133 20.8 h	D 1	300	1 10^{-7}	1	100
I-134 52.6 m	D 1	5 10^4	2 10^{-5}	1	2 10^4
I-135 6.61 h	D 1	2000	7 10^{-7}	1	800
Xenon					
Xe-120 40 m	Sub		1 10^{-5}		
Xe-121 40.1 m	Sub		2 10^{-6}		
Xe-122 20.1 h	Sub		7 10^{-5}		
Xe-123 2.08 h	Sub		6 10^{-6}		
Xe-125 17.0 h	Sub		2 10^{-5}		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Xe-127 36.41 d	Sub		0.5		
Xe-129m 8.0 d	Sub		7		
Xe-131m 11.9 d	Sub		10		
Xe-133m 2.188 d	Sub		5		
Xe-133 5.245 d	Sub		4		
Xe-135m 15.29 m	Sub		0.3		
Xe-135 9.09 h	Sub		0.5		
Xe-138 14.17 m	Sub		0.1		
Cesium					
Cs-125 45 m	D 1	5000	2	1	2000
Cs-127 6.25 h	D 1	4000	1	1	2000
Cs-129 32.06 h	D 1	1000	0.5	1	900
Cs-130 29.9 m	D 1	7000	3	1	2000
Cs-131 9.69 d	D 1	1000	0.5	1	800
Cs-132 6.475 d	D 1	100	0.06	1	100
Cs-134 2.062 y	D 1	4	0.002	1	3
Cs-134m 2.90 h	D 1	5000	2	1	4000
Cs-135 2.3 10^6 y	D 1	40	0.02	1	30
Cs-135m 53 m	D 1	7000	3	1	4000
Cs-136 13.1 d	D 1	20	0.01	1	20
Cs-137 30.0 y	D 1	6	0.002	1	4

Table 1.b, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Xe-127 36.41 d	Sub		1 10^{-5}		
Xe-129m 8.0 d	Sub		2 10^{-4}		
Xe-131m 11.9 d	Sub		4 10^{-4}		
Xe-133m 2.188 d	Sub		1 10^{-4}		
Xe-133 5.245 d	Sub		1 10^{-4}		
Xe-135m 15.29 m	Sub		9 10^{-6}		
Xe-135 9.09 h	Sub		1 10^{-5}		
Xe-138 14.17 m	Sub		4 10^{-6}		
Cesium					
Cs-125 45 m	D 1	1 10^{5}	6 10^{-5}	1	5 10^{4}
Cs-127 6.25 h	D 1	9 10^{4}	4 10^{-5}	1	6 10^{4}
Cs-129 32.06 h	D 1	3 10^{4}	1 10^{-5}	1	2 10^{4}
Cs-130 29.9 m	D 1	2 10^{5}	8 10^{-5}	1	6 10^{4}
Cs-131 9.69 d	D 1	3 10^{4}	1 10^{-5}	1	2 10^{4}
Cs-132 6.475 d	D 1	4000	2 10^{-6}	1	3000
Cs-134 2.062 y	D 1	100	4 10^{-8}	1	70
Cs-134m 2.90 h	D 1	1 10^{5}	6 10^{-5}	1	1 10^{5}
Cs-135 2.3 10^{6} y	D 1	1000	5 10^{-7}	1	700
Cs-135m 53 m	D 1	2 10^{5}	8 10^{-5}	1	1 10^{5}
Cs-136 13.1 d	D 1	700	3 10^{-7}	1	400
Cs-137 30.0 y	D 1	200	6 10^{-8}	1	100

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Cs-138 32.2 m	D 1	2000	0.9	1	700
Barium					
Ba-126 96.5 m	D 0.1	600	0.2	0.1	200
Ba-128 2.43 d	D 0.1	70	0.03	0.1	20
Ba-131 11.8 d	D 0.1	300	0.1	0.1	100
Ba-131m 14.6 m	D 0.1	$5\ 10^4$	20	0.1	$1\ 10^4$
Ba-133 10.74 y	D 0.1	30	0.01	0.1	60
Ba-133m 38.9 h	D 0.1	300	0.1	0.1	90
Ba-135m 28.7 h	D 0.1	400	0.2	0.1	100
Ba-139 82.7 m	D 0.1	1000	0.5	0.1	500
Ba-140 12.74 d	D 0.1	50	0.02	0.1	20
Ba-141 18.27 m	D 0.1	3000	1	0.1	900
Ba-142 10.6 m	D 0.1	5000	2	0.1	2000
Lanthanum					
La-131 59 m	D 0.001 W 0.001	4000 6000	2 3	0.001	2000
La-132 4.8 h	D 0.001 W 0.001	400 400	0.2 0.2	0.001	100
La-135 19.5 h	D 0.001 W 0.001	4000 4000	2 1	0.001	1000
La-137 $6\ 10^4$ y	D 0.001 W 0.001	2 10	0.001 0.004	0.001	400
La-138 $1.35\ 10^{11}$ y	D 0.001 W 0.001	0.1 0.5	$5\ 10^{-5}$ $2\ 10^{-4}$	0.001	30
La-140 40.272 h	D 0.001 W 0.001	50 40	0.02 0.02	0.001	20
La-141 3.93 h	D 0.001 W 0.001	300 400	0.1 0.2	0.001	100

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Cs-138	D 1	6 10^4	2 10^{-5}	1	2 10^4
32.2 m					
Barium					
Ba-126	D 0.1	2 10^4	6 10^{-6}	0.1	6000
96.5 m					
Ba-128	D 0.1	2000	7 10^{-7}	0.1	500
2.43 d					
Ba-131	D 0.1	8000	3 10^{-6}	0.1	3000
11.8 d					
Ba-131m	D 0.1	1 10^6	6 10^{-4}	0.1	4 10^5
14.6 m					
Ba-133	D 0.1	700	3 10^{-7}	0.1	2000
10.74 y					
Ba-133m	D 0.1	9000	4 10^{-6}	0.1	2000
38.9 h					
Ba-135m	D 0.1	1 10^4	5 10^{-6}	0.1	3000
28.7 h					
Ba-139	D 0.1	3 10^4	1 10^{-5}	0.1	1 10^4
82.7 m					
Ba-140	D 0.1	1000	6 10^{-7}	0.1	500
12.74 d					
Ba-141	D 0.1	7 10^4	3 10^{-5}	0.1	2 10^4
18.27 m					
Ba-142	D 0.1	1 10^5	6 10^{-5}	0.1	5 10^4
10.6 m					
Lanthanum					
La-131	D 0.001	1 10^5	5 10^{-5}	0.001	5 10^4
59 m	W 0.001	2 10^5	7 10^{-5}		
La-132	D 0.001	1 10^4	4 10^{-6}	0.001	3000
4.8 h	W 0.001	1 10^4	5 10^{-6}		
La-135	D 0.001	1 10^5	4 10^{-5}	0.001	4 10^4
19.5 h	W 0.001	9 10^4	4 10^{-5}		
La-137	D 0.001	60	3 10^{-8}	0.001	1 10^4
6 10^4 y	W 0.001	300	1 10^{-7}		
La-138	D 0.001	4	1 10^{-9}	0.001	900
1.35 10^{11} y	W 0.001	10	6 10^{-9}		
La-140	D 0.001	1000	6 10^{-7}	0.001	600
40.272 h	W 0.001	1000	5 10^{-7}		
La-141	D 0.001	9000	4 10^{-6}	0.001	4000
3.93 h	W 0.001	1 10^4	5 10^{-6}		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
La-142	D 0.001	800	0.3	0.001	300
92.5 m	W 0.001	1000	0.5		
La-143	D 0.001	4000	2	0.001	1000
14.23 m	W 0.001	3000	1		
Cerium					
Ce-134	W $3\ 10^{-4}$	30	0.01	$3\ 10^{-4}$	20
72.0 h	Y $3\ 10^{-4}$	20	0.01		
Ce-135	W $3\ 10^{-4}$	100	0.06	$3\ 10^{-4}$	60
17.6 h	Y $3\ 10^{-4}$	100	0.05		
Ce-137	W $3\ 10^{-4}$	5000	2	$3\ 10^{-4}$	2000
9.0 h	Y $3\ 10^{-4}$	5000	2		
Ce-137m	W $3\ 10^{-4}$	200	0.07	$3\ 10^{-4}$	90
34.4 h	Y $3\ 10^{-4}$	100	0.06		
Ce-139	W $3\ 10^{-4}$	30	0.01	$3\ 10^{-4}$	200
137.66 d	Y $3\ 10^{-4}$	20	0.01		
Ce-141	W $3\ 10^{-4}$	30	0.01	$3\ 10^{-4}$	60
32.501 d	Y $3\ 10^{-4}$	20	0.009		
Ce-143	W $3\ 10^{-4}$	70	0.03	$3\ 10^{-4}$	40
33.0 h	Y $3\ 10^{-4}$	60	0.02		
Ce-144	W $3\ 10^{-4}$	0.9	$4\ 10^{-4}$	$3\ 10^{-4}$	8
284.3 d	Y $3\ 10^{-4}$	0.5	$2\ 10^{-4}$		
Praseodymium					
Pr-136	W $3\ 10^{-4}$	9000	4	$3\ 10^{-4}$	2000
13.1 m	Y $3\ 10^{-4}$	8000	3		
Pr-137	W $3\ 10^{-4}$	6000	2	$3\ 10^{-4}$	1000
76.6 m	Y $3\ 10^{-4}$	5000	2		
Pr-138m	W $3\ 10^{-4}$	2000	0.8	$3\ 10^{-4}$	400
2.1 h	Y $3\ 10^{-4}$	2000	0.7		
Pr-139	W $3\ 10^{-4}$	4000	2	$3\ 10^{-4}$	1000
4.51 h	Y $3\ 10^{-4}$	4000	2		
Pr-142	W $3\ 10^{-4}$	80	0.03	$3\ 10^{-4}$	40
19.13 h	Y $3\ 10^{-4}$	70	0.03		
Pr-142m	W $3\ 10^{-4}$	6000	3	$3\ 10^{-4}$	3000
14.6 m	Y $3\ 10^{-4}$	5000	2		
Pr-143	W $3\ 10^{-4}$	30	0.01	$3\ 10^{-4}$	30
13.56 d	Y $3\ 10^{-4}$	20	0.01		
Pr-144	W $3\ 10^{-4}$	5000	2	$3\ 10^{-4}$	1000
17.28 m	Y $3\ 10^{-4}$	4000	2		
Pr-145	W $3\ 10^{-4}$	300	0.1	$3\ 10^{-4}$	100
5.98 h	Y $3\ 10^{-4}$	300	0.1		

Table 1.b, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
La-142	D 0.001	2 10^{4}	9 10^{-6}	0.001	8000
92.5 m	W 0.001	3 10^{4}	1 10^{-5}		
La-143	D 0.001	1 10^{5}	4 10^{-5}	0.001	4 10^{4}
14.23 m	W 0.001	9 10^{4}	4 10^{-5}		
Cerium					
Ce-134	W 3 10^{-4}	700	3 10^{-7}	3 10^{-4}	500
72.0 h	Y 3 10^{-4}	700	3 10^{-7}		
Ce-135	W 3 10^{-4}	4000	2 10^{-6}	3 10^{-4}	2000
17.6 h	Y 3 10^{-4}	4000	1 10^{-6}		
Ce-137	W 3 10^{-4}	1 10^{5}	6 10^{-5}	3 10^{-4}	5 10^{4}
9.0 h	Y 3 10^{-4}	1 10^{5}	5 10^{-5}		
Ce-137m	W 3 10^{-4}	4000	2 10^{-6}	3 10^{-4}	2000
34.4 h	Y 3 10^{-4}	4000	2 10^{-6}		
Ce-139	W 3 10^{-4}	800	3 10^{-7}	3 10^{-4}	5000
137.66 d	Y 3 10^{-4}	700	3 10^{-7}		
Ce-141	W 3 10^{-4}	700	3 10^{-7}	3 10^{-4}	2000
32.501 d	Y 3 10^{-4}	600	2 10^{-7}		
Ce-143	W 3 10^{-4}	2000	8 10^{-7}	3 10^{-4}	1000
33.0 h	Y 3 10^{-4}	2000	7 10^{-7}		
Ce-144	W 3 10^{-4}	30	1 10^{-8}	3 10^{-4}	200
284.3 d	Y 3 10^{-4}	10	6 10^{-9}		
Praseodymium					
Pr-136	W 3 10^{-4}	2 10^{5}	1 10^{-4}	3 10^{-4}	5 10^{4}
13.1 m	Y 3 10^{-4}	2 10^{5}	9 10^{-5}		
Pr-137	W 3 10^{-4}	2 10^{5}	6 10^{-5}	3 10^{-4}	4 10^{4}
76.6 m	Y 3 10^{-4}	1 10^{5}	6 10^{-5}		
Pr-138m	W 3 10^{-4}	5 10^{4}	2 10^{-5}	3 10^{-4}	1 10^{4}
2.1 h	Y 3 10^{-4}	4 10^{4}	2 10^{-5}		
Pr-139	W 3 10^{-4}	1 10^{5}	5 10^{-5}	3 10^{-4}	4 10^{4}
4.51 h	Y 3 10^{-4}	1 10^{5}	5 10^{-5}		
Pr-142	W 3 10^{-4}	2000	9 10^{-7}	3 10^{-4}	1000
19.13 h	Y 3 10^{-4}	2000	8 10^{-7}		
Pr-142m	W 3 10^{-4}	2 10^{5}	7 10^{-5}	3 10^{-4}	8 10^{4}
14.6 m	Y 3 10^{-4}	1 10^{5}	6 10^{-5}		
Pr-143	W 3 10^{-4}	800	3 10^{-7}	3 10^{-4}	900
13.56 d	Y 3 10^{-4}	700	3 10^{-7}		
Pr-144	W 3 10^{-4}	1 10^{5}	5 10^{-5}	3 10^{-4}	3 10^{4}
17.28 m	Y 3 10^{-4}	1 10^{5}	5 10^{-5}		
Pr-145	W 3 10^{-4}	9000	4 10^{-6}	3 10^{-4}	3000
5.98 h	Y 3 10^{-4}	8000	3 10^{-6}		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Pr-147 13.6 m	W 3 10^{-4} Y 3 10^{-4}	7000 7000	3 3	3 10^{-4}	2000
Neodymium					
Nd-136 50.65 m	W 3 10^{-4} Y 3 10^{-4}	2000 2000	0.9 0.8	3 10^{-4}	600
Nd-138 5.04 h	W 3 10^{-4} Y 3 10^{-4}	200 200	0.1 0.08	3 10^{-4}	70
Nd-139 29.7 m	W 3 10^{-4} Y 3 10^{-4}	1 10^4 1 10^4	5 5	3 10^{-4}	3000
Nd-139m 5.5 h	W 3 10^{-4} Y 3 10^{-4}	600 500	0.3 0.2	3 10^{-4}	200
Nd-141 2.49 h	W 3 10^{-4} Y 3 10^{-4}	3 10^4 2 10^4	10 9	3 10^{-4}	6000
Nd-147 10.98 d	W 3 10^{-4} Y 3 10^{-4}	30 30	0.01 0.01	3 10^{-4}	40
Nd-149 1.73 h	W 3 10^{-4} Y 3 10^{-4}	1000 900	0.4 0.4	3 10^{-4}	400
Nd-151 12.44 m	W 3 10^{-4} Y 3 10^{-4}	7000 7000	3 3	3 10^{-4}	3000
Promethium					
Pm-141 20.90 m	W 3 10^{-4} Y 3 10^{-4}	7000 6000	3 3	3 10^{-4}	2000
Pm-143 265 d	W 3 10^{-4} Y 3 10^{-4}	20 30	0.009 0.01	3 10^{-4}	200
Pm-144 363 d	W 3 10^{-4} Y 3 10^{-4}	4 4	0.002 0.002	3 10^{-4}	50
Pm-145 17.7 y	W 3 10^{-4} Y 3 10^{-4}	7 7	0.003 0.003	3 10^{-4}	400
Pm-146 2020 d	W 3 10^{-4} Y 3 10^{-4}	2 2	8 10^{-4} 7 10^{-4}	3 10^{-4}	60
Pm-147 2.6234 y	W 3 10^{-4} Y 3 10^{-4}	5 5	0.002 0.002	3 10^{-4}	200
Pm-148 5.37 d	W 3 10^{-4} Y 3 10^{-4}	20 20	0.008 0.008	3 10^{-4}	20
Pm-148m 41.3 d	W 3 10^{-4} Y 3 10^{-4}	10 10	0.004 0.005	3 10^{-4}	30
Pm-149 53.08 h	W 3 10^{-4} Y 3 10^{-4}	70 70	0.03 0.03	3 10^{-4}	40
Pm-150 2.68 h	W 3 10^{-4} Y 3 10^{-4}	700 600	0.3 0.3	3 10^{-4}	200

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	µCi	µCi/cm^3	f_1	µCi
Pr-147	W 3 10^{-4}	2 10^5	8 10^{-5}	3 10^{-4}	5 10^4
13.6 m	Y 3 10^{-4}	2 10^5	8 10^{-5}		
Neodymium					
Nd-136	W 3 10^{-4}	6 10^4	2 10^{-5}	3 10^{-4}	1 10^4
50.65 m	Y 3 10^{-4}	5 10^4	2 10^{-5}		
Nd-138	W 3 10^{-4}	6000	3 10^{-6}	3 10^{-4}	2000
5.04 h	Y 3 10^{-4}	5000	2 10^{-6}		
Nd-139	W 3 10^{-4}	3 10^5	1 10^{-4}	3 10^{-4}	9 10^4
29.7 m	Y 3 10^{-4}	3 10^5	1 10^{-4}		
Nd-139m	W 3 10^{-4}	2 10^4	7 10^{-6}	3 10^{-4}	5000
5.5 h	Y 3 10^{-4}	1 10^4	6 10^{-6}		
Nd-141	W 3 10^{-4}	7 10^5	3 10^{-4}	3 10^{-4}	2 10^5
2.49 h	Y 3 10^{-4}	6 10^5	3 10^{-4}		
Nd-147	W 3 10^{-4}	900	4 10^{-7}	3 10^{-4}	1000
10.98 d	Y 3 10^{-4}	800	4 10^{-7}		
Nd-149	W 3 10^{-4}	3 10^4	1 10^{-5}	3 10^{-4}	1 10^4
1.73 h	Y 3 10^{-4}	2 10^4	1 10^{-5}		
Nd-151	W 3 10^{-4}	2 10^5	8 10^{-5}	3 10^{-4}	7 10^4
12.44 m	Y 3 10^{-4}	2 10^5	8 10^{-5}		
Promethium					
Pm-141	W 3 10^{-4}	2 10^5	8 10^{-5}	3 10^{-4}	5 10^4
20.90 m	Y 3 10^{-4}	2 10^5	7 10^{-5}		
Pm-143	W 3 10^{-4}	600	2 10^{-7}	3 10^{-4}	5000
265 d	Y 3 10^{-4}	700	3 10^{-7}		
Pm-144	W 3 10^{-4}	100	5 10^{-8}	3 10^{-4}	1000
363 d	Y 3 10^{-4}	100	5 10^{-8}		
Pm-145	W 3 10^{-4}	200	7 10^{-8}	3 10^{-4}	1 10^4
17.7 y	Y 3 10^{-4}	200	8 10^{-8}		
Pm-146	W 3 10^{-4}	50	2 10^{-8}	3 10^{-4}	2000
2020 d	Y 3 10^{-4}	40	2 10^{-8}		
Pm-147	W 3 10^{-4}	100	5 10^{-8}	3 10^{-4}	4000
2.6234 y	Y 3 10^{-4}	100	6 10^{-8}		
Pm-148	W 3 10^{-4}	500	2 10^{-7}	3 10^{-4}	400
5.37 d	Y 3 10^{-4}	500	2 10^{-7}		
Pm-148m	W 3 10^{-4}	300	1 10^{-7}	3 10^{-4}	700
41.3 d	Y 3 10^{-4}	300	1 10^{-7}		
Pm-149	W 3 10^{-4}	2000	8 10^{-7}	3 10^{-4}	1000
53.08 h	Y 3 10^{-4}	2000	8 10^{-7}		
Pm-150	W 3 10^{-4}	2 10^4	8 10^{-6}	3 10^{-4}	5000
2.68 h	Y 3 10^{-4}	2 10^4	7 10^{-6}		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Pm-151 28.40 h	W 3 10^{-4} Y 3 10^{-4}	100 100	0.06 0.05	3 10^{-4}	70
Samarium					
Sm-141 10.2 m	W 3 10^{-4}	7000	3	3 10^{-4}	2000
Sm-141m 22.6 m	W 3 10^{-4}	4000	2	3 10^{-4}	1000
Sm-142 72.49 m	W 3 10^{-4}	1000	0.4	3 10^{-4}	300
Sm-145 340 d	W 3 10^{-4}	20	0.008	3 10^{-4}	200
Sm-146 1.03 10^8 y	W 3 10^{-4}	0.001	6 10^{-7}	3 10^{-4}	0.5
Sm-147 1.06 10^{11} y	W 3 10^{-4}	0.001	6 10^{-7}	3 10^{-4}	0.6
Sm-151 90 y	W 3 10^{-4}	4	0.002	3 10^{-4}	500
Sm-153 46.7 h	W 3 10^{-4}	100	0.04	3 10^{-4}	60
Sm-155 22.1 m	W 3 10^{-4}	8000	3	3 10^{-4}	2000
Sm-156 9.4 h	W 3 10^{-4}	300	0.1	3 10^{-4}	200
Europium					
Eu-145 5.94 d	W 0.001	70	0.03	0.001	60
Eu-146 4.61 d	W 0.001	50	0.02	0.001	40
Eu-147 24 d	W 0.001	60	0.03	0.001	100
Eu-148 54.5 d	W 0.001	10	0.005	0.001	40
Eu-149 93.1 d	W 0.001	100	0.05	0.001	400
Eu-150 12.62 h	W 0.001	300	0.1	0.001	100
Eu-150 34.2 y	W 0.001	0.7	3 10^{-4}	0.001	30
Eu-152 13.33 y	W 0.001	0.9	4 10^{-4}	0.001	30

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Pm-151	W 3 10^{-4}	4000	1 10^{-6}	3 10^{-4}	2000
28.40 h	Y 3 10^{-4}	3000	1 10^{-6}		
Samarium					
Sm-141 10.2 m	W 3 10^{-4}	2 10^{5}	8 10^{-5}	3 10^{-4}	5 10^{4}
Sm-141m 22.6 m	W 3 10^{-4}	1 10^{5}	4 10^{-5}	3 10^{-4}	3 10^{4}
Sm-142 72.49 m	W 3 10^{-4}	3 10^{4}	1 10^{-5}	3 10^{-4}	8000
Sm-145 340 d	W 3 10^{-4}	500	2 10^{-7}	3 10^{-4}	6000
Sm-146 1.03 10^{8} y	W 3 10^{-4}	0.04	1 10^{-11}	3 10^{-4}	10
Sm-147 1.06 10^{11} y	W 3 10^{-4}	0.04	2 10^{-11}	3 10^{-4}	20
Sm-151 90 y	W 3 10^{-4}	100	4 10^{-8}	3 10^{-4}	1 10^{4}
Sm-153 46.7 h	W 3 10^{-4}	3000	1 10^{-6}	3 10^{-4}	2000
Sm-155 22.1 m	W 3 10^{-4}	2 10^{5}	9 10^{-5}	3 10^{-4}	6 10^{4}
Sm-156 9.4 h	W 3 10^{-4}	9000	4 10^{-6}	3 10^{-4}	5000
Europium					
Eu-145 5.94 d	W 0.001	2000	8 10^{-7}	0.001	2000
Eu-146 4.61 d	W 0.001	1000	5 10^{-7}	0.001	1000
Eu-147 24 d	W 0.001	2000	7 10^{-7}	0.001	3000
Eu-148 54.5 d	W 0.001	400	1 10^{-7}	0.001	1000
Eu-149 93.1 d	W 0.001	3000	1 10^{-6}	0.001	1 10^{4}
Eu-150 12.62 h	W 0.001	8000	4 10^{-6}	0.001	3000
Eu-150 34.2 y	W 0.001	20	8 10^{-9}	0.001	800
Eu-152 13.33 y	W 0.001	20	1 10^{-8}	0.001	800

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Eu-152m	W 0.001	200	0.1	0.001	100
9.32 h					
Eu-154	W 0.001	0.7	3 10^{-4}	0.001	20
8.8 y					
Eu-155	W 0.001	3	0.001	0.001	100
4.96 y					
Eu-156	W 0.001	20	0.007	0.001	20
15.19 d					
Eu-157	W 0.001	200	0.08	0.001	80
15.15 h					
Eu-158	W 0.001	2000	0.9	0.001	700
45.9 m					
Gadolinium					
Gd-145	D 3 10^{-4}	6000	2	3 10^{-4}	2000
22.9 m	W 3 10^{-4}	6000	3		
Gd-146	D 3 10^{-4}	5	0.002	3 10^{-4}	50
48.3 d	W 3 10^{-4}	10	0.004		
Gd-147	D 3 10^{-4}	200	0.06	3 10^{-4}	70
38.1 h	W 3 10^{-4}	100	0.05		
Gd-148	D 3 10^{-4}	3 10^{-4}	1 10^{-7}	3 10^{-4}	0.4
93 y	W 3 10^{-4}	0.001	5 10^{-7}		
Gd-149	D 3 10^{-4}	80	0.03	3 10^{-4}	100
9.4 d	W 3 10^{-4}	90	0.04		
Gd-151	D 3 10^{-4}	10	0.006	3 10^{-4}	200
120 d	W 3 10^{-4}	40	0.02		
Gd-152	D 3 10^{-4}	4 10^{-4}	2 10^{-7}	3 10^{-4}	0.6
1.08 10^{14} y	W 3 10^{-4}	0.002	6 10^{-7}		
Gd-153	D 3 10^{-4}	5	0.002	3 10^{-4}	200
242 d	W 3 10^{-4}	20	0.009		
Gd-159	D 3 10^{-4}	300	0.1	3 10^{-4}	100
18.56 h	W 3 10^{-4}	200	0.09		
Terbium					
Tb-147	W 3 10^{-4}	1000	0.5	3 10^{-4}	300
1.65 h					
Tb-149	W 3 10^{-4}	30	0.01	3 10^{-4}	200
4.15 h					
Tb-150	W 3 10^{-4}	800	0.3	3 10^{-4}	200
3.27 h					
Tb-151	W 3 10^{-4}	300	0.1	3 10^{-4}	100
17.6 h					

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	µCi	µCi/cm^3	f_1	µCi
Eu-152m	W 0.001	6000	3 10^{-6}	0.001	3000
9.32 h					
Eu-154	W 0.001	20	8 10^{-9}	0.001	500
8.8 y					
Eu-155	W 0.001	90	4 10^{-8}	0.001	4000
4.96 y					
Eu-156	W 0.001	500	2 10^{-7}	0.001	600
15.19 d					
Eu-157	W 0.001	5000	2 10^{-6}	0.001	2000
15.15 h					
Eu-158	W 0.001	6 10^{4}	2 10^{-5}	0.001	2 10^{4}
45.9 m					
Gadolinium					
Gd-145	D 3 10^{-4}	2 10^{5}	6 10^{-5}	3 10^{-4}	5 10^{4}
22.9 m	W 3 10^{-4}	2 10^{5}	7 10^{-5}		
Gd-146	D 3 10^{-4}	100	5 10^{-8}	3 10^{-4}	1000
48.3 d	W 3 10^{-4}	300	1 10^{-7}		
Gd-147	D 3 10^{-4}	4000	2 10^{-6}	3 10^{-4}	2000
38.1 h	W 3 10^{-4}	4000	1 10^{-6}		
Gd-148	D 3 10^{-4}	0.008	3 10^{-12}	3 10^{-4}	10
93 y	W 3 10^{-4}	0.03	1 10^{-11}		
Gd-149	D 3 10^{-4}	2000	9 10^{-7}	3 10^{-4}	3000
9.4 d	W 3 10^{-4}	2000	1 10^{-6}		
Gd-151	D 3 10^{-4}	400	2 10^{-7}	3 10^{-4}	6000
120 d	W 3 10^{-4}	1000	5 10^{-7}		
Gd-152	D 3 10^{-4}	0.01	4 10^{-12}	3 10^{-4}	20
1.08 10^{14} y	W 3 10^{-4}	0.04	2 10^{-11}		
Gd-153	D 3 10^{-4}	100	6 10^{-8}	3 10^{-4}	5000
242 d	W 3 10^{-4}	600	2 10^{-7}		
Gd-159	D 3 10^{-4}	8000	3 10^{-6}	3 10^{-4}	3000
18.56 h	W 3 10^{-4}	6000	2 10^{-6}		
Terbium					
Tb-147	W 3 10^{-4}	3 10^{4}	1 10^{-5}	3 10^{-4}	9000
1.65 h					
Tb-149	W 3 10^{-4}	700	3 10^{-7}	3 10^{-4}	5000
4.15 h					
Tb-150	W 3 10^{-4}	2 10^{4}	9 10^{-6}	3 10^{-4}	5000
3.27 h					
Tb-151	W 3 10^{-4}	9000	4 10^{-6}	3 10^{-4}	4000
17.6 h					

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Tb-153 2.34 d	W $3\ 10^{-4}$	300	0.1	$3\ 10^{-4}$	200
Tb-154 21.4 h	W $3\ 10^{-4}$	200	0.07	$3\ 10^{-4}$	60
Tb-155 5.32 d	W $3\ 10^{-4}$	300	0.1	$3\ 10^{-4}$	200
Tb-156 5.34 d	W $3\ 10^{-4}$	50	0.02	$3\ 10^{-4}$	40
Tb-156m 24.4 h	W $3\ 10^{-4}$	300	0.1	$3\ 10^{-4}$	300
Tb-156m 5.0 h	W $3\ 10^{-4}$	1000	0.4	$3\ 10^{-4}$	600
Tb-157 150 y	W $3\ 10^{-4}$	10	0.005	$3\ 10^{-4}$	2000
Tb-158 150 y	W $3\ 10^{-4}$	0.7	$3\ 10^{-4}$	$3\ 10^{-4}$	50
Tb-160 72.3 d	W $3\ 10^{-4}$	8	0.004	$3\ 10^{-4}$	30
Tb-161 6.91 d	W $3\ 10^{-4}$	60	0.02	$3\ 10^{-4}$	60
Dysprosium					
Dy-155 10.0 h	W $3\ 10^{-4}$	900	0.4	$3\ 10^{-4}$	300
Dy-157 8.1 h	W $3\ 10^{-4}$	2000	1	$3\ 10^{-4}$	700
Dy-159 144.4 d	W $3\ 10^{-4}$	90	0.04	$3\ 10^{-4}$	500
Dy-165 2.334 h	W $3\ 10^{-4}$	2000	0.7	$3\ 10^{-4}$	500
Dy-166 81.6 h	W $3\ 10^{-4}$	30	0.01	$3\ 10^{-4}$	20
Holmium					
Ho-155 48 m	W $3\ 10^{-4}$	6000	2	$3\ 10^{-4}$	2000
Ho-157 12.6 m	W $3\ 10^{-4}$	$5\ 10^{4}$	20	$3\ 10^{-4}$	$1\ 10^{4}$
Ho-159 33 m	W $3\ 10^{-4}$	$4\ 10^{4}$	20	$3\ 10^{-4}$	8000
Ho-161 2.5 h	W $3\ 10^{-4}$	$2\ 10^{4}$	6	$3\ 10^{-4}$	4000

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Tb-153 2.34 d	W $3\ 10^{-4}$	7000	$3\ 10^{-6}$	$3\ 10^{-4}$	5000
Tb-154 21.4 h	W $3\ 10^{-4}$	4000	$2\ 10^{-6}$	$3\ 10^{-4}$	2000
Tb-155 5.32 d	W $3\ 10^{-4}$	8000	$3\ 10^{-6}$	$3\ 10^{-4}$	6000
Tb-156 5.34 d	W $3\ 10^{-4}$	1000	$6\ 10^{-7}$	$3\ 10^{-4}$	1000
Tb-156m 24.4 h	W $3\ 10^{-4}$	8000	$3\ 10^{-6}$	$3\ 10^{-4}$	7000
Tb-156m 5.0 h	W $3\ 10^{-4}$	$3\ 10^{4}$	$1\ 10^{-5}$	$3\ 10^{-4}$	$2\ 10^{4}$
Tb-157 150 y	W $3\ 10^{-4}$	300	$1\ 10^{-7}$	$3\ 10^{-4}$	$5\ 10^{4}$
Tb-158 150 y	W $3\ 10^{-4}$	20	$8\ 10^{-9}$	$3\ 10^{-4}$	1000
Tb-160 72.3 d	W $3\ 10^{-4}$	200	$9\ 10^{-8}$	$3\ 10^{-4}$	800
Tb-161 6.91 d	W $3\ 10^{-4}$	2000	$7\ 10^{-7}$	$3\ 10^{-4}$	2000
Dysprosium					
Dy-155 10.0 h	W $3\ 10^{-4}$	$3\ 10^{4}$	$1\ 10^{-5}$	$3\ 10^{-4}$	9000
Dy-157 8.1 h	W $3\ 10^{-4}$	$6\ 10^{4}$	$3\ 10^{-5}$	$3\ 10^{-4}$	$2\ 10^{4}$
Dy-159 144.4 d	W $3\ 10^{-4}$	2000	$1\ 10^{-6}$	$3\ 10^{-4}$	$1\ 10^{4}$
Dy-165 2.334 h	W $3\ 10^{-4}$	$5\ 10^{4}$	$2\ 10^{-5}$	$3\ 10^{-4}$	$1\ 10^{4}$
Dy-166 81.6 h	W $3\ 10^{-4}$	700	$3\ 10^{-7}$	$3\ 10^{-4}$	600
Holmium					
Ho-155 48 m	W $3\ 10^{-4}$	$2\ 10^{5}$	$6\ 10^{-5}$	$3\ 10^{-4}$	$4\ 10^{4}$
Ho-157 12.6 m	W $3\ 10^{-4}$	$1\ 10^{6}$	$6\ 10^{-4}$	$3\ 10^{-4}$	$3\ 10^{5}$
Ho-159 33 m	W $3\ 10^{-4}$	$1\ 10^{6}$	$4\ 10^{-4}$	$3\ 10^{-4}$	$2\ 10^{5}$
Ho-161 2.5 h	W $3\ 10^{-4}$	$4\ 10^{5}$	$2\ 10^{-4}$	$3\ 10^{-4}$	$1\ 10^{5}$

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Ho-162 15 m	W $3\ 10^{-4}$	$9\ 10^4$	40	$3\ 10^{-4}$	$2\ 10^4$
Ho-162m 68 m	W $3\ 10^{-4}$	$1\ 10^4$	4	$3\ 10^{-4}$	2000
Ho-164 29 m	W $3\ 10^{-4}$	$2\ 10^4$	10	$3\ 10^{-4}$	7000
Ho-164m 37.5 m	W $3\ 10^{-4}$	$1\ 10^4$	5	$3\ 10^{-4}$	4000
Ho-166 26.80 h	W $3\ 10^{-4}$	70	0.03	$3\ 10^{-4}$	30
Ho-166m $1.20\ 10^3$ y	W $3\ 10^{-4}$	0.3	$1\ 10^{-4}$	$3\ 10^{-4}$	20
Ho-167 3.1 h	W $3\ 10^{-4}$	2000	0.9	$3\ 10^{-4}$	600
Erbium					
Er-161 3.24 h	W $3\ 10^{-4}$	2000	1	$3\ 10^{-4}$	600
Er-165 10.36 h	W $3\ 10^{-4}$	7000	3	$3\ 10^{-4}$	2000
Er-169 9.3 d	W $3\ 10^{-4}$	90	0.04	$3\ 10^{-4}$	100
Er-171 7.52 h	W $3\ 10^{-4}$	400	0.2	$3\ 10^{-4}$	100
Er-172 49.3 h	W $3\ 10^{-4}$	50	0.02	$3\ 10^{-4}$	40
Thulium					
Tm-162 21.7 m	W $3\ 10^{-4}$	$1\ 10^4$	4	$3\ 10^{-4}$	2000
Tm-166 7.70 h	W $3\ 10^{-4}$	500	0.2	$3\ 10^{-4}$	200
Tm-167 9.24 d	W $3\ 10^{-4}$	70	0.03	$3\ 10^{-4}$	80
Tm-170 128.6 d	W $3\ 10^{-4}$	8	0.003	$3\ 10^{-4}$	30
Tm-171 1.92 y	W $3\ 10^{-4}$	10	0.004	$3\ 10^{-4}$	400
Tm-172 63.6 h	W $3\ 10^{-4}$	40	0.02	$3\ 10^{-4}$	30
Tm-173 8.24 h	W $3\ 10^{-4}$	400	0.2	$3\ 10^{-4}$	200

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Ho-162 15 m	W $3\ 10^{-4}$	$2\ 10^{6}$	0.001	$3\ 10^{-4}$	$5\ 10^{5}$
Ho-162m 68 m	W $3\ 10^{-4}$	$3\ 10^{5}$	$1\ 10^{-4}$	$3\ 10^{-4}$	$5\ 10^{4}$
Ho-164 29 m	W $3\ 10^{-4}$	$6\ 10^{5}$	$3\ 10^{-4}$	$3\ 10^{-4}$	$2\ 10^{5}$
Ho-164m 37.5 m	W $3\ 10^{-4}$	$3\ 10^{5}$	$1\ 10^{-4}$	$3\ 10^{-4}$	$1\ 10^{5}$
Ho-166 26.80 h	W $3\ 10^{-4}$	2000	$7\ 10^{-7}$	$3\ 10^{-4}$	900
Ho-166m 1.20 10^3 y	W $3\ 10^{-4}$	7	$3\ 10^{-9}$	$3\ 10^{-4}$	600
Ho-167 3.1 h	W $3\ 10^{-4}$	$6\ 10^{4}$	$2\ 10^{-5}$	$3\ 10^{-4}$	$2\ 10^{4}$
Erbium					
Er-161 3.24 h	W $3\ 10^{-4}$	$6\ 10^{4}$	$3\ 10^{-5}$	$3\ 10^{-4}$	$2\ 10^{4}$
Er-165 10.36 h	W $3\ 10^{-4}$	$2\ 10^{5}$	$8\ 10^{-5}$	$3\ 10^{-4}$	$6\ 10^{4}$
Er-169 9.3 d	W $3\ 10^{-4}$	3000	$1\ 10^{-6}$	$3\ 10^{-4}$	3000
Er-171 7.52 h	W $3\ 10^{-4}$	$1\ 10^{4}$	$4\ 10^{-6}$	$3\ 10^{-4}$	4000
Er-172 49.3 h	W $3\ 10^{-4}$	1000	$6\ 10^{-7}$	$3\ 10^{-4}$	1000
Thulium					
Tm-162 21.7 m	W $3\ 10^{-4}$	$3\ 10^{5}$	$1\ 10^{-4}$	$3\ 10^{-4}$	$7\ 10^{4}$
Tm-166 7.70 h	W $3\ 10^{-4}$	$1\ 10^{4}$	$6\ 10^{-6}$	$3\ 10^{-4}$	4000
Tm-167 9.24 d	W $3\ 10^{-4}$	2000	$8\ 10^{-7}$	$3\ 10^{-4}$	2000
Tm-170 128.6 d	W $3\ 10^{-4}$	200	$9\ 10^{-8}$	$3\ 10^{-4}$	800
Tm-171 1.92 y	W $3\ 10^{-4}$	300	$1\ 10^{-7}$	$3\ 10^{-4}$	$1\ 10^{4}$
Tm-172 63.6 h	W $3\ 10^{-4}$	1000	$5\ 10^{-7}$	$3\ 10^{-4}$	700
Tm-173 8.24 h	W $3\ 10^{-4}$	$1\ 10^{4}$	$5\ 10^{-6}$	$3\ 10^{-4}$	4000

Table 1.a, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Tm-175	W 3 10^{-4}	1 10^4	4	3 10^{-4}	2000
15.2 m					
Ytterbium					
Yb-162	W 3 10^{-4}	1 10^4	5	3 10^{-4}	3000
18.9 m	Y 3 10^{-4}	1 10^4	4		
Yb-166	W 3 10^{-4}	70	0.03	3 10^{-4}	50
56.7 h	Y 3 10^{-4}	70	0.03		
Yb-167	W 3 10^{-4}	3 10^4	10	3 10^{-4}	1 10^4
17.5 m	Y 3 10^{-4}	3 10^4	10		
Yb-169	W 3 10^{-4}	30	0.01	3 10^{-4}	70
32.01 d	Y 3 10^{-4}	30	0.01		
Yb-175	W 3 10^{-4}	100	0.05	3 10^{-4}	100
4.19 d	Y 3 10^{-4}	100	0.05		
Yb-177	W 3 10^{-4}	2000	0.8	3 10^{-4}	600
1.9 h	Y 3 10^{-4}	2000	0.7		
Yb-178	W 3 10^{-4}	1000	0.6	3 10^{-4}	500
74 m	Y 3 10^{-4}	1000	0.6		
Lutetium					
Lu-169	W 3 10^{-4}	200	0.07	3 10^{-4}	90
34.06 h	Y 3 10^{-4}	200	0.06		
Lu-170	W 3 10^{-4}	80	0.03	3 10^{-4}	40
2.00 d	Y 3 10^{-4}	70	0.03		
Lu-171	W 3 10^{-4}	70	0.03	3 10^{-4}	70
8.22 d	Y 3 10^{-4}	70	0.03		
Lu-172	W 3 10^{-4}	40	0.02	3 10^{-4}	40
6.70 d	Y 3 10^{-4}	40	0.02		
Lu-173	W 3 10^{-4}	10	0.004	3 10^{-4}	200
1.37 y	Y 3 10^{-4}	10	0.004		
Lu-174	W 3 10^{-4}	4	0.002	3 10^{-4}	200
3.31 y	Y 3 10^{-4}	6	0.002		
Lu-174m	W 3 10^{-4}	9	0.004	3 10^{-4}	80
142 d	Y 3 10^{-4}	8	0.003		
Lu-176	W 3 10^{-4}	0.2	7 10^{-5}	3 10^{-4}	30
3.60 10^{10} y	Y 3 10^{-4}	0.3	1 10^{-4}		
Lu-176m	W 3 10^{-4}	900	0.4	3 10^{-4}	300
3.68 h	Y 3 10^{-4}	800	0.4		
Lu-177	W 3 10^{-4}	80	0.03	3 10^{-4}	80
6.71 d	Y 3 10^{-4}	80	0.03		
Lu-177m	W 3 10^{-4}	4	0.002	3 10^{-4}	30
160.9 d	Y 3 10^{-4}	3	0.001		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	µCi	µCi/cm^3	f_1	µCi
Tm-175	W 3 10^{-4}	3 10^{5}	1 10^{-4}	3 10^{-4}	7 10^{4}
15.2 m					
Ytterbium					
Yb-162	W 3 10^{-4}	3 10^{5}	1 10^{-4}	3 10^{-4}	7 10^{4}
18.9 m	Y 3 10^{-4}	3 10^{5}	1 10^{-4}		
Yb-166	W 3 10^{-4}	2000	8 10^{-7}	3 10^{-4}	1000
56.7 h	Y 3 10^{-4}	2000	8 10^{-7}		
Yb-167	W 3 10^{-4}	8 10^{5}	3 10^{-4}	3 10^{-4}	3 10^{5}
17.5 m	Y 3 10^{-4}	7 10^{5}	3 10^{-4}		
Yb-169	W 3 10^{-4}	800	4 10^{-7}	3 10^{-4}	2000
32.01 d	Y 3 10^{-4}	700	3 10^{-7}		
Yb-175	W 3 10^{-4}	4000	1 10^{-6}	3 10^{-4}	3000
4.19 d	Y 3 10^{-4}	3000	1 10^{-6}		
Yb-177	W 3 10^{-4}	5 10^{4}	2 10^{-5}	3 10^{-4}	2 10^{4}
1.9 h	Y 3 10^{-4}	5 10^{4}	2 10^{-5}		
Yb-178	W 3 10^{-4}	4 10^{4}	2 10^{-5}	3 10^{-4}	1 10^{4}
74 m	Y 3 10^{-4}	4 10^{4}	2 10^{-5}		
Lutetium					
Lu-169	W 3 10^{-4}	4000	2 10^{-6}	3 10^{-4}	3000
34.06 h	Y 3 10^{-4}	4000	2 10^{-6}		
Lu-170	W 3 10^{-4}	2000	9 10^{-7}	3 10^{-4}	1000
2.00 d	Y 3 10^{-4}	2000	8 10^{-7}		
Lu-171	W 3 10^{-4}	2000	8 10^{-7}	3 10^{-4}	2000
8.22 d	Y 3 10^{-4}	2000	8 10^{-7}		
Lu-172	W 3 10^{-4}	1000	5 10^{-7}	3 10^{-4}	1000
6.70 d	Y 3 10^{-4}	1000	5 10^{-7}		
Lu-173	W 3 10^{-4}	300	1 10^{-7}	3 10^{-4}	5000
1.37 y	Y 3 10^{-4}	300	1 10^{-7}		
Lu-174	W 3 10^{-4}	100	5 10^{-8}	3 10^{-4}	5000
3.31 y	Y 3 10^{-4}	200	6 10^{-8}		
Lu-174m	W 3 10^{-4}	200	1 10^{-7}	3 10^{-4}	2000
142 d	Y 3 10^{-4}	200	9 10^{-8}		
Lu-176	W 3 10^{-4}	5	2 10^{-9}	3 10^{-4}	700
3.60 10^{10} y	Y 3 10^{-4}	8	3 10^{-9}		
Lu-176m	W 3 10^{-4}	3 10^{4}	1 10^{-5}	3 10^{-4}	8000
3.68 h	Y 3 10^{-4}	2 10^{4}	9 10^{-6}		
Lu-177	W 3 10^{-4}	2000	9 10^{-7}	3 10^{-4}	2000
6.71 d	Y 3 10^{-4}	2000	9 10^{-7}		
Lu-177m	W 3 10^{-4}	100	5 10^{-8}	3 10^{-4}	700
160.9 d	Y 3 10^{-4}	80	3 10^{-8}		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Lu-178	W $3\ 10^{-4}$	5000	2	$3\ 10^{-4}$	1000
28.4 m	Y $3\ 10^{-4}$	4000	2		
Lu-178m	W $3\ 10^{-4}$	7000	3	$3\ 10^{-4}$	2000
22.7 m	Y $3\ 10^{-4}$	6000	3		
Lu-179	W $3\ 10^{-4}$	700	0.3	$3\ 10^{-4}$	200
4.59 h	Y $3\ 10^{-4}$	600	0.2		
Hafnium					
Hf-170	D 0.002	200	0.09	0.002	100
16.01 h	W 0.002	200	0.07		
Hf-172	D 0.002	0.3	$1\ 10^{-4}$	0.002	50
1.87 y	W 0.002	1	$6\ 10^{-4}$		
Hf-173	D 0.002	500	0.2	0.002	200
24.0 h	W 0.002	400	0.2		
Hf-175	D 0.002	40	0.01	0.002	100
70 d	W 0.002	40	0.02		
Hf-177m	D 0.002	2000	0.9	0.002	700
51.4 m	W 0.002	3000	1		
Hf-178m	D 0.002	0.05	$2\ 10^{-5}$	0.002	9
31 y	W 0.002	0.2	$8\ 10^{-5}$		
Hf-179m	D 0.002	10	0.005	0.002	40
25.1 d	W 0.002	20	0.009		
Hf-180m	D 0.002	800	0.3	0.002	300
5.5 h	W 0.002	900	0.4		
Hf-181	D 0.002	6	0.003	0.002	40
42.4 d	W 0.002	20	0.007		
Hf-182	D 0.002	0.03	$1\ 10^{-5}$	0.002	7
$9\ 10^{6}$ y	W 0.002	0.1	$5\ 10^{-5}$		
Hf-182m	D 0.002	3000	1	0.002	1000
61.5 m	W 0.002	5000	2		
Hf-183	D 0.002	2000	0.7	0.002	800
64 m	W 0.002	2000	0.9		
Hf-184	D 0.002	300	0.1	0.002	90
4.12 h	W 0.002	200	0.1		
Tantalum					
Ta-172	W 0.001	5000	2	0.001	1000
36.8 m	Y 0.001	4000	2		
Ta-173	W 0.001	700	0.3	0.001	200
3.65 h	Y 0.001	600	0.3		
Ta-174	W 0.001	4000	2	0.001	1000
1.2 h	Y 0.001	3000	1		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	µCi	µCi/cm^3	f_1	µCi
Lu-178	W 3 10^{-4}	1 10^{5}	5 10^{-5}	3 10^{-4}	4 10^{4}
28.4 m	Y 3 10^{-4}	1 10^{5}	5 10^{-5}		
Lu-178m	W 3 10^{-4}	2 10^{5}	8 10^{-5}	3 10^{-4}	5 10^{4}
22.7 m	Y 3 10^{-4}	2 10^{5}	7 10^{-5}		
Lu-179	W 3 10^{-4}	2 10^{4}	8 10^{-6}	3 10^{-4}	6000
4.59 h	Y 3 10^{-4}	2 10^{4}	6 10^{-6}		
Hafnium					
Hf-170	D 0.002	6000	2 10^{-6}	0.002	3000
16.01 h	W 0.002	5000	2 10^{-6}		
Hf-172	D 0.002	9	4 10^{-9}	0.002	1000
1.87 y	W 0.002	40	2 10^{-8}		
Hf-173	D 0.002	1 10^{4}	5 10^{-6}	0.002	5000
24.0 h	W 0.002	1 10^{4}	5 10^{-6}		
Hf-175	D 0.002	900	4 10^{-7}	0.002	3000
70 d	W 0.002	1000	5 10^{-7}		
Hf-177m	D 0.002	6 10^{4}	2 10^{-5}	0.002	2 10^{4}
51.4 m	W 0.002	9 10^{4}	4 10^{-5}		
Hf-178m	D 0.002	1	5 10^{-10}	0.002	300
31 y	W 0.002	5	2 10^{-9}		
Hf-179m	D 0.002	300	1 10^{-7}	0.002	1000
25.1 d	W 0.002	600	3 10^{-7}		
Hf-180m	D 0.002	2 10^{4}	9 10^{-6}	0.002	7000
5.5 h	W 0.002	3 10^{4}	1 10^{-5}		
Hf-181	D 0.002	200	7 10^{-8}	0.002	1000
42.4 d	W 0.002	400	2 10^{-7}		
Hf-182	D 0.002	0.8	3 10^{-10}	0.002	200
9 10^{6} y	W 0.002	3	1 10^{-9}		
Hf-182m	D 0.002	9 10^{4}	4 10^{-5}	0.002	4 10^{4}
61.5 m	W 0.002	1 10^{5}	6 10^{-5}		
Hf-183	D 0.002	5 10^{4}	2 10^{-5}	0.002	2 10^{4}
64 m	W 0.002	6 10^{4}	2 10^{-5}		
Hf-184	D 0.002	8000	3 10^{-6}	0.002	2000
4.12 h	W 0.002	6000	3 10^{-6}		
Tantalum					
Ta-172	W 0.001	1 10^{5}	5 10^{-5}	0.001	4 10^{4}
36.8 m	Y 0.001	1 10^{5}	4 10^{-5}		
Ta-173	W 0.001	2 10^{4}	8 10^{-6}	0.001	7000
3.65 h	Y 0.001	2 10^{4}	7 10^{-6}		
Ta-174	W 0.001	1 10^{5}	4 10^{-5}	0.001	3 10^{4}
1.2 h	Y 0.001	9 10^{4}	4 10^{-5}		

Table I.a, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Ta-175	W 0.001	600	0.2	0.001	200
10.5 h	Y 0.001	500	0.2		
Ta-176	W 0.001	500	0.2	0.001	100
8.08 h	Y 0.001	400	0.2		
Ta-177	W 0.001	700	0.3	0.001	400
56.6 h	Y 0.001	700	0.3		
Ta-178	W 0.001	3000	1	0.001	600
2.2 h	Y 0.001	3000	1		
Ta-179	W 0.001	200	0.08	0.001	800
664.9 d	Y 0.001	30	0.01		
Ta-180	W 0.001	20	0.007	0.001	60
1.0 10^{13} y	Y 0.001	0.9	4 10^{-4}		
Ta-180m	W 0.001	2000	1	0.001	900
8.1 h	Y 0.001	2000	0.9		
Ta-182	W 0.001	10	0.005	0.001	30
115.0 d	Y 0.001	5	0.002		
Ta-182m	W 0.001	2 10^{4}	8	0.001	6000
15.84 m	Y 0.001	2 10^{4}	6		
Ta-183	W 0.001	40	0.02	0.001	30
5.1 d	Y 0.001	40	0.02		
Ta-184	W 0.001	200	0.08	0.001	70
8.7 h	Y 0.001	200	0.07		
Ta-185	W 0.001	3000	1	0.001	1000
49 m	Y 0.001	2000	1		
Ta-186	W 0.001	9000	4	0.001	2000
10.5 m	Y 0.001	8000	3		
Tungsten					
W-176	D 0.3	2000	0.8	0.01	400
2.3 h				0.3	500
W-177	D 0.3	3000	1	0.01	800
135 m				0.3	900
W-178	D 0.3	700	0.3	0.01	200
21.7 d				0.3	300
W-179	D 0.3	6 10^{4}	30	0.01	2 10^{4}
37.5 m				0.3	2 10^{4}
W-181	D 0.3	1000	0.5	0.01	600
121.2 d				0.3	700
W-185	D 0.3	200	0.1	0.01	80
75.1 d				0.3	100
W-187	D 0.3	300	0.1	0.01	70
23.9 h				0.3	100

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Ta-175	W 0.001	2 10^{4}	7 10^{-6}	0.001	6000
10.5 h	Y 0.001	1 10^{4}	6 10^{-6}		
Ta-176	W 0.001	1 10^{4}	5 10^{-6}	0.001	4000
8.08 h	Y 0.001	1 10^{4}	5 10^{-6}		
Ta-177	W 0.001	2 10^{4}	8 10^{-6}	0.001	1 10^{4}
56.6 h	Y 0.001	2 10^{4}	7 10^{-6}		
Ta-178	W 0.001	9 10^{4}	4 10^{-5}	0.001	2 10^{4}
2.2 h	Y 0.001	7 10^{4}	3 10^{-5}		
Ta-179	W 0.001	5000	2 10^{-6}	0.001	2 10^{4}
664.9 d	Y 0.001	900	4 10^{-7}		
Ta-180	W 0.001	400	2 10^{-7}	0.001	1000
1.0 10^{13} y	Y 0.001	20	1 10^{-8}		
Ta-180m	W 0.001	7 10^{4}	3 10^{-5}	0.001	2 10^{4}
8.1 h	Y 0.001	6 10^{4}	2 10^{-5}		
Ta-182	W 0.001	300	1 10^{-7}	0.001	800
115.0 d	Y 0.001	100	6 10^{-8}		
Ta-182m	W 0.001	5 10^{5}	2 10^{-4}	0.001	2 10^{5}
15.84 m	Y 0.001	4 10^{5}	2 10^{-4}		
Ta-183	W 0.001	1000	5 10^{-7}	0.001	900
5.1 d	Y 0.001	1000	4 10^{-7}		
Ta-184	W 0.001	5000	2 10^{-6}	0.001	2000
8.7 h	Y 0.001	5000	2 10^{-6}		
Ta-185	W 0.001	7 10^{4}	3 10^{-5}	0.001	3 10^{4}
49 m	Y 0.001	6 10^{4}	3 10^{-5}		
Ta-186	W 0.001	2 10^{5}	1 10^{-4}	0.001	5 10^{4}
10.5 m	Y 0.001	2 10^{5}	9 10^{-5}		
Tungsten					
W-176	D 0.3	5 10^{4}	2 10^{-5}	0.01	1 10^{4}
2.3 h				0.3	1 10^{4}
W-177	D 0.3	9 10^{4}	4 10^{-5}	0.01	2 10^{4}
135 m				0.3	2 10^{4}
W-178	D 0.3	2 10^{4}	8 10^{-6}	0.01	5000
21.7 d				0.3	8000
W-179	D 0.3	2 10^{6}	7 10^{-4}	0.01	5 10^{5}
37.5 m				0.3	6 10^{5}
W-181	D 0.3	3 10^{4}	1 10^{-5}	0.01	2 10^{4}
121.2 d				0.3	2 10^{4}
W-185	D 0.3	7000	3 10^{-6}	0.01	2000
75.1 d				0.3	3000
W-187	D 0.3	9000	4 10^{-6}	0.01	2000
23.9 h				0.3	3000

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
W-188 69.4 d	D 0.3	50	0.02	0.01 0.3	10 20
Rhenium					
Re-177 14.0 m	D 0.8 W 0.8	1 10^4 1 10^4	4 5	0.8	4000
Re-178 13.2 m	D 0.8 W 0.8	1 10^4 1 10^4	4 5	0.8	3000
Re-181 20 h	D 0.8 W 0.8	300 300	0.1 0.1	0.8	200
Re-182 12.7 h	D 0.8 W 0.8	500 600	0.2 0.2	0.8	300
Re-182 64.0 h	D 0.8 W 0.8	90 80	0.04 0.03	0.8	50
Re-184 38.0 d	D 0.8 W 0.8	100 50	0.05 0.02	0.8	90
Re-184m 165 d	D 0.8 W 0.8	100 20	0.05 0.007	0.8	80
Re-186 90.64 h	D 0.8 W 0.8	100 60	0.04 0.03	0.8	70
Re-186m 2.0 10^5 y	D 0.8 W 0.8	60 6	0.03 0.002	0.8	50
Re-187 5 10^{10} y	D 0.8 W 0.8	3 10^4 4000	10 2	0.8	2 10^4
Re-188 16.98 h	D 0.8 W 0.8	100 100	0.04 0.04	0.8	60
Re-188m 18.6 m	D 0.8 W 0.8	5000 5000	2 2	0.8	3000
Re-189 24.3 h	D 0.8 W 0.8	200 200	0.08 0.07	0.8	100
Osmium					
Os-180 22 m	D 0.01 W 0.01 Y 0.01	1 10^4 2 10^4 2 10^4	6 7 7	0.01	4000
Os-181 105 m	D 0.01 W 0.01 Y 0.01	2000 2000 2000	0.7 0.7 0.7	0.01	500
Os-182 22 h	D 0.01 W 0.01 Y 0.01	200 200 100	0.09 0.07 0.06	0.01	80
Os-185 94 d	D 0.01 W 0.01 Y 0.01	20 30 30	0.008 0.01 0.01	0.01	90

Table 1.b, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	µCi	µCi/cm^3	f_1	µCi
W-188	D 0.3	1000	5 10^{-7}	0.01	400
69.4 d				0.3	600
Rhenium					
Re-177	D 0.8	3 10^5	1 10^{-4}	0.8	9 10^4
14.0 m	W 0.8	4 10^5	1 10^{-4}		
Re-178	D 0.8	3 10^5	1 10^{-4}	0.8	7 10^4
13.2 m	W 0.8	3 10^5	1 10^{-4}		
Re-181	D 0.8	9000	4 10^{-6}	0.8	5000
20 h	W 0.8	9000	4 10^{-6}		
Re-182	D 0.8	1 10^4	5 10^{-6}	0.8	7000
12.7 h	W 0.8	2 10^4	6 10^{-6}		
Re-182	D 0.8	2000	1 10^{-6}	0.8	1000
64.0 h	W 0.8	2000	9 10^{-7}		
Re-184	D 0.8	4000	1 10^{-6}	0.8	2000
38.0 d	W 0.8	1000	6 10^{-7}		
Re-184m	D 0.8	3000	1 10^{-6}	0.8	2000
165 d	W 0.8	400	2 10^{-7}		
Re-186	D 0.8	3000	1 10^{-6}	0.8	2000
90.64 h	W 0.8	2000	7 10^{-7}		
Re-186m	D 0.8	2000	7 10^{-7}	0.8	1000
2.0 10^5 y	W 0.8	200	6 10^{-8}		
Re-187	D 0.8	8 10^5	4 10^{-4}	0.8	6 10^5
5 10^{10} y	W 0.8	1 10^5	4 10^{-5}		
Re-188	D 0.8	3000	1 10^{-6}	0.8	2000
16.98 h	W 0.8	3000	1 10^{-6}		
Re-188m	D 0.8	1 10^5	6 10^{-5}	0.8	8 10^4
18.6 m	W 0.8	1 10^5	6 10^{-5}		
Re-189	D 0.8	5000	2 10^{-6}	0.8	3000
24.3 h	W 0.8	4000	2 10^{-6}		
Osmium					
Os-180	D 0.01	4 10^5	2 10^{-4}	0.01	1 10^5
22 m	W 0.01	5 10^5	2 10^{-4}		
	Y 0.01	5 10^5	2 10^{-4}		
Os-181	D 0.01	4 10^4	2 10^{-5}	0.01	1 10^4
105 m	W 0.01	5 10^4	2 10^{-5}		
	Y 0.01	4 10^4	2 10^{-5}		
Os-182	D 0.01	6000	2 10^{-6}	0.01	2000
22 h	W 0.01	4000	2 10^{-6}		
	Y 0.01	4000	2 10^{-6}		
Os-185	D 0.01	500	2 10^{-7}	0.01	2000
94 d	W 0.01	800	3 10^{-7}		
	Y 0.01	800	3 10^{-7}		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Os-189m 6.0 h	D 0.01	9000	4	0.01	3000
	W 0.01	8000	3		
	Y 0.01	6000	3		
Os-191 15.4 d	D 0.01	80	0.03	0.01	80
	W 0.01	60	0.02		
	Y 0.01	50	0.02		
Os-191m 13.03 h	D 0.01	1000	0.4	0.01	500
	W 0.01	800	0.3		
	Y 0.01	700	0.3		
Os-193 30.0 h	D 0.01	200	0.07	0.01	60
	W 0.01	100	0.05		
	Y 0.01	100	0.04		
Os-194 6.0 y	D 0.01	2	$6\ 10^{-4}$	0.01	20
	W 0.01	2	$9\ 10^{-4}$		
	Y 0.01	0.3	$1\ 10^{-4}$		
Iridium					
Ir-182 15 m	D 0.01	5000	2	0.01	2000
	W 0.01	6000	2		
	Y 0.01	5000	2		
Ir-184 3.02 h	D 0.01	900	0.4	0.01	300
	W 0.01	1000	0.5		
	Y 0.01	1000	0.4		
Ir-185 14.0 h	D 0.01	500	0.2	0.01	200
	W 0.01	400	0.2		
	Y 0.01	400	0.2		
Ir-186 15.8 h	D 0.01	300	0.1	0.01	90
	W 0.01	200	0.1		
	Y 0.01	200	0.09		
Ir-187 10.5 h	D 0.01	1000	0.5	0.01	400
	W 0.01	1000	0.5		
	Y 0.01	1000	0.4		
Ir-188 41.5 h	D 0.01	200	0.07	0.01	70
	W 0.01	100	0.05		
	Y 0.01	100	0.05		
Ir-189 13.3 d	D 0.01	200	0.07	0.01	200
	W 0.01	100	0.06		
	Y 0.01	100	0.06		
Ir-190 12.1 d	D 0.01	30	0.01	0.01	40
	W 0.01	40	0.02		
	Y 0.01	30	0.01		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Os-189m	D 0.01	$2\ 10^5$	$1\ 10^{-4}$	0.01	$8\ 10^4$
6.0 h	W 0.01	$2\ 10^5$	$9\ 10^{-5}$		
	Y 0.01	$2\ 10^5$	$7\ 10^{-5}$		
Os-191	D 0.01	2000	$9\ 10^{-7}$	0.01	2000
15.4 d	W 0.01	2000	$7\ 10^{-7}$		
	Y 0.01	1000	$6\ 10^{-7}$		
Os-191m	D 0.01	$3\ 10^4$	$1\ 10^{-5}$	0.01	$1\ 10^4$
13.03 h	W 0.01	$2\ 10^4$	$8\ 10^{-6}$		
	Y 0.01	$2\ 10^4$	$7\ 10^{-6}$		
Os-193	D 0.01	5000	$2\ 10^{-6}$	0.01	2000
30.0 h	W 0.01	3000	$1\ 10^{-6}$		
	Y 0.01	3000	$1\ 10^{-6}$		
Os-194	D 0.01	40	$2\ 10^{-8}$	0.01	400
6.0 y	W 0.01	60	$2\ 10^{-8}$		
	Y 0.01	8	$3\ 10^{-9}$		
Iridium					
Ir-182	D 0.01	$1\ 10^5$	$6\ 10^{-5}$	0.01	$4\ 10^4$
15 m	W 0.01	$2\ 10^5$	$6\ 10^{-5}$		
	Y 0.01	$1\ 10^5$	$5\ 10^{-5}$		
Ir-184	D 0.01	$2\ 10^4$	$1\ 10^{-5}$	0.01	8000
3.02 h	W 0.01	$3\ 10^4$	$1\ 10^{-5}$		
	Y 0.01	$3\ 10^4$	$1\ 10^{-5}$		
Ir-185	D 0.01	$1\ 10^4$	$5\ 10^{-6}$	0.01	5000
14.0 h	W 0.01	$1\ 10^4$	$5\ 10^{-6}$		
	Y 0.01	$1\ 10^4$	$4\ 10^{-6}$		
Ir-186	D 0.01	8000	$3\ 10^{-6}$	0.01	2000
15.8 h	W 0.01	6000	$3\ 10^{-6}$		
	Y 0.01	6000	$2\ 10^{-6}$		
Ir-187	D 0.01	$3\ 10^4$	$1\ 10^{-5}$	0.01	$1\ 10^4$
10.5 h	W 0.01	$3\ 10^4$	$1\ 10^{-5}$		
	Y 0.01	$3\ 10^4$	$1\ 10^{-5}$		
Ir-188	D 0.01	5000	$2\ 10^{-6}$	0.01	2000
41.5 h	W 0.01	4000	$1\ 10^{-6}$		
	Y 0.01	3000	$1\ 10^{-6}$		
Ir-189	D 0.01	5000	$2\ 10^{-6}$	0.01	5000
13.3 d	W 0.01	4000	$2\ 10^{-6}$		
	Y 0.01	4000	$1\ 10^{-6}$		
Ir-190	D 0.01	900	$4\ 10^{-7}$	0.01	1000
12.1 d	W 0.01	1000	$4\ 10^{-7}$		
	Y 0.01	900	$4\ 10^{-7}$		

Table 1.a, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Ir-190m	D 0.01	7000	3	0.01	6000
1.2 h	W 0.01	8000	3		
	Y 0.01	7000	3		
Ir-192	D 0.01	10	0.004	0.01	40
74.02 d	W 0.01	10	0.006		
	Y 0.01	8	0.003		
Ir-192m	D 0.01	3	0.001	0.01	100
241 y	W 0.01	8	0.003		
	Y 0.01	0.6	$2\ 10^{-4}$		
Ir-194	D 0.01	100	0.05	0.01	40
19.15 h	W 0.01	80	0.03		
	Y 0.01	70	0.03		
Ir-194m	D 0.01	3	0.001	0.01	20
171 d	W 0.01	6	0.003		
	Y 0.01	4	0.002		
Ir-195	D 0.01	2000	0.6	0.01	600
2.5 h	W 0.01	2000	0.8		
	Y 0.01	2000	0.7		
Ir-195m	D 0.01	900	0.4	0.01	300
3.8 h	W 0.01	1000	0.4		
	Y 0.01	800	0.3		
Platinum					
Pt-186	D 0.01	1000	0.6	0.01	500
2.0 h					
Pt-188	D 0.01	60	0.03	0.01	60
10.2 d					
Pt-189	D 0.01	1000	0.4	0.01	400
10.87 h					
Pt-191	D 0.01	300	0.1	0.01	100
2.8 d					
Pt-193	D 0.01	900	0.4	0.01	1000
50 y					
Pt-193m	D 0.01	200	0.09	0.01	90
4.33 d					
Pt-195m	D 0.01	200	0.07	0.01	70
4.02 d					
Pt-197	D 0.01	400	0.1	0.01	100
18.3 h					
Pt-197m	D 0.01	2000	0.7	0.01	600
94.4 m					

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Ir-190m	D 0.01	2 10^5	8 10^{-5}	0.01	2 10^5
1.2 h	W 0.01	2 10^5	9 10^{-5}		
	Y 0.01	2 10^5	8 10^{-5}		
Ir-192	D 0.01	300	1 10^{-7}	0.01	900
74.02 d	W 0.01	400	2 10^{-7}		
	Y 0.01	200	9 10^{-8}		
Ir-192m	D 0.01	90	4 10^{-8}	0.01	3000
241 y	W 0.01	200	9 10^{-8}		
	Y 0.01	20	6 10^{-9}		
Ir-194	D 0.01	3000	1 10^{-6}	0.01	1000
19.15 h	W 0.01	2000	9 10^{-7}		
	Y 0.01	2000	8 10^{-7}		
Ir-194m	D 0.01	90	4 10^{-8}	0.01	600
171 d	W 0.01	200	7 10^{-8}		
	Y 0.01	100	4 10^{-8}		
Ir-195	D 0.01	4 10^4	2 10^{-5}	0.01	1 10^4
2.5 h	W 0.01	5 10^4	2 10^{-5}		
	Y 0.01	4 10^4	2 10^{-5}		
Ir-195m	D 0.01	2 10^4	1 10^{-5}	0.01	8000
3.8 h	W 0.01	3 10^4	1 10^{-5}		
	Y 0.01	2 10^4	9 10^{-6}		
Platinum					
Pt-186	D 0.01	4 10^4	2 10^{-5}	0.01	1 10^4
2.0 h					
Pt-188	D 0.01	2000	7 10^{-7}	0.01	2000
10.2 d					
Pt-189	D 0.01	3 10^4	1 10^{-5}	0.01	1 10^4
10.87 h					
Pt-191	D 0.01	8000	4 10^{-6}	0.01	4000
2.8 d					
Pt-193	D 0.01	2 10^4	1 10^{-5}	0.01	4 10^4
50 y					
Pt-193m	D 0.01	6000	3 10^{-6}	0.01	3000
4.33 d					
Pt-195m	D 0.01	4000	2 10^{-6}	0.01	2000
4.02 d					
Pt-197	D 0.01	1 10^4	4 10^{-6}	0.01	3000
18.3 h					
Pt-197m	D 0.01	4 10^4	2 10^{-5}	0.01	2 10^4
94.4 m					

Table 1.a, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Pt-199	D 0.01	5000	2	0.01	2000
30.8 m					
Pt-200	D 0.01	100	0.05	0.01	40
12.5 h					
Gold					
Au-193	D 0.1	1000	0.4	0.1	300
17.65 h	W 0.1	800	0.3		
	Y 0.1	700	0.3		
Au-194	D 0.1	300	0.1	0.1	100
39.5 h	W 0.1	200	0.08		
	Y 0.1	200	0.08		
Au-195	D 0.1	400	0.2	0.1	200
183 d	W 0.1	50	0.02		
	Y 0.1	20	0.007		
Au-198	D 0.1	100	0.06	0.1	50
2.696 d	W 0.1	70	0.03		
	Y 0.1	60	0.03		
Au-198m	D 0.1	100	0.04	0.1	40
2.30 d	W 0.1	40	0.02		
	Y 0.1	40	0.02		
Au-199	D 0.1	300	0.1	0.1	100
3.139 d	W 0.1	100	0.06		
	Y 0.1	100	0.06		
Au-200	D 0.1	2000	1	0.1	1000
48.4 m	W 0.1	3000	1		
	Y 0.1	3000	1		
Au-200m	D 0.1	100	0.05	0.1	40
18.7 h	W 0.1	100	0.04		
	Y 0.1	90	0.04		
Au-201	D 0.1	8000	3	0.1	3000
26.4 m	W 0.1	9000	4		
	Y 0.1	8000	3		
Mercury					
Hg-193	D 0.02	2000	0.7	0.02	600
3.5 h	W 0.02	2000	0.6		
organic	D 1	2000	1	1	2000
				0.4	700
vapor		1000	0.5		
Hg-193m	D 0.02	300	0.1	0.02	100
11.1 h	W 0.02	300	0.1		
organic	D 1	500	0.2	1	300
				0.4	200
vapor		300	0.1		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	µCi	µCi/cm^3	f_1	µCi
Pt-199	D 0.01	$1\ 10^{5}$	$6\ 10^{-5}$	0.01	$5\ 10^{4}$
30.8 m					
Pt-200	D 0.01	3000	$1\ 10^{-6}$	0.01	1000
12.5 h					
Gold					
Au-193	D 0.1	$3\ 10^{4}$	$1\ 10^{-5}$	0.1	9000
17.65 h	W 0.1	$2\ 10^{4}$	$9\ 10^{-6}$		
	Y 0.1	$2\ 10^{4}$	$8\ 10^{-6}$		
Au-194	D 0.1	8000	$3\ 10^{-6}$	0.1	3000
39.5 h	W 0.1	5000	$2\ 10^{-6}$		
	Y 0.1	5000	$2\ 10^{-6}$		
Au-195	D 0.1	$1\ 10^{4}$	$5\ 10^{-6}$	0.1	5000
183 d	W 0.1	1000	$6\ 10^{-7}$		
	Y 0.1	400	$2\ 10^{-7}$		
Au-198	D 0.1	4000	$2\ 10^{-6}$	0.1	1000
2.696 d	W 0.1	2000	$8\ 10^{-7}$		
	Y 0.1	2000	$7\ 10^{-7}$		
Au-198m	D 0.1	3000	$1\ 10^{-6}$	0.1	1000
2.30 d	W 0.1	1000	$5\ 10^{-7}$		
	Y 0.1	1000	$5\ 10^{-7}$		
Au-199	D 0.1	9000	$4\ 10^{-6}$	0.1	3000
3.139 d	W 0.1	4000	$2\ 10^{-6}$		
	Y 0.1	4000	$2\ 10^{-6}$		
Au-200	D 0.1	$6\ 10^{4}$	$3\ 10^{-5}$	0.1	$3\ 10^{4}$
48.4 m	W 0.1	$8\ 10^{4}$	$3\ 10^{-5}$		
	Y 0.1	$7\ 10^{4}$	$3\ 10^{-5}$		
Au-200m	D 0.1	4000	$1\ 10^{-6}$	0.1	1000
18.7 h	W 0.1	3000	$1\ 10^{-6}$		
	Y 0.1	2000	$1\ 10^{-6}$		
Au-201	D 0.1	$2\ 10^{5}$	$9\ 10^{-5}$	0.1	$7\ 10^{4}$
26.4 m	W 0.1	$2\ 10^{5}$	$1\ 10^{-4}$		
	Y 0.1	$2\ 10^{5}$	$9\ 10^{-5}$		
Mercury					
Hg-193	D 0.02	$4\ 10^{4}$	$2\ 10^{-5}$	0.02	$2\ 10^{4}$
3.5 h	W 0.02	$4\ 10^{4}$	$2\ 10^{-5}$		
organic	D 1	$6\ 10^{4}$	$3\ 10^{-5}$	1	$5\ 10^{4}$
				0.4	$2\ 10^{4}$
vapor		$3\ 10^{4}$	$1\ 10^{-5}$		
Hg-193m	D 0.02	9000	$4\ 10^{-6}$	0.02	3000
11.1 h	W 0.02	8000	$3\ 10^{-6}$		
organic	D 1	$1\ 10^{4}$	$5\ 10^{-6}$	1	9000
				0.4	4000
vapor		8000	$4\ 10^{-6}$		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Hg-194	D 0.02	2	$7\ 10^{-4}$	0.02	30
260 y	W 0.02	4	0.002		
organic	D 1	1	$4\ 10^{-4}$	1	0.6
				0.4	2
vapor		1	$5\ 10^{-4}$		
Hg-195	D 0.02	1000	0.5	0.02	500
9.9 h	W 0.02	1000	0.5		
organic	D 1	2000	0.7	1	1000
				0.4	600
vapor		1000	0.5		
Hg-195m	D 0.02	200	0.08	0.02	90
41.6 h	W 0.02	100	0.06		
organic	D 1	200	0.09	1	200
				0.4	100
vapor		100	0.06		
Hg-197	D 0.02	400	0.2	0.02	200
64.1 h	W 0.02	300	0.1		
organic	D 1	500	0.2	1	400
				0.4	300
vapor		300	0.1		
Hg-197m	D 0.02	300	0.1	0.02	100
23.8 h	W 0.02	200	0.08		
organic	D 1	300	0.1	1	300
				0.4	100
vapor		200	0.08		
Hg-199m	D 0.02	5000	2	0.02	2000
42.6 m	W 0.02	7000	3		
organic	D 1	6000	2	1	2000
				0.4	2000
vapor		3000	1		
Hg-203	D 0.02	50	0.02	0.02	90
46.60 d	W 0.02	40	0.02		
organic	D 1	30	0.01	1	20
				0.4	30
vapor		30	0.01		
Thallium					
Tl-194	D 1	$2\ 10^{4}$	9	1	9000
33 m					
Tl-194m	D 1	6000	2	1	2000
32.8 m					

Table 1.b, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Hg-194	D 0.02	40	2 10^{-8}	0.02	800
260 y	W 0.02	100	5 10^{-8}		
organic	D 1	30	1 10^{-8}	1	20
				0.4	40
vapor		30	1 10^{-8}		
Hg-195	D 0.02	4 10^4	1 10^{-5}	0.02	1 10^4
9.9 h	W 0.02	3 10^4	1 10^{-5}		
organic	D 1	5 10^4	2 10^{-5}	1	4 10^4
				0.4	2 10^4
vapor		3 10^4	1 10^{-5}		
Hg-195m	D 0.02	5000	2 10^{-6}	0.02	2000
41.6 h	W 0.02	4000	2 10^{-6}		
organic	D 1	6000	3 10^{-6}	1	5000
				0.4	3000
vapor		4000	2 10^{-6}		
Hg-197	D 0.02	1 10^4	5 10^{-6}	0.02	6000
64.1 h	W 0.02	9000	4 10^{-6}		
organic	D 1	1 10^4	6 10^{-6}	1	9000
				0.4	7000
vapor		8000	4 10^{-6}		
Hg-197m	D 0.02	7000	3 10^{-6}	0.02	3000
23.8 h	W 0.02	5000	2 10^{-6}		
organic	D 1	9000	4 10^{-6}	1	7000
				0.4	4000
vapor		5000	2 10^{-6}		
Hg-199m	D 0.02	1 10^5	6 10^{-5}	0.02	6 10^4
42.6 m	W 0.02	2 10^5	7 10^{-5}		
organic	D 1	2 10^5	7 10^{-5}	1	6 10^4
				0.4	6 10^4
vapor		8 10^4	3 10^{-5}		
Hg-203	D 0.02	1000	5 10^{-7}	0.02	2000
46.60 d	W 0.02	1000	5 10^{-7}		
organic	D 1	800	3 10^{-7}	1	500
				0.4	900
vapor		800	4 10^{-7}		
Thallium					
Tl-194	D 1	6 10^5	2 10^{-4}	1	3 10^5
33 m					
Tl-194m	D 1	2 10^5	6 10^{-5}	1	5 10^4
32.8 m					

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Tl-195 1.16 h	D 1	5000	2	1	2000
Tl-197 2.84 h	D 1	4000	2	1	3000
Tl-198 5.3 h	D 1	1000	0.5	1	700
Tl-198m 1.87 h	D 1	2000	0.8	1	1000
Tl-199 7.42 h	D 1	3000	1	1	2000
Tl-200 26.1 h	D 1	400	0.2	1	300
Tl-201 3.044 d	D 1	800	0.3	1	600
Tl-202 12.23 d	D 1	200	0.08	1	100
Tl-204 3.779 y	D 1	80	0.03	1	60
Lead					
Pb-195m 15.8 m	D 0.2	7000	3	0.2	2000
Pb-198 2.4 h	D 0.2	2000	1	0.2	1000
Pb-199 90 m	D 0.2	3000	1	0.2	800
Pb-200 21.5 h	D 0.2	200	0.1	0.2	100
Pb-201 9.4 h	D 0.2	700	0.3	0.2	300
Pb-202 3 10^5 y	D 0.2	2	8 10^{-4}	0.2	5
Pb-202m 3.62 h	D 0.2	1000	0.4	0.2	300
Pb-203 52.05 h	D 0.2	400	0.1	0.2	200
Pb-205 1.43 10^7 y	D 0.2	50	0.02	0.2	100
Pb-209 3.253 h	D 0.2	2000	0.9	0.2	900
Pb-210 22.3 y	D 0.2	0.009	4 10^{-6}	0.2	0.02

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Tl-195 1.16 h	D 1	1 10^5	5 10^{-5}	1	6 10^4
Tl-197 2.84 h	D 1	1 10^5	5 10^{-5}	1	7 10^4
Tl-198 5.3 h	D 1	3 10^4	1 10^{-5}	1	2 10^4
Tl-198m 1.87 h	D 1	5 10^4	2 10^{-5}	1	3 10^4
Tl-199 7.42 h	D 1	8 10^4	4 10^{-5}	1	6 10^4
Tl-200 26.1 h	D 1	1 10^4	5 10^{-6}	1	8000
Tl-201 3.044 d	D 1	2 10^4	9 10^{-6}	1	2 10^4
Tl-202 12.23 d	D 1	5000	2 10^{-6}	1	4000
Tl-204 3.779 y	D 1	2000	9 10^{-7}	1	2000
Lead					
Pb-195m 15.8 m	D 0.2	2 10^5	8 10^{-5}	0.2	6 10^4
Pb-198 2.4 h	D 0.2	6 10^4	3 10^{-5}	0.2	3 10^4
Pb-199 90 m	D 0.2	7 10^4	3 10^{-5}	0.2	2 10^4
Pb-200 21.5 h	D 0.2	6000	3 10^{-6}	0.2	3000
Pb-201 9.4 h	D 0.2	2 10^4	8 10^{-6}	0.2	7000
Pb-202 3 10^5 y	D 0.2	50	2 10^{-8}	0.2	100
Pb-202m 3.62 h	D 0.2	3 10^4	1 10^{-5}	0.2	9000
Pb-203 52.05 h	D 0.2	9000	4 10^{-6}	0.2	5000
Pb-205 1.43 10^7 y	D 0.2	1000	6 10^{-7}	0.2	4000
Pb-209 3.253 h	D 0.2	6 10^4	2 10^{-5}	0.2	2 10^4
Pb-210 22.3 y	D 0.2	0.2	1 10^{-10}	0.2	0.6

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Pb-211	D 0.2	20	0.01	0.2	400
36.1 m					
Pb-212	D 0.2	1	$5\ 10^{-4}$	0.2	3
10.64 h					
Pb-214	D 0.2	30	0.01	0.2	300
26.8 m					
Bismuth					
Bi-200	D 0.05	3000	1	0.05	1000
36.4 m	W 0.05	4000	2		
Bi-201	D 0.05	1000	0.4	0.05	400
108 m	W 0.05	1000	0.6		
Bi-202	D 0.05	1000	0.6	0.05	500
1.67 h	W 0.05	3000	1		
Bi-203	D 0.05	200	0.1	0.05	90
11.76 h	W 0.05	200	0.09		
Bi-205	D 0.05	90	0.04	0.05	50
15.31 d	W 0.05	50	0.02		
Bi-206	D 0.05	50	0.02	0.05	20
6.243 d	W 0.05	30	0.01		
Bi-207	D 0.05	60	0.03	0.05	40
38 y	W 0.05	10	0.005		
Bi-210	D 0.05	9	0.004	0.05	30
5.012 d	W 0.05	1	$4\ 10^{-4}$		
Bi-210m	D 0.05	0.2	$7\ 10^{-5}$	0.05	2
$3.0\ 10^{6}$ y	W 0.05	0.03	$1\ 10^{-5}$		
Bi-212	D 0.05	9	0.004	0.05	200
60.55 m	W 0.05	10	0.004		
Bi-213	D 0.05	10	0.005	0.05	300
45.65 m	W 0.05	10	0.005		
Bi-214	D 0.05	30	0.01	0.05	600
19.9 m	W 0.05	30	0.01		
Polonium					
Po-203	D 0.1	2000	1	0.1	900
36.7 m	W 0.1	3000	1		
Po-205	D 0.1	1000	0.6	0.1	800
1.80 h	W 0.1	3000	1		
Po-207	D 0.1	900	0.4	0.1	300
350 m	W 0.1	1000	0.4		
Po-210	D 0.1	0.02	$1\ 10^{-5}$	0.1	0.1
138.38 d	W 0.1	0.02	$1\ 10^{-5}$		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	µCi	µCi/cm^3	f_1	µCi
Pb-211	D 0.2	600	3 10^{-7}	0.2	1 10^{4}
36.1 m					
Pb-212	D 0.2	30	1 10^{-8}	0.2	80
10.64 h					
Pb-214	D 0.2	800	3 10^{-7}	0.2	9000
26.8 m					
Bismuth					
Bi-200	D 0.05	8 10^{4}	4 10^{-5}	0.05	3 10^{4}
36.4 m	W 0.05	1 10^{5}	4 10^{-5}		
Bi-201	D 0.05	3 10^{4}	1 10^{-5}	0.05	1 10^{4}
108 m	W 0.05	4 10^{4}	2 10^{-5}		
Bi-202	D 0.05	4 10^{4}	2 10^{-5}	0.05	1 10^{4}
1.67 h	W 0.05	8 10^{4}	3 10^{-5}		
Bi-203	D 0.05	7000	3 10^{-6}	0.05	2000
11.76 h	W 0.05	6000	3 10^{-6}		
Bi-205	D 0.05	3000	1 10^{-6}	0.05	1000
15.31 d	W 0.05	1000	5 10^{-7}		
Bi-206	D 0.05	1000	6 10^{-7}	0.05	600
6.243 d	W 0.05	900	4 10^{-7}		
Bi-207	D 0.05	2000	7 10^{-7}	0.05	1000
38 y	W 0.05	400	1 10^{-7}		
Bi-210	D 0.05	200	1 10^{-7}	0.05	800
5.012 d	W 0.05	30	1 10^{-8}		
Bi-210m	D 0.05	5	2 10^{-9}	0.05	40
3.0 10^{6} y	W 0.05	0.7	3 10^{-10}		
Bi-212	D 0.05	200	1 10^{-7}	0.05	5000
60.55 m	W 0.05	300	1 10^{-7}		
Bi-213	D 0.05	300	1 10^{-7}	0.05	7000
45.65 m	W 0.05	400	1 10^{-7}		
Bi-214	D 0.05	800	3 10^{-7}	0.05	2 10^{4}
19.9 m	W 0.05	900	4 10^{-7}		
Polonium					
Po-203	D 0.1	6 10^{4}	3 10^{-5}	0.1	3 10^{4}
36.7 m	W 0.1	9 10^{4}	4 10^{-5}		
Po-205	D 0.1	4 10^{4}	2 10^{-5}	0.1	2 10^{4}
1.80 h	W 0.1	7 10^{4}	3 10^{-5}		
Po-207	D 0.1	3 10^{4}	1 10^{-5}	0.1	8000
350 m	W 0.1	3 10^{4}	1 10^{-5}		
Po-210	D 0.1	0.6	3 10^{-10}	0.1	3
138.38 d	W 0.1	0.6	3 10^{-10}		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Astatine					
At-207	D 1	100	0.04	1	200
1.80 h	W 1	80	0.03		
At-211	D 1	3	0.001	1	5
7.214 h	W 1	2	8 10^{-4}		
Radon					
Rn-220	decay	12 WLM*			
55.6 s	products				
Rn-222	decay	4 WLM*			
3.8235 d	products				
Francium					
Fr-222	D 1	20	0.007	1	80
14.4 m					
Fr-223	D 1	30	0.01	1	20
21.8 m					
Radium					
Ra-223	W 0.2	0.03	1 10^{-5}	0.2	0.2
11.434 d					
Ra-224	W 0.2	0.06	3 10^{-5}	0.2	0.3
3.66 d					
Ra-225	W 0.2	0.02	1 10^{-5}	0.2	0.3
14.8 d					
Ra-226	W 0.2	0.02	1 10^{-5}	0.2	0.07
1600 y					
Ra-227	W 0.2	500	0.2	0.2	600
42.2 m					
Ra-228	W 0.2	0.04	2 10^{-5}	0.2	0.09
5.75 y					
Actinium					
Ac-224	D 0.001	1	4 10^{-4}	0.001	70
2.9 h	W 0.001	2	8 10^{-4}		
	Y 0.001	2	7 10^{-4}		
Ac-225	D 0.001	0.01	4 10^{-6}	0.001	2
10.0 d	W 0.001	0.02	1 10^{-5}		
	Y 0.001	0.02	1 10^{-5}		
Ac-226	D 0.001	0.1	5 10^{-5}	0.001	5
29 h	W 0.001	0.2	8 10^{-5}		
	Y 0.001	0.2	7 10^{-5}		
Ac-227	D 0.001	2 10^{-5}	6 10^{-9}	0.001	0.007
21.773 y	W 0.001	6 10^{-5}	3 10^{-8}		
	Y 0.001	1 10^{-4}	6 10^{-8}		

*Primary guide.

Table 1.b, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Astatine					
At-207	D 1	3000	1 10^{-6}	1	6000
1.80 h	W 1	2000	9 10^{-7}		
At-211	D 1	80	3 10^{-8}	1	100
7.214 h	W 1	50	2 10^{-8}		
Radon					
Rn-220	decay	12 WLM*			
55.6 s	products				
Rn-222	decay	4 WLM*			
3.8235 d	products				
Francium					
Fr-222	D 1	500	2 10^{-7}	1	2000
14.4 m					
Fr-223	D 1	800	3 10^{-7}	1	600
21.8 m					
Radium					
Ra-223	W 0.2	0.7	3 10^{-10}	0.2	5
11.434 d					
Ra-224	W 0.2	2	7 10^{-10}	0.2	8
3.66 d					
Ra-225	W 0.2	0.7	3 10^{-10}	0.2	8
14.8 d					
Ra-226	W 0.2	0.6	3 10^{-10}	0.2	2
1600 y					
Ra-227	W 0.2	1 10^{4}	6 10^{-6}	0.2	2 10^{4}
42.2 m					
Ra-228	W 0.2	1	5 10^{-10}	0.2	2
5.75 y					
Actinium					
Ac-224	D 0.001	30	1 10^{-8}	0.001	2000
2.9 h	W 0.001	50	2 10^{-8}		
	Y 0.001	50	2 10^{-8}		
Ac-225	D 0.001	0.3	1 10^{-10}	0.001	50
10.0 d	W 0.001	0.6	3 10^{-10}		
	Y 0.001	0.6	3 10^{-10}		
Ac-226	D 0.001	3	1 10^{-9}	0.001	100
29 h	W 0.001	5	2 10^{-9}		
	Y 0.001	5	2 10^{-9}		
Ac-227	D 0.001	4 10^{-4}	2 10^{-13}	0.001	0.2
21.773 y	W 0.001	0.002	7 10^{-13}		
	Y 0.001	0.004	2 10^{-12}		

*Primary guide.

Table 1.a, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Ac-228	D 0.001	0.4	1 10^{-4}	0.001	90
6.13 h	W 0.001	1	6 10^{-4}		
	Y 0.001	2	7 10^{-4}		
Thorium					
Th-226	W 2 10^{-4}	6	0.002	2 10^{-4}	200
30.9 m	Y 2 10^{-4}	5	0.002		
Th-227	W 2 10^{-4}	0.01	5 10^{-6}	2 10^{-4}	5
18.718 d	Y 2 10^{-4}	0.01	5 10^{-6}		
Th-228	W 2 10^{-4}	4 10^{-4}	2 10^{-7}	2 10^{-4}	0.2
1.9131 y	Y 2 10^{-4}	6 10^{-4}	3 10^{-7}		
Th-229	W 2 10^{-4}	3 10^{-5}	1 10^{-8}	2 10^{-4}	0.02
7340 y	Y 2 10^{-4}	9 10^{-5}	4 10^{-8}		
Th-230	W 2 10^{-4}	2 10^{-4}	1 10^{-7}	2 10^{-4}	0.1
7.7 10^{4} y	Y 2 10^{-4}	6 10^{-4}	2 10^{-7}		
Th-231	W 2 10^{-4}	200	0.1	2 10^{-4}	100
25.52 h	Y 2 10^{-4}	200	0.1		
Th-232	W 2 10^{-4}	4 10^{-5}	2 10^{-8}	2 10^{-4}	0.03
1.405 10^{10} y	Y 2 10^{-4}	1 10^{-4}	4 10^{-8}		
Th-234	W 2 10^{-4}	7	0.003	2 10^{-4}	10
24.10 d	Y 2 10^{-4}	6	0.002		
Protactinium					
Pa-227	W 0.001	4	0.002	0.001	100
38.3 m	Y 0.001	4	0.002		
Pa-228	W 0.001	0.5	2 10^{-4}	0.001	50
22 h	Y 0.001	0.4	2 10^{-4}		
Pa-230	W 0.001	0.2	7 10^{-5}	0.001	20
17.4 d	Y 0.001	0.1	5 10^{-5}		
Pa-231	W 0.001	6 10^{-5}	2 10^{-8}	0.001	0.007
3.276 10^{4} y	Y 0.001	1 10^{-4}	6 10^{-8}		
Pa-232	W 0.001	0.8	3 10^{-4}	0.001	50
1.31 d	Y 0.001	2	9 10^{-4}		
Pa-233	W 0.001	30	0.01	0.001	50
27.0 d	Y 0.001	20	0.009		
Pa-234	W 0.001	300	0.1	0.001	90
6.70 h	Y 0.001	200	0.1		
Uranium					
U-230	D 0.05	0.02	6 10^{-6}	0.05	0.1
20.8 d	W 0.05	0.01	5 10^{-6}	0.002	2
	Y 0.002	0.01	4 10^{-6}		
U-231	D 0.05	300	0.1	0.05	200
4.2 d	W 0.05	200	0.09	0.002	200
	Y 0.002	200	0.07		

Table 1.b, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Ac-228	D 0.001	9	$4\ 10^{-9}$	0.001	2000
6.13 h	W 0.001	40	$2\ 10^{-8}$		
	Y 0.001	40	$2\ 10^{-8}$		
Thorium					
Th-226	W $2\ 10^{-4}$	200	$6\ 10^{-8}$	$2\ 10^{-4}$	5000
30.9 m	Y $2\ 10^{-4}$	100	$6\ 10^{-8}$		
Th-227	W $2\ 10^{-4}$	0.3	$1\ 10^{-10}$	$2\ 10^{-4}$	100
18.718 d	Y $2\ 10^{-4}$	0.3	$1\ 10^{-10}$		
Th-228	W $2\ 10^{-4}$	0.01	$4\ 10^{-12}$	$2\ 10^{-4}$	6
1.9131 y	Y $2\ 10^{-4}$	0.02	$7\ 10^{-12}$		
Th-229	W $2\ 10^{-4}$	$9\ 10^{-4}$	$4\ 10^{-13}$	$2\ 10^{-4}$	0.6
7340 y	Y $2\ 10^{-4}$	0.002	$1\ 10^{-12}$		
Th-230	W $2\ 10^{-4}$	0.006	$3\ 10^{-12}$	$2\ 10^{-4}$	4
$7.7\ 10^4$ y	Y $2\ 10^{-4}$	0.02	$6\ 10^{-12}$		
Th-231	W $2\ 10^{-4}$	6000	$3\ 10^{-6}$	$2\ 10^{-4}$	4000
25.52 h	Y $2\ 10^{-4}$	6000	$3\ 10^{-6}$		
Th-232	W $2\ 10^{-4}$	0.001	$5\ 10^{-13}$	$2\ 10^{-4}$	0.7
$1.405\ 10^{10}$ y	Y $2\ 10^{-4}$	0.003	$1\ 10^{-12}$		
Th-234	W $2\ 10^{-4}$	200	$8\ 10^{-8}$	$2\ 10^{-4}$	300
24.10 d	Y $2\ 10^{-4}$	200	$6\ 10^{-8}$		
Protactinium					
Pa-227	W 0.001	100	$5\ 10^{-8}$	0.001	4000
38.3 m	Y 0.001	100	$4\ 10^{-8}$		
Pa-228	W 0.001	10	$5\ 10^{-9}$	0.001	1000
22 h	Y 0.001	10	$5\ 10^{-9}$		
Pa-230	W 0.001	5	$2\ 10^{-9}$	0.001	600
17.4 d	Y 0.001	4	$1\ 10^{-9}$		
Pa-231	W 0.001	0.002	$6\ 10^{-13}$	0.001	0.2
$3.276\ 10^4$ y	Y 0.001	0.004	$2\ 10^{-12}$		
Pa-232	W 0.001	20	$9\ 10^{-9}$	0.001	1000
1.31 d	Y 0.001	60	$2\ 10^{-8}$		
Pa-233	W 0.001	700	$3\ 10^{-7}$	0.001	1000
27.0 d	Y 0.001	600	$2\ 10^{-7}$		
Pa-234	W 0.001	8000	$3\ 10^{-6}$	0.001	2000
6.70 h	Y 0.001	7000	$3\ 10^{-6}$		
Uranium					
U-230	D 0.05	0.4	$2\ 10^{-10}$	0.05	4
20.8 d	W 0.05	0.4	$1\ 10^{-10}$	0.002	40
	Y 0.002	0.3	$1\ 10^{-10}$		
U-231	D 0.05	8000	$3\ 10^{-6}$	0.05	5000
4.2 d	W 0.05	6000	$2\ 10^{-6}$	0.002	4000
	Y 0.002	5000	$2\ 10^{-6}$		

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
U-232	D 0.05	0.008	$3\ 10^{-6}$	0.05	0.08
72 y	W 0.05	0.01	$6\ 10^{-6}$	0.002	2
	Y 0.002	$3\ 10^{-4}$	$1\ 10^{-7}$		
U-233	D 0.05	0.04	$2\ 10^{-5}$	0.05	0.4
1.585 10^5 y	W 0.05	0.03	$1\ 10^{-5}$	0.002	7
	Y 0.002	0.001	$6\ 10^{-7}$		
U-234	D 0.05	0.05	$2\ 10^{-5}$	0.05	0.4
2.445 10^5 y	W 0.05	0.03	$1\ 10^{-5}$	0.002	7
	Y 0.002	0.001	$6\ 10^{-7}$		
U-235	D 0.05	0.05	$2\ 10^{-5}$	0.05	0.5
703.8 10^6 y	W 0.05	0.03	$1\ 10^{-5}$	0.002	7
	Y 0.002	0.002	$6\ 10^{-7}$		
U-236	D 0.05	0.05	$2\ 10^{-5}$	0.05	0.5
2.3415 10^7 y	W 0.05	0.03	$1\ 10^{-5}$	0.002	8
	Y 0.002	0.001	$6\ 10^{-7}$		
U-237	D 0.05	100	0.04	0.05	60
6.75 d	W 0.05	60	0.03	0.002	60
	Y 0.002	60	0.02		
U-238	D 0.05	0.05	$2\ 10^{-5}$	0.05	0.5
4.468 10^9 y	W 0.05	0.03	$1\ 10^{-5}$	0.002	8
	Y 0.002	0.002	$7\ 10^{-7}$		
U-239	D 0.05	7000	3	0.05	2000
23.54 m	W 0.05	6000	3	0.002	2000
	Y 0.002	6000	2		
U-240	D 0.05	100	0.06	0.05	50
14.1 h	W 0.05	100	0.04	0.002	50
	Y 0.002	90	0.04		
Neptunium					
Np-232	W 0.001	70	0.03	0.001	5000
14.7 m					
Np-233	W 0.001	$1\ 10^5$	50	0.001	$3\ 10^4$
36.2 m					
Np-234	W 0.001	100	0.04	0.001	80
4.4 d					
Np-235	W 0.001	30	0.01	0.001	800
396.1 d					
Np-236	W 0.001	$8\ 10^{-4}$	$3\ 10^{-7}$	0.001	0.09
115 10^3 y					
Np-236	W 0.001	1	$4\ 10^{-4}$	0.001	100
22.5 h					

Table 1.b, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
U-232	D 0.05	0.2	9 10^{-11}	0.05	2
72 y	W 0.05	0.4	2 10^{-10}	0.002	50
	Y 0.002	0.008	3 10^{-12}		
U-233	D 0.05	1	5 10^{-10}	0.05	10
1.585 10^5 y	W 0.05	0.7	3 10^{-10}	0.002	200
	Y 0.002	0.04	2 10^{-11}		
U-234	D 0.05	1	5 10^{-10}	0.05	10
2.445 10^5 y	W 0.05	0.7	3 10^{-10}	0.002	200
	Y 0.002	0.04	2 10^{-11}		
U-235	D 0.05	1	6 10^{-10}	0.05	10
703.8 10^6 y	W 0.05	0.8	3 10^{-10}	0.002	200
	Y 0.002	0.04	2 10^{-11}		
U-236	D 0.05	1	5 10^{-10}	0.05	10
2.3415 10^7 y	W 0.05	0.8	3 10^{-10}	0.002	200
	Y 0.002	0.04	2 10^{-11}		
U-237	D 0.05	3000	1 10^{-6}	0.05	2000
6.75 d	W 0.05	2000	7 10^{-7}	0.002	2000
	Y 0.002	2000	6 10^{-7}		
U-238	D 0.05	1	6 10^{-10}	0.05	10
4.468 10^9 y	W 0.05	0.8	3 10^{-10}	0.002	200
	Y 0.002	0.04	2 10^{-11}		
U-239	D 0.05	2 10^5	8 10^{-5}	0.05	7 10^4
23.54 m	W 0.05	2 10^5	7 10^{-5}	0.002	7 10^4
	Y 0.002	2 10^5	6 10^{-5}		
U-240	D 0.05	4000	2 10^{-6}	0.05	1000
14.1 h	W 0.05	3000	1 10^{-6}	0.002	1000
	Y 0.002	2000	1 10^{-6}		
Neptunium					
Np-232	W 0.001	2000	7 10^{-7}	0.001	1 10^5
14.7 m					
Np-233	W 0.001	3 10^6	0.001	0.001	8 10^5
36.2 m					
Np-234	W 0.001	3000	1 10^{-6}	0.001	2000
4.4 d					
Np-235	W 0.001	800	3 10^{-7}	0.001	2 10^4
396.1 d					
Np-236	W 0.001	0.02	9 10^{-12}	0.001	3
115 10^3 y					
Np-236	W 0.001	30	1 10^{-8}	0.001	3000
22.5 h					

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Np-237	W 0.001	2 10^{-4}	6 10^{-8}	0.001	0.02
2.14 10^6 y					
Np-238	W 0.001	2	0.001	0.001	50
2.117 d					
Np-239	W 0.001	80	0.03	0.001	60
2.355 d					
Np-240	W 0.001	3000	1	0.001	800
65 m					
Plutonium					
Pu-234	W 0.001	8	0.003	0.001	300
8.8 h	Y 1 10^{-5}	7	0.003	1 10^{-4}	300
				1 10^{-5}	300
Pu-235	W 0.001	1 10^5	50	0.001	3 10^4
25.3 m	Y 1 10^{-5}	9 10^4	40	1 10^{-4}	3 10^4
				1 10^{-5}	3 10^4
Pu-236	W 0.001	7 10^{-4}	3 10^{-7}	0.001	0.09
2.851 y	Y 1 10^{-5}	0.002	7 10^{-7}	1 10^{-4}	0.9
				1 10^{-5}	7
Pu-237	W 0.001	100	0.05	0.001	500
45.3 d	Y 1 10^{-5}	100	0.05	1 10^{-4}	500
				1 10^{-5}	500
Pu-238	W 0.001	3 10^{-4}	1 10^{-7}	0.001	0.03
87.74 y	Y 1 10^{-5}	7 10^{-4}	3 10^{-7}	1 10^{-4}	0.3
				1 10^{-5}	3
Pu-239	W 0.001	2 10^{-4}	1 10^{-7}	0.001	0.03
24065 y	Y 1 10^{-5}	6 10^{-4}	3 10^{-7}	1 10^{-4}	0.3
				1 10^{-5}	3
Pu-240	W 0.001	2 10^{-4}	1 10^{-7}	0.001	0.03
6537 y	Y 1 10^{-5}	6 10^{-4}	3 10^{-7}	1 10^{-4}	0.3
				1 10^{-5}	3
Pu-241	W 0.001	0.01	5 10^{-6}	0.001	1
14.4 y	Y 1 10^{-5}	0.03	1 10^{-5}	1 10^{-4}	10
				1 10^{-5}	100
Pu-242	W 0.001	2 10^{-4}	1 10^{-7}	0.001	0.03
3.763 10^5 y	Y 1 10^{-5}	6 10^{-4}	3 10^{-7}	1 10^{-4}	0.3
				1 10^{-5}	3
Pu-243	W 0.001	1000	0.6	0.001	600
4.956 h	Y 1 10^{-5}	1000	0.6	1 10^{-4}	600
				1 10^{-5}	600
Pu-244	W 0.001	3 10^{-4}	1 10^{-7}	0.001	0.03
8.26 10^7 y	Y 1 10^{-5}	7 10^{-4}	3 10^{-7}	1 10^{-4}	0.3
				1 10^{-5}	3

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Np-237	W 0.001	0.004	2 10^{-12}	0.001	0.5
2.14 10^6 y					
Np-238	W 0.001	60	3 10^{-8}	0.001	1000
2.117 d					
Np-239	W 0.001	2000	9 10^{-7}	0.001	2000
2.355 d					
Np-240	W 0.001	8 10^4	3 10^{-5}	0.001	2 10^4
65 m					
Plutonium					
Pu-234	W 0.001	200	9 10^{-8}	0.001	8000
8.8 h	Y 1 10^{-5}	200	8 10^{-8}	1 10^{-4}	9000
				1 10^{-5}	9000
Pu-235	W 0.001	3 10^6	0.001	0.001	9 10^5
25.3 m	Y 1 10^{-5}	3 10^6	0.001	1 10^{-4}	9 10^5
				1 10^{-5}	9 10^5
Pu-236	W 0.001	0.02	8 10^{-12}	0.001	2
2.851 y	Y 1 10^{-5}	0.04	2 10^{-11}	1 10^{-4}	20
				1 10^{-5}	200
Pu-237	W 0.001	3000	1 10^{-6}	0.001	1 10^4
45.3 d	Y 1 10^{-5}	3000	1 10^{-6}	1 10^{-4}	1 10^4
				1 10^{-5}	1 10^4
Pu-238	W 0.001	0.007	3 10^{-12}	0.001	0.9
87.74 y	Y 1 10^{-5}	0.02	8 10^{-12}	1 10^{-4}	9
				1 10^{-5}	90
Pu-239	W 0.001	0.006	3 10^{-12}	0.001	0.8
24065 y	Y 1 10^{-5}	0.02	7 10^{-12}	1 10^{-4}	8
				1 10^{-5}	80
Pu-240	W 0.001	0.006	3 10^{-12}	0.001	0.8
6537 y	Y 1 10^{-5}	0.02	7 10^{-12}	1 10^{-4}	8
				1 10^{-5}	80
Pu-241	W 0.001	0.3	1 10^{-10}	0.001	40
14.4 y	Y 1 10^{-5}	0.8	3 10^{-10}	1 10^{-4}	400
				1 10^{-5}	4000
Pu-242	W 0.001	0.007	3 10^{-12}	0.001	0.8
3.763 10^5 y	Y 1 10^{-5}	0.02	7 10^{-12}	1 10^{-4}	8
				1 10^{-5}	80
Pu-243	W 0.001	4 10^4	2 10^{-5}	0.001	2 10^4
4.956 h	Y 1 10^{-5}	4 10^4	2 10^{-5}	1 10^{-4}	2 10^4
				1 10^{-5}	2 10^4
Pu-244	W 0.001	0.007	3 10^{-12}	0.001	0.8
8.26 10^7 y	Y 1 10^{-5}	0.02	7 10^{-12}	1 10^{-4}	8
				1 10^{-5}	80

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Pu-245	W 0.001	200	0.07	0.001	80
10.5 h	Y 1 10^{-5}	200	0.06	1 10^{-4}	80
				1 10^{-5}	80
Pu-246	W 0.001	9	0.004	0.001	10
10.85 d	1 10^{-4}	10	0.004	1 10^{-4}	10
				1 10^{-5}	10
Americium					
Am-237	W 0.001	1 10^{4}	4	1 10^{-4}	3000
73.0 m					
Am-238	W 0.001	100	0.05	1 10^{-4}	1000
98 m					
Am-239	W 0.001	500	0.2	1 10^{-4}	200
11.9 h					
Am-240	W 0.001	100	0.04	1 10^{-4}	80
50.8 h					
Am-241	W 0.001	2 10^{-4}	1 10^{-7}	1 10^{-4}	0.03
432.2 y					
Am-242	W 0.001	3	0.001	1 10^{-4}	100
16.02 h					
Am-242m	W 0.001	2 10^{-4}	1 10^{-7}	1 10^{-4}	0.03
152 y					
Am-243	W 0.001	2 10^{-4}	1 10^{-7}	1 10^{-4}	0.03
7380 y					
Am-244	W 0.001	7	0.003	1 10^{-4}	100
10.1 h					
Am-244m	W 0.001	200	0.07	1 10^{-4}	2000
26 m					
Am-245	W 0.001	3000	1	1 10^{-4}	1000
2.05 h					
Am-246	W 0.001	4000	2	1 10^{-4}	1000
39 m					
Am-246m	W 0.001	7000	3	1 10^{-4}	2000
25.0 m					
Curium					
Cm-238	W 0.001	40	0.02	0.001	600
2.4 h					
Cm-240	W 0.001	0.02	9 10^{-6}	0.001	2
27 d					
Cm-241	W 0.001	1	4 10^{-4}	0.001	40
32.8 d					

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	μCi	μCi/cm^3	f_1	μCi
Pu-245	W 0.001	5000	$2\ 10^{-6}$	0.001	2000
10.5 h	Y $1\ 10^{-5}$	4000	$2\ 10^{-6}$	$1\ 10^{-4}$	2000
				$1\ 10^{-5}$	2000
Pu-246	W 0.001	300	$1\ 10^{-7}$	0.001	400
10.85 d	$1\ 10^{-4}$	300	$1\ 10^{-7}$	$1\ 10^{-4}$	400
				$1\ 10^{-5}$	400
Americium					
Am-237 73.0 m	W 0.001	$3\ 10^{5}$	$1\ 10^{-4}$	$1\ 10^{-4}$	$8\ 10^{4}$
Am-238 98 m	W 0.001	3000	$1\ 10^{-6}$	$1\ 10^{-4}$	$4\ 10^{4}$
Am-239 11.9 h	W 0.001	$1\ 10^{4}$	$5\ 10^{-6}$	$1\ 10^{-4}$	5000
Am-240 50.8 h	W 0.001	3000	$1\ 10^{-6}$	$1\ 10^{-4}$	2000
Am-241 432.2 y	W 0.001	0.006	$3\ 10^{-12}$	$1\ 10^{-4}$	0.8
Am-242 16.02 h	W 0.001	80	$4\ 10^{-8}$	$1\ 10^{-4}$	4000
Am-242m 152 y	W 0.001	0.006	$3\ 10^{-12}$	$1\ 10^{-4}$	0.8
Am-243 7380 y	W 0.001	0.006	$3\ 10^{-12}$	$1\ 10^{-4}$	0.8
Am-244 10.1 h	W 0.001	200	$8\ 10^{-8}$	$1\ 10^{-4}$	3000
Am-244m 26 m	W 0.001	4000	$2\ 10^{-6}$	$1\ 10^{-4}$	$6\ 10^{4}$
Am-245 2.05 h	W 0.001	$8\ 10^{4}$	$3\ 10^{-5}$	$1\ 10^{-4}$	$3\ 10^{4}$
Am-246 39 m	W 0.001	$1\ 10^{5}$	$4\ 10^{-5}$	$1\ 10^{-4}$	$3\ 10^{4}$
Am-246m 25.0 m	W 0.001	$2\ 10^{5}$	$8\ 10^{-5}$	$1\ 10^{-4}$	$5\ 10^{4}$
Curium					
Cm-238 2.4 h	W 0.001	1000	$5\ 10^{-7}$	0.001	$2\ 10^{4}$
Cm-240 27 d	W 0.001	0.6	$2\ 10^{-10}$	0.001	60
Cm-241 32.8 d	W 0.001	30	$1\ 10^{-8}$	0.001	1000

Table 1.a, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Cm-242	W 0.001	0.01	4 10^{-6}	0.001	1
162.8 d					
Cm-243	W 0.001	3 10^{-4}	1 10^{-7}	0.001	0.04
28.5 y					
Cm-244	W 0.001	4 10^{-4}	2 10^{-7}	0.001	0.05
18.11 y					
Cm-245	W 0.001	2 10^{-4}	9 10^{-8}	0.001	0.03
8500 y					
Cm-246	W 0.001	2 10^{-4}	9 10^{-8}	0.001	0.03
4730 y					
Cm-247	W 0.001	2 10^{-4}	1 10^{-7}	0.001	0.03
1.56 10^7 y					
Cm-248	W 0.001	6 10^{-5}	3 10^{-8}	0.001	0.007
3.39 10^5 y					
Cm-249	W 0.001	600	0.3	0.001	2000
64.15 m					
Cm-250	W 0.001	1 10^{-5}	5 10^{-9}	0.001	0.001
6900 y					
Berkelium					
Bk-245	W 0.001	50	0.02	0.001	80
4.94 d					
Bk-246	W 0.001	100	0.05	0.001	100
1.83 d					
Bk-247	W 0.001	2 10^{-4}	6 10^{-8}	0.001	0.02
1380 y					
Bk-249	W 0.001	0.06	3 10^{-5}	0.001	7
320 d					
Bk-250	W 0.001	10	0.005	0.001	300
3.222 h					
Californium					
Cf-244	W 0.001	20	0.009	0.001	900
19.4 m	Y 0.001	20	0.009		
Cf-246	W 0.001	0.4	1 10^{-4}	0.001	10
35.7 h	Y 0.001	0.3	1 10^{-4}		
Cf-248	W 0.001	0.002	1 10^{-6}	0.001	0.3
333.5 d	Y 0.001	0.004	2 10^{-6}		
Cf-249	W 0.001	2 10^{-4}	6 10^{-8}	0.001	0.02
350.6 y	Y 0.001	4 10^{-4}	2 10^{-7}		
Cf-250	W 0.001	3 10^{-4}	1 10^{-7}	0.001	0.04
13.08 y	Y 0.001	0.001	4 10^{-7}		

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	µCi	µCi/cm^3	f_1	µCi
Cm-242	W 0.001	0.3	1 10^{-10}	0.001	30
162.8 d					
Cm-243	W 0.001	0.009	4 10^{-12}	0.001	1
28.5 y					
Cm-244	W 0.001	0.01	5 10^{-12}	0.001	1
18.11 y					
Cm-245	W 0.001	0.006	3 10^{-12}	0.001	0.7
8500 y					
Cm-246	W 0.001	0.006	3 10^{-12}	0.001	0.7
4730 y					
Cm-247	W 0.001	0.006	3 10^{-12}	0.001	0.8
1.56 10^7 y					
Cm-248	W 0.001	0.002	7 10^{-13}	0.001	0.2
3.39 10^5 y					
Cm-249	W 0.001	2 10^4	7 10^{-6}	0.001	5 10^4
64.15 m					
Cm-250	W 0.001	3 10^{-4}	1 10^{-13}	0.001	0.04
6900 y					
Berkelium					
Bk-245	W 0.001	1000	5 10^{-7}	0.001	2000
4.94 d					
Bk-246	W 0.001	3000	1 10^{-6}	0.001	3000
1.83 d					
Bk-247	W 0.001	0.004	2 10^{-12}	0.001	0.5
1380 y					
Bk-249	W 0.001	2	7 10^{-10}	0.001	200
320 d					
Bk-250	W 0.001	300	1 10^{-7}	0.001	9000
3.222 h					
Californium					
Cf-244	W 0.001	600	2 10^{-7}	0.001	3 10^4
19.4 m	Y 0.001	600	2 10^{-7}		
Cf-246	W 0.001	9	4 10^{-9}	0.001	400
35.7 h	Y 0.001	9	4 10^{-9}		
Cf-248	W 0.001	0.06	3 10^{-11}	0.001	8
333.5 d	Y 0.001	0.1	4 10^{-11}		
Cf-249	W 0.001	0.004	2 10^{-12}	0.001	0.5
350.6 y	Y 0.001	0.01	4 10^{-12}		
Cf-250	W 0.001	0.009	4 10^{-12}	0.001	1
13.08 y	Y 0.001	0.03	1 10^{-11}		

Table 1.a, Cont'd.

		Inhalation		Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	MBq	MBq/m^3	f_1	MBq
Cf-251	W 0.001	$1\ 10^{-4}$	$6\ 10^{-8}$	0.001	0.02
898 y	Y 0.001	$4\ 10^{-4}$	$2\ 10^{-7}$		
Cf-252	W 0.001	$7\ 10^{-4}$	$3\ 10^{-7}$	0.001	0.09
2.638 y	Y 0.001	0.001	$5\ 10^{-7}$		
Cf-253	W 0.001	0.07	$3\ 10^{-5}$	0.001	7
17.81 d	Y 0.001	0.06	$3\ 10^{-5}$		
Cf-254	W 0.001	$8\ 10^{-4}$	$3\ 10^{-7}$	0.001	0.08
60.5 d	Y 0.001	$6\ 10^{-4}$	$3\ 10^{-7}$		
Einsteinium					
Es-250	W 0.001	20	0.008	0.001	2000
2.1 h					
Es-251	W 0.001	30	0.01	0.001	300
33 h					
Es-253	W 0.001	0.05	$2\ 10^{-5}$	0.001	6
20.47 d					
Es-254	W 0.001	0.003	$1\ 10^{-6}$	0.001	0.3
275.7 d					
Es-254m	W 0.001	0.4	$2\ 10^{-4}$	0.001	10
39.3 h					
Fermium					
Fm-252	W 0.001	0.5	$2\ 10^{-4}$	0.001	20
22.7 h					
Fm-253	W 0.001	0.4	$1\ 10^{-4}$	0.001	40
3.00 d					
Fm-254	W 0.001	3	0.001	0.001	100
3.240 h					
Fm-255	W 0.001	0.8	$3\ 10^{-4}$	0.001	20
20.07 h					
Fm-257	W 0.001	0.007	$3\ 10^{-6}$	0.001	0.7
100.5 d					
Mendelevium					
Md-257	W 0.001	3	0.001	0.001	300
5.2 h					
Md-258	W 0.001	0.009	$4\ 10^{-6}$	0.001	0.9
55 d					

Table 1.b, Cont'd.

	Inhalation			Ingestion	
		ALI	DAC		ALI
Nuclide	Class/f_1	µCi	µCi/cm^3	f_1	µCi
Cf-251 898 y	W 0.001 Y 0.001	0.004 0.01	2 10^{-12} 4 10^{-12}	0.001	0.5
Cf-252 2.638 y	W 0.001 Y 0.001	0.02 0.03	8 10^{-12} 1 10^{-11}	0.001	2
Cf-253 17.81 d	W 0.001 Y 0.001	2 2	8 10^{-10} 7 10^{-10}	0.001	200
Cf-254 60.5 d	W 0.001 Y 0.001	0.02 0.02	9 10^{-12} 7 10^{-12}	0.001	2
Einsteinium					
Es-250 2.1 h	W 0.001	500	2 10^{-7}	0.001	4 10^{4}
Es-251 33 h	W 0.001	900	4 10^{-7}	0.001	7000
Es-253 20.47 d	W 0.001	1	6 10^{-10}	0.001	200
Es-254 275.7 d	W 0.001	0.07	3 10^{-11}	0.001	8
Es-254m 39.3 h	W 0.001	10	4 10^{-9}	0.001	300
Fermium					
Fm-252 22.7 h	W 0.001	10	5 10^{-9}	0.001	500
Fm-253 3.00 d	W 0.001	10	4 10^{-9}	0.001	1000
Fm-254 3.240 h	W 0.001	90	4 10^{-8}	0.001	3000
Fm-255 20.07 h	W 0.001	20	9 10^{-9}	0.001	500
Fm-257 100.5 d	W 0.001	0.2	7 10^{-11}	0.001	20
Mendelevium					
Md-257 5.2 h	W 0.001	80	4 10^{-8}	0.001	7000
Md-258 55 d	W 0.001	0.2	1 10^{-10}	0.001	30

TABLE 2.1

Exposure-to-Dose Conversion Factors for Inhalation

Explanation of Entries

For each radionuclide, values in SI units for the organ dose equivalent conversion factors, $h_{T,50}$, and the effective dose equivalent conversion factor, $h_{E,50}$, based upon the weighting factors set forth on page 6, are listed in Table 2.1 for inhalation. The limiting coefficient, with respect to determining the ALI and DAC, is indicated by bold-faced type.

class/f_1: The lung clearance class (D, W, or Y) and the fractional uptake from the small intestine to blood (f_1) for common chemical forms of the radionuclide are shown. The vapor form is noted as "V."

$h_{T,50}$: The tissue dose equivalent conversion factor for organ or tissue T (expressed in Sv/Bq), i.e., the committed dose equivalent per unit intake of radionuclide.

$h_{E,50}$: The effective dose equivalent conversion factor (expressed in Sv/Bq), i.e., the committed effective dose equivalent per unit intake of radionuclide:

$$h_{E,50} = \sum_T w_T \, h_{T,50} .$$

To convert to conventional units (mrem/μCi), multiply table entries by **3.7×10^9.**

As an example, consider the factor for lung for inhalation of a class W form of Be-7:

$$h_{lung,50} = 2.15 \times 10^{-10}\ \text{Sv/Bq} \times \mathbf{3.7 \times 10^9} = 0.80\ \text{mrem}/\mu\text{Ci}.$$

Table 2.1. Exposure-to-Dose Conversion Factors for Inhalation

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Hydrogen									
H-3	V[*] 1.0	$1.73\ 10^{-11}$	$1.73\ 10^{-11}$	$1.73\ 10^{-11}$	$1.73\ 10^{-11}$	$1.73\ 10^{-11}$	$1.73\ 10^{-11}$	$1.73\ 10^{-11}$	**$1.73\ 10^{-11}$**
Beryllium									
Be-7	W 5 10^{-3}	$3.72\ 10^{-11}$	$3.12\ 10^{-11}$	$2.15\ 10^{-10}$	$4.58\ 10^{-11}$	$4.09\ 10^{-11}$	$2.60\ 10^{-11}$	$5.46\ 10^{-11}$	**$6.37\ 10^{-11}$**
	Y 5 10^{-3}	$3.17\ 10^{-11}$	$3.82\ 10^{-11}$	$3.73\ 10^{-10}$	$3.99\ 10^{-11}$	$2.98\ 10^{-11}$	$3.10\ 10^{-11}$	$7.23\ 10^{-11}$	**$8.67\ 10^{-11}$**
Be-10	W 5 10^{-3}	$5.94\ 10^{-10}$	$5.94\ 10^{-10}$	$4.22\ 10^{-8}$	$1.77\ 10^{-8}$	$5.26\ 10^{-8}$	$5.94\ 10^{-10}$	$2.44\ 10^{-9}$	**$9.75\ 10^{-9}$**
	Y 5 10^{-3}	$2.56\ 10^{-10}$	$2.56\ 10^{-10}$	$7.78\ 10^{-7}$	$7.65\ 10^{-9}$	$2.27\ 10^{-8}$	$2.56\ 10^{-10}$	$2.35\ 10^{-9}$	**$9.58\ 10^{-8}$**
Carbon									
C-11	1.0[†]	$3.41\ 10^{-12}$	$2.98\ 10^{-12}$	$3.09\ 10^{-12}$	$3.18\ 10^{-12}$	$3.03\ 10^{-12}$	$2.97\ 10^{-12}$	$3.54\ 10^{-12}$	**$3.29\ 10^{-12}$**
	1.0[‡]	$1.24\ 10^{-12}$	$1.08\ 10^{-12}$	$1.12\ 10^{-12}$	$1.16\ 10^{-12}$	$1.10\ 10^{-12}$	$1.08\ 10^{-12}$	$1.29\ 10^{-12}$	**$1.20\ 10^{-12}$**
	1.0[§]	$2.22\ 10^{-12}$	$1.94\ 10^{-12}$	$2.01\ 10^{-12}$	$2.07\ 10^{-12}$	$1.97\ 10^{-12}$	$1.93\ 10^{-12}$	$2.30\ 10^{-12}$	**$2.14\ 10^{-12}$**
C-14	1.0[†]	$5.64\ 10^{-10}$	$5.64\ 10^{-10}$	$5.64\ 10^{-10}$	$5.64\ 10^{-10}$	$5.64\ 10^{-10}$	$5.64\ 10^{-10}$	$5.64\ 10^{-10}$	**$5.64\ 10^{-10}$**
	1.0[‡]	$7.83\ 10^{-13}$	$7.83\ 10^{-13}$	$7.83\ 10^{-13}$	$7.83\ 10^{-13}$	$7.83\ 10^{-13}$	$7.83\ 10^{-13}$	$7.83\ 10^{-13}$	**$7.83\ 10^{-13}$**
	1.0[§]	$6.36\ 10^{-12}$	$6.36\ 10^{-12}$	$6.36\ 10^{-12}$	$6.36\ 10^{-12}$	$6.36\ 10^{-12}$	$6.36\ 10^{-12}$	$6.36\ 10^{-12}$	**$6.36\ 10^{-12}$**
Fluorine									
F-18	D 1.0	$2.17\ 10^{-12}$	$3.88\ 10^{-12}$	$1.09\ 10^{-10}$	$2.76\ 10^{-11}$	$2.79\ 10^{-11}$	$3.47\ 10^{-12}$	$1.37\ 10^{-11}$	**$2.26\ 10^{-11}$**
	W 1.0	$8.70\ 10^{-13}$	$2.74\ 10^{-12}$	$1.29\ 10^{-10}$	$1.02\ 10^{-11}$	$9.96\ 10^{-12}$	$2.44\ 10^{-12}$	$8.08\ 10^{-12}$	**$2.01\ 10^{-11}$**
	Y 1.0	$6.25\ 10^{-13}$	$2.66\ 10^{-12}$	$1.40\ 10^{-10}$	$6.57\ 10^{-12}$	$6.21\ 10^{-12}$	$2.32\ 10^{-12}$	$9.15\ 10^{-12}$	**$2.11\ 10^{-11}$**
Sodium									
Na-22	D 1.0	$1.77\ 10^{-9}$	$1.65\ 10^{-9}$	$2.47\ 10^{-9}$	$2.73\ 10^{-9}$	$3.51\ 10^{-9}$	$1.60\ 10^{-9}$	$2.00\ 10^{-9}$	**$2.07\ 10^{-9}$**
Na-24	D 1.0	$1.78\ 10^{-10}$	$1.61\ 10^{-10}$	$1.25\ 10^{-9}$	$2.13\ 10^{-10}$	$2.58\ 10^{-10}$	$1.53\ 10^{-10}$	$2.35\ 10^{-10}$	**$3.27\ 10^{-10}$**
Magnesium									
Mg-28	D 5 10^{-1}	$2.91\ 10^{-10}$	$2.07\ 10^{-10}$	$2.96\ 10^{-9}$	$7.96\ 10^{-10}$	$1.42\ 10^{-9}$	$1.78\ 10^{-10}$	$1.04\ 10^{-9}$	**$9.16\ 10^{-10}$**
	W 5 10^{-1}	$2.59\ 10^{-10}$	$1.46\ 10^{-10}$	$5.92\ 10^{-9}$	$4.03\ 10^{-10}$	$6.40\ 10^{-10}$	$1.07\ 10^{-10}$	$1.55\ 10^{-9}$	**$1.33\ 10^{-9}$**
Aluminum									
Al-26	D 1 10^{-2}	$1.87\ 10^{-8}$	$1.56\ 10^{-8}$	$1.67\ 10^{-8}$	$3.98\ 10^{-8}$	$3.79\ 10^{-8}$	$1.44\ 10^{-8}$	$2.04\ 10^{-8}$	**$2.15\ 10^{-8}$**
	W 1 10^{-2}	$6.39\ 10^{-9}$	$6.04\ 10^{-9}$	$9.66\ 10^{-8}$	$1.24\ 10^{-8}$	$1.14\ 10^{-8}$	$5.24\ 10^{-9}$	$1.14\ 10^{-8}$	**$1.95\ 10^{-8}$**
Silicon									
Si-31	D 1 10^{-2}	$4.54\ 10^{-12}$	$4.53\ 10^{-12}$	$2.92\ 10^{-10}$	$4.53\ 10^{-12}$	$4.53\ 10^{-12}$	$4.53\ 10^{-12}$	$7.20\ 10^{-11}$	**$5.93\ 10^{-11}$**
	W 1 10^{-2}	$1.20\ 10^{-12}$	$1.20\ 10^{-12}$	$3.59\ 10^{-10}$	$1.20\ 10^{-12}$	$1.19\ 10^{-12}$	$1.19\ 10^{-12}$	$3.79\ 10^{-11}$	**$5.52\ 10^{-11}$**
	Y 1 10^{-2}	$7.56\ 10^{-14}$	$7.45\ 10^{-14}$	$3.86\ 10^{-10}$	$7.46\ 10^{-14}$	$7.34\ 10^{-14}$	$7.34\ 10^{-14}$	$4.63\ 10^{-11}$	**$6.03\ 10^{-11}$**
Si-32	D 1 10^{-2}	$5.59\ 10^{-9}$	$5.59\ 10^{-9}$	$5.87\ 10^{-9}$	$5.59\ 10^{-9}$	$5.59\ 10^{-9}$	$5.59\ 10^{-9}$	$5.83\ 10^{-9}$	**$5.70\ 10^{-9}$**
	W 1 10^{-2}	$1.53\ 10^{-9}$	$1.53\ 10^{-9}$	$1.02\ 10^{-7}$	$1.53\ 10^{-9}$	$1.53\ 10^{-9}$	$1.53\ 10^{-9}$	$3.21\ 10^{-9}$	**$1.41\ 10^{-8}$**
	Y 1 10^{-2}	$7.31\ 10^{-10}$	$7.31\ 10^{-10}$	$2.27\ 10^{-6}$	$7.31\ 10^{-10}$	$7.31\ 10^{-10}$	$7.31\ 10^{-10}$	$2.70\ 10^{-9}$	**$2.74\ 10^{-7}$**
Phosphorus									
P-32	D 8 10^{-1}	$4.83\ 10^{-10}$	$4.83\ 10^{-10}$	$2.50\ 10^{-9}$	$5.97\ 10^{-9}$	$5.81\ 10^{-9}$	$4.83\ 10^{-10}$	$7.94\ 10^{-10}$	**$1.64\ 10^{-9}$**
	W 8 10^{-1}	$3.37\ 10^{-10}$	$3.37\ 10^{-10}$	$2.56\ 10^{-8}$	$4.17\ 10^{-9}$	$4.05\ 10^{-9}$	$3.37\ 10^{-10}$	$1.18\ 10^{-9}$	**$4.19\ 10^{-9}$**
P-33	D 8 10^{-1}	$6.96\ 10^{-11}$	$6.96\ 10^{-11}$	$2.96\ 10^{-10}$	$3.71\ 10^{-10}$	$9.84\ 10^{-10}$	$6.96\ 10^{-11}$	$1.05\ 10^{-10}$	**$1.71\ 10^{-10}$**
	W 8 10^{-1}	$5.06\ 10^{-11}$	$5.06\ 10^{-11}$	$4.22\ 10^{-9}$	$2.69\ 10^{-10}$	$7.15\ 10^{-10}$	$5.06\ 10^{-11}$	$1.50\ 10^{-10}$	**$6.27\ 10^{-10}$**
Sulphur									
S-35	D 8 10^{-1}	$5.70\ 10^{-11}$	$5.70\ 10^{-11}$	$2.04\ 10^{-10}$	$5.70\ 10^{-11}$	$5.70\ 10^{-11}$	$5.70\ 10^{-11}$	$7.99\ 10^{-11}$	**$8.15\ 10^{-11}$**
	W 8 10^{-1}	$4.54\ 10^{-11}$	$4.54\ 10^{-11}$	$5.07\ 10^{-9}$	$4.54\ 10^{-11}$	$4.54\ 10^{-11}$	$4.54\ 10^{-11}$	$1.15\ 10^{-10}$	**$6.69\ 10^{-10}$**
	Gases	$9.55\ 10^{-11}$	$9.55\ 10^{-11}$	$9.55\ 10^{-11}$	$9.55\ 10^{-11}$	$9.55\ 10^{-11}$	$9.55\ 10^{-11}$	$2.25\ 10^{-10}$	**$1.21\ 10^{-10}$**

[*] V denotes water vapor.

[†] Labelled organic compounds.

[‡] Carbon monoxide.

[§] Carbon dioxide.

Table 2.1, Cont'd.

Nuclide	Class/f_1	Committed Dose Equivalent per Unit Intake (Sv/Bq)							
		Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Chlorine									
Cl-36	D 1.0	5.04 10^{-10}	5.04 10^{-10}	1.33 10^{-9}	5.04 10^{-10}	5.04 10^{-10}	5.04 10^{-10}	5.14 10^{-10}	**6.06 10^{-10}**
	W 1.0	5.04 10^{-10}	5.04 10^{-10}	4.56 10^{-8}	5.04 10^{-10}	5.04 10^{-10}	5.04 10^{-10}	5.36 10^{-10}	**5.93 10^{-9}**
Cl-38	D 1.0	3.85 10^{-12}	4.21 10^{-12}	2.20 10^{-10}	4.18 10^{-12}	3.91 10^{-12}	3.85 10^{-12}	2.49 10^{-11}	**3.62 10^{-11}**
	W 1.0	1.13 10^{-12}	1.78 10^{-12}	2.43 10^{-10}	1.75 10^{-12}	1.55 10^{-12}	1.54 10^{-12}	6.53 10^{-12}	**3.20 10^{-11}**
Cl-39	D 1.0	4.46 10^{-12}	5.12 10^{-12}	1.77 10^{-10}	5.09 10^{-12}	4.65 10^{-12}	4.60 10^{-12}	2.21 10^{-11}	**3.06 10^{-11}**
	W 1.0	1.38 10^{-12}	2.44 10^{-12}	2.00 10^{-10}	2.36 10^{-12}	2.04 10^{-12}	2.08 10^{-12}	7.80 10^{-12}	**2.75 10^{-11}**
Potassium									
K-40	D 1.0	3.19 10^{-9}	3.08 10^{-9}	4.66 10^{-9}	3.10 10^{-9}	3.07 10^{-9}	3.06 10^{-9}	3.21 10^{-9}	**3.34 10^{-9}**
K-42	D 1.0	1.08 10^{-10}	1.06 10^{-10}	2.15 10^{-9}	1.06 10^{-10}	1.06 10^{-10}	1.05 10^{-10}	1.57 10^{-10}	**3.67 10^{-10}**
K-43	D 1.0	9.69 10^{-11}	9.60 10^{-11}	7.58 10^{-10}	1.03 10^{-10}	9.65 10^{-11}	9.45 10^{-11}	1.31 10^{-10}	**1.87 10^{-10}**
K-44	D 1.0	2.08 10^{-12}	2.57 10^{-12}	1.36 10^{-10}	2.52 10^{-12}	2.28 10^{-12}	2.38 10^{-12}	1.59 10^{-11}	**2.24 10^{-11}**
K-45	D 1.0	1.35 10^{-12}	1.72 10^{-12}	8.35 10^{-11}	1.71 10^{-12}	1.51 10^{-12}	1.44 10^{-12}	1.01 10^{-11}	**1.39 10^{-11}**
Calcium									
Ca-41	W 3 10^{-1}	2.43 10^{-12}	2.98 10^{-12}	4.53 10^{-10}	1.62 10^{-9}	**3.65 10^{-9}**	2.57 10^{-12}	1.53 10^{-11}	3.64 10^{-10}
Ca-45	W 3 10^{-1}	4.49 10^{-11}	4.49 10^{-11}	9.67 10^{-9}	2.92 10^{-9}	4.39 10^{-9}	4.49 10^{-11}	4.27 10^{-10}	**1.79 10^{-9}**
Ca-47	W 3 10^{-1}	3.31 10^{-10}	1.94 10^{-10}	7.89 10^{-9}	9.86 10^{-10}	2.71 10^{-9}	1.47 10^{-10}	1.69 10^{-9}	**1.77 10^{-9}**
Scandium									
Sc-43	Y 1 10^{-4}	1.55 10^{-11}	7.10 10^{-12}	3.43 10^{-10}	8.22 10^{-12}	4.98 10^{-12}	4.28 10^{-12}	7.56 10^{-11}	**7.00 10^{-11}**
Sc-44	Y 1 10^{-4}	2.69 10^{-11}	1.34 10^{-11}	6.56 10^{-10}	1.48 10^{-11}	9.05 10^{-12}	8.57 10^{-12}	1.45 10^{-10}	**1.33 10^{-10}**
Sc-44m	Y 1 10^{-4}	7.39 10^{-10}	1.86 10^{-10}	6.58 10^{-9}	2.48 10^{-10}	1.31 10^{-10}	8.96 10^{-11}	3.36 10^{-9}	**2.05 10^{-9}**
Sc-46	Y 1 10^{-4}	1.30 10^{-9}	2.15 10^{-9}	4.62 10^{-8}	2.21 10^{-9}	1.68 10^{-9}	2.02 10^{-9}	4.79 10^{-9}	**8.01 10^{-9}**
Sc-47	Y 1 10^{-4}	4.70 10^{-11}	1.15 10^{-11}	2.03 10^{-9}	2.46 10^{-11}	1.39 10^{-11}	4.64 10^{-12}	7.92 10^{-10}	**4.98 10^{-10}**
Sc-48	Y 1 10^{-4}	7.77 10^{-10}	2.07 10^{-10}	2.77 10^{-9}	2.60 10^{-10}	1.34 10^{-10}	1.05 10^{-10}	1.72 10^{-9}	**1.11 10^{-9}**
Sc-49	Y 1 10^{-4}	2.60 10^{-14}	2.66 10^{-14}	2.06 10^{-10}	4.60 10^{-14}	4.54 10^{-14}	2.61 10^{-14}	9.30 10^{-12}	**2.75 10^{-11}**
Titanium									
Ti-44	D 1 10^{-2}	1.22 10^{-7}	1.09 10^{-7}	1.12 10^{-7}	1.22 10^{-7}	1.15 10^{-7}	1.10 10^{-7}	1.34 10^{-7}	**1.22 10^{-7}**
	W 1 10^{-2}	3.20 10^{-8}	3.04 10^{-8}	1.47 10^{-7}	3.39 10^{-8}	3.14 10^{-8}	3.03 10^{-8}	4.11 10^{-8}	**4.84 10^{-8}**
	Y 1 10^{-2}	1.76 10^{-8}	3.99 10^{-8}	1.97 10^{-6}	4.17 10^{-8}	3.49 10^{-8}	3.70 10^{-8}	6.91 10^{-8}	**2.75 10^{-7}**
Ti-45	D 1 10^{-2}	1.66 10^{-11}	1.01 10^{-11}	2.36 10^{-10}	1.10 10^{-11}	8.80 10^{-12}	8.30 10^{-12}	7.47 10^{-11}	**5.82 10^{-11}**
	W 1 10^{-2}	7.92 10^{-12}	5.39 10^{-12}	2.93 10^{-10}	5.75 10^{-12}	4.22 10^{-12}	4.18 10^{-12}	4.42 10^{-11}	**5.21 10^{-11}**
	Y 1 10^{-2}	7.80 10^{-12}	4.34 10^{-12}	3.14 10^{-10}	4.69 10^{-12}	2.96 10^{-12}	2.87 10^{-12}	5.28 10^{-11}	**5.69 10^{-11}**
Vanadium									
V-47	D 1 10^{-2}	1.97 10^{-12}	1.93 10^{-12}	1.05 10^{-10}	2.19 10^{-12}	1.89 10^{-12}	1.65 10^{-12}	1.74 10^{-11}	**1.90 10^{-11}**
	W 1 10^{-2}	5.49 10^{-13}	9.92 10^{-13}	1.15 10^{-10}	1.04 10^{-12}	8.81 10^{-13}	8.92 10^{-13}	3.93 10^{-12}	**1.54 10^{-11}**
V-48	D 1 10^{-2}	9.40 10^{-10}	6.43 10^{-10}	1.34 10^{-9}	2.27 10^{-9}	2.43 10^{-9}	4.82 10^{-10}	1.37 10^{-9}	**1.26 10^{-9}**
	W 1 10^{-2}	1.30 10^{-9}	7.42 10^{-10}	1.14 10^{-8}	1.08 10^{-9}	8.69 10^{-10}	5.51 10^{-10}	2.60 10^{-9}	**2.76 10^{-9}**
V-49	D 1 10^{-2}	1.09 10^{-11}	1.08 10^{-11}	2.39 10^{-11}	1.65 10^{-10}	**4.19 10^{-10}**	1.11 10^{-11}	1.88 10^{-11}	4.56 10^{-11}
	W 1 10^{-2}	2.80 10^{-12}	2.87 10^{-12}	6.30 10^{-10}	4.04 10^{-11}	1.03 10^{-10}	2.71 10^{-12}	2.86 10^{-11}	**9.33 10^{-11}**
Chromium									
Cr-48	D 1 10^{-1}	1.22 10^{-10}	7.56 10^{-11}	1.43 10^{-10}	1.05 10^{-10}	8.92 10^{-11}	6.80 10^{-11}	1.52 10^{-10}	**1.22 10^{-10}**
	W 1 10^{-1}	1.31 10^{-10}	6.55 10^{-11}	7.79 10^{-10}	8.31 10^{-11}	5.70 10^{-11}	4.88 10^{-11}	2.07 10^{-10}	**2.11 10^{-10}**
	Y 1 10^{-1}	1.36 10^{-10}	6.55 10^{-11}	9.50 10^{-10}	8.10 10^{-11}	5.20 10^{-11}	4.68 10^{-11}	2.22 10^{-10}	**2.37 10^{-10}**
Cr-49	D 1 10^{-1}	2.84 10^{-12}	2.54 10^{-12}	1.02 10^{-10}	2.82 10^{-12}	2.36 10^{-12}	2.10 10^{-12}	1.93 10^{-11}	**1.96 10^{-11}**
	W 1 10^{-1}	7.99 10^{-13}	1.34 10^{-12}	1.13 10^{-10}	1.42 10^{-12}	1.18 10^{-12}	1.16 10^{-12}	5.13 10^{-12}	**1.57 10^{-11}**
	Y 1 10^{-1}	4.61 10^{-13}	1.04 10^{-12}	1.22 10^{-10}	1.09 10^{-12}	8.28 10^{-13}	8.32 10^{-13}	5.79 10^{-12}	**1.68 10^{-11}**

Table 2.1, Cont'd.

Nuclide	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Cr-51	D 1 10^{-1}	2.71 10^{-11}	1.94 10^{-11}	3.81 10^{-11}	2.68 10^{-11}	2.74 10^{-11}	1.82 10^{-11}	3.55 10^{-11}	**2.95 10^{-11}**
	W 1 10^{-1}	2.21 10^{-11}	1.50 10^{-11}	3.77 10^{-10}	1.87 10^{-11}	1.50 10^{-11}	1.10 10^{-11}	4.93 10^{-11}	**7.08 10^{-11}**
	Y 1 10^{-1}	2.03 10^{-11}	1.58 10^{-11}	5.34 10^{-10}	1.87 10^{-11}	1.39 10^{-11}	1.08 10^{-11}	5.26 10^{-11}	**9.03 10^{-11}**
Manganese									
Mn-51	D 1 10^{-1}	3.57 10^{-12}	3.22 10^{-12}	1.66 10^{-10}	4.13 10^{-12}	4.07 10^{-12}	2.79 10^{-12}	3.01 10^{-11}	**3.10 10^{-11}**
	W 1 10^{-1}	1.04 10^{-12}	1.56 10^{-12}	1.86 10^{-10}	1.78 10^{-12}	1.64 10^{-12}	1.39 10^{-12}	7.83 10^{-12}	**2.55 10^{-11}**
Mn-52	D 1 10^{-1}	9.63 10^{-10}	6.61 10^{-10}	1.31 10^{-9}	1.20 10^{-9}	1.20 10^{-9}	4.89 10^{-10}	1.80 10^{-9}	**1.23 10^{-9}**
	W 1 10^{-1}	1.17 10^{-9}	5.21 10^{-10}	4.24 10^{-9}	6.99 10^{-10}	5.30 10^{-10}	3.41 10^{-10}	1.84 10^{-9}	**1.54 10^{-9}**
Mn-52m	D 1 10^{-1}	2.07 10^{-12}	2.27 10^{-12}	1.03 10^{-10}	2.43 10^{-12}	2.06 10^{-12}	1.82 10^{-12}	1.57 10^{-11}	**1.83 10^{-11}**
	W 1 10^{-1}	6.34 10^{-13}	1.31 10^{-12}	1.11 10^{-10}	1.31 10^{-12}	1.08 10^{-12}	1.08 10^{-12}	3.71 10^{-12}	**1.50 10^{-11}**
Mn-53	D 1 10^{-1}	7.81 10^{-12}	7.64 10^{-12}	2.34 10^{-11}	1.07 10^{-10}	**1.11 10^{-9}**	7.98 10^{-12}	5.18 10^{-11}	6.78 10^{-11}
	W 1 10^{-1}	2.95 10^{-12}	3.14 10^{-12}	8.70 10^{-10}	3.72 10^{-11}	3.85 10^{-10}	2.78 10^{-12}	4.27 10^{-11}	**1.35 10^{-10}**
Mn-54	D 1 10^{-1}	8.85 10^{-10}	9.13 10^{-10}	1.18 10^{-9}	1.66 10^{-9}	2.56 10^{-9}	6.52 10^{-10}	2.09 10^{-9}	**1.42 10^{-9}**
	W 1 10^{-1}	7.09 10^{-10}	8.59 10^{-10}	6.66 10^{-9}	1.10 10^{-9}	1.25 10^{-9}	7.40 10^{-10}	1.72 10^{-9}	**1.81 10^{-9}**
Mn-56	D 1 10^{-1}	2.19 10^{-11}	1.47 10^{-11}	4.40 10^{-10}	2.36 10^{-11}	2.05 10^{-11}	1.20 10^{-11}	1.25 10^{-10}	**1.02 10^{-10}**
	W 1 10^{-1}	9.46 10^{-12}	7.79 10^{-12}	5.37 10^{-10}	1.02 10^{-11}	8.23 10^{-12}	6.18 10^{-12}	6.50 10^{-11}	**8.91 10^{-11}**
Iron									
Fe-52	D 1 10^{-1}	1.78 10^{-10}	1.04 10^{-10}	1.70 10^{-9}	1.15 10^{-10}	9.43 10^{-11}	8.59 10^{-11}	7.67 10^{-10}	**5.13 10^{-10}**
	W 1 10^{-1}	1.29 10^{-10}	5.83 10^{-11}	2.53 10^{-9}	6.66 10^{-11}	4.50 10^{-11}	3.82 10^{-11}	7.89 10^{-10}	**5.92 10^{-10}**
Fe-55	D 1 10^{-1}	5.23 10^{-10}	5.09 10^{-10}	5.19 10^{-10}	5.17 10^{-10}	5.14 10^{-10}	5.42 10^{-10}	1.21 10^{-9}	**7.26 10^{-10}**
	W 1 10^{-1}	1.79 10^{-10}	1.74 10^{-10}	1.06 10^{-9}	1.76 10^{-10}	1.75 10^{-10}	1.85 10^{-10}	4.37 10^{-10}	**3.61 10^{-10}**
Fe-59	D 1 10^{-1}	3.32 10^{-9}	3.01 10^{-9}	3.50 10^{-9}	3.18 10^{-9}	2.91 10^{-9}	2.95 10^{-9}	5.81 10^{-9}	**4.00 10^{-9}**
	W 1 10^{-1}	1.39 10^{-9}	1.26 10^{-9}	1.38 10^{-8}	1.31 10^{-9}	1.11 10^{-9}	1.17 10^{-9}	2.96 10^{-9}	**3.30 10^{-9}**
Fe-60	D 1 10^{-1}	1.73 10^{-7}	1.55 10^{-7}	1.55 10^{-7}	1.62 10^{-7}	1.50 10^{-7}	1.50 10^{-7}	2.93 10^{-7}	**2.02 10^{-7}**
	W 1 10^{-1}	6.06 10^{-8}	5.43 10^{-8}	7.31 10^{-8}	5.69 10^{-8}	5.28 10^{-8}	5.27 10^{-8}	1.03 10^{-7}	**7.29 10^{-8}**
Cobalt									
Co-55	W 5 10^{-2}	2.00 10^{-10}	6.56 10^{-11}	1.71 10^{-9}	7.84 10^{-11}	4.65 10^{-11}	3.96 10^{-11}	7.78 10^{-10}	**5.10 10^{-10}**
	Y 5 10^{-2}	2.26 10^{-10}	6.19 10^{-11}	1.78 10^{-9}	7.68 10^{-11}	4.03 10^{-11}	3.12 10^{-11}	9.14 10^{-10}	**5.65 10^{-10}**
Co-56	W 5 10^{-2}	2.34 10^{-9}	2.15 10^{-9}	2.79 10^{-8}	2.21 10^{-9}	1.68 10^{-9}	1.82 10^{-9}	4.72 10^{-9}	**6.04 10^{-9}**
	Y 5 10^{-2}	2.16 10^{-9}	3.42 10^{-9}	5.93 10^{-8}	3.36 10^{-9}	2.53 10^{-9}	2.91 10^{-9}	6.70 10^{-9}	**1.07 10^{-8}**
Co-57	W 5 10^{-2}	1.63 10^{-10}	1.56 10^{-10}	4.05 10^{-9}	2.54 10^{-10}	1.97 10^{-10}	1.13 10^{-10}	4.05 10^{-10}	**7.12 10^{-10}**
	Y 5 10^{-2}	1.24 10^{-10}	3.75 10^{-10}	1.69 10^{-8}	5.88 10^{-10}	4.52 10^{-10}	2.71 10^{-10}	8.22 10^{-10}	**2.45 10^{-9}**
Co-58	W 5 10^{-2}	6.52 10^{-10}	6.11 10^{-10}	7.94 10^{-9}	6.33 10^{-10}	4.78 10^{-10}	5.52 10^{-10}	1.35 10^{-9}	**1.72 10^{-9}**
	Y 5 10^{-2}	6.17 10^{-10}	9.37 10^{-10}	1.60 10^{-8}	9.23 10^{-10}	6.93 10^{-10}	8.72 10^{-10}	1.89 10^{-9}	**2.94 10^{-9}**
Co-58m	W 5 10^{-2}	3.49 10^{-12}	3.38 10^{-12}	8.82 10^{-11}	3.48 10^{-12}	2.68 10^{-12}	3.09 10^{-12}	1.90 10^{-11}	**1.82 10^{-11}**
	Y 5 10^{-2}	3.14 10^{-12}	5.03 10^{-12}	1.34 10^{-10}	4.92 10^{-12}	3.72 10^{-12}	4.69 10^{-12}	2.32 10^{-11}	**2.54 10^{-11}**
Co-60	W 5 10^{-2}	4.05 10^{-9}	4.16 10^{-9}	3.57 10^{-8}	4.25 10^{-9}	3.54 10^{-9}	3.72 10^{-9}	7.65 10^{-9}	**8.94 10^{-9}**
	Y 5 10^{-2}	4.76 10^{-9}	1.84 10^{-8}	3.45 10^{-7}	1.72 10^{-8}	1.35 10^{-8}	1.62 10^{-8}	3.60 10^{-8}	**5.91 10^{-8}**
Co-60m	W 5 10^{-2}	1.92 10^{-14}	2.08 10^{-14}	2.86 10^{-12}	2.12 10^{-14}	1.83 10^{-14}	1.85 10^{-14}	5.16 10^{-14}	**3.70 10^{-13}**
	Y 5 10^{-2}	1.83 10^{-14}	7.12 10^{-14}	4.16 10^{-12}	6.67 10^{-14}	5.25 10^{-14}	6.20 10^{-14}	1.60 10^{-13}	**5.74 10^{-13}**
Co-61	W 5 10^{-2}	8.03 10^{-13}	8.00 10^{-13}	1.83 10^{-10}	1.04 10^{-12}	8.99 10^{-13}	6.87 10^{-13}	1.26 10^{-11}	**2.62 10^{-11}**
	Y 5 10^{-2}	3.30 10^{-13}	3.01 10^{-13}	1.98 10^{-10}	5.24 10^{-13}	3.72 10^{-13}	1.71 10^{-13}	1.54 10^{-11}	**2.86 10^{-11}**
Co-62m	W 5 10^{-2}	3.26 10^{-13}	8.54 10^{-13}	6.78 10^{-11}	8.16 10^{-13}	6.69 10^{-13}	7.79 10^{-13}	2.12 10^{-12}	**9.12 10^{-12}**
	Y 5 10^{-2}	1.64 10^{-13}	7.31 10^{-13}	7.14 10^{-11}	6.84 10^{-13}	5.33 10^{-13}	6.45 10^{-13}	2.21 10^{-12}	**9.50 10^{-12}**
Nickel									
Ni-56	D 5 10^{-2}	7.76 10^{-10}	4.96 10^{-10}	6.99 10^{-10}	5.67 10^{-10}	4.86 10^{-10}	4.79 10^{-10}	8.73 10^{-10}	**7.11 10^{-10}**
	W 5 10^{-2}	7.87 10^{-10}	4.21 10^{-10}	3.68 10^{-9}	4.81 10^{-10}	3.35 10^{-10}	3.27 10^{-10}	1.04 10^{-9}	**1.09 10^{-9}**
	Vapor	1.11 10^{-9}	9.46 10^{-10}	1.09 10^{-9}	1.05 10^{-9}	9.57 10^{-10}	9.73 10^{-10}	1.28 10^{-9}	**1.12 10^{-9}**

Table 2.1, Cont'd.

Nuclide	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Ni-57	D 5 10^{-2}	2.30 10^{-10}	9.51 10^{-11}	5.61 10^{-10}	1.12 10^{-10}	8.20 10^{-11}	6.92 10^{-11}	4.33 10^{-10}	**2.87 10^{-10}**
	W 5 10^{-2}	3.33 10^{-10}	1.02 10^{-10}	1.41 10^{-9}	1.24 10^{-10}	7.04 10^{-11}	5.16 10^{-11}	7.48 10^{-10}	**5.11 10^{-10}**
	Vapor	1.64 10^{-10}	1.44 10^{-10}	5.55 10^{-10}	1.57 10^{-10}	1.42 10^{-10}	1.36 10^{-10}	1.99 10^{-10}	**2.16 10^{-10}**
Ni-59	D 5 10^{-2}	3.59 10^{-10}	3.46 10^{-10}	3.59 10^{-10}	3.54 10^{-10}	3.51 10^{-10}	3.77 10^{-10}	3.63 10^{-10}	**3.58 10^{-10}**
	W 5 10^{-2}	1.09 10^{-10}	1.05 10^{-10}	1.20 10^{-9}	1.06 10^{-10}	1.05 10^{-10}	1.14 10^{-10}	1.40 10^{-10}	**2.48 10^{-10}**
	Vapor	7.43 10^{-10}	7.15 10^{-10}	7.14 10^{-10}	7.31 10^{-10}	7.25 10^{-10}	7.80 10^{-10}	7.33 10^{-10}	**7.31 10^{-10}**
Ni-63	D 5 10^{-2}	8.22 10^{-10}	8.22 10^{-10}	8.74 10^{-10}	8.22 10^{-10}	8.22 10^{-10}	8.22 10^{-10}	8.59 10^{-10}	**8.39 10^{-10}**
	W 5 10^{-2}	2.47 10^{-10}	2.47 10^{-10}	3.07 10^{-9}	2.47 10^{-10}	2.47 10^{-10}	2.47 10^{-10}	3.67 10^{-10}	**6.22 10^{-10}**
	Vapor	1.70 10^{-9}	1.70 10^{-9}	1.73 10^{-9}	1.70 10^{-9}	1.70 10^{-9}	1.70 10^{-9}	1.70 10^{-9}	**1.70 10^{-9}**
Ni-65	D 5 10^{-2}	8.46 10^{-12}	6.48 10^{-12}	3.11 10^{-10}	6.70 10^{-12}	5.79 10^{-12}	5.54 10^{-12}	7.98 10^{-11}	**6.55 10^{-11}**
	W 5 10^{-2}	3.27 10^{-12}	2.95 10^{-12}	3.81 10^{-10}	2.99 10^{-12}	2.38 10^{-12}	2.30 10^{-12}	4.15 10^{-11}	**5.99 10^{-11}**
	Vapor	1.08 10^{-11}	1.21 10^{-11}	6.80 10^{-10}	1.21 10^{-11}	1.14 10^{-11}	1.16 10^{-11}	1.66 10^{-11}	**9.32 10^{-11}**
Ni-66	D 5 10^{-2}	1.28 10^{-10}	1.22 10^{-10}	2.84 10^{-9}	1.22 10^{-10}	1.21 10^{-10}	1.21 10^{-10}	1.78 10^{-9}	**9.48 10^{-10}**
	W 5 10^{-2}	4.30 10^{-11}	2.97 10^{-11}	9.52 10^{-9}	3.09 10^{-11}	2.77 10^{-11}	2.75 10^{-11}	3.61 10^{-9}	**2.25 10^{-9}**
	Vapor	2.68 10^{-10}	2.67 10^{-10}	2.37 10^{-9}	2.68 10^{-10}	2.67 10^{-10}	2.68 10^{-10}	3.17 10^{-10}	**5.35 10^{-10}**
Copper									
Cu-60	D 5 10^{-1}	3.12 10^{-12}	3.39 10^{-12}	9.66 10^{-11}	3.38 10^{-12}	2.74 10^{-12}	2.71 10^{-12}	1.76 10^{-11}	**1.87 10^{-11}**
	W 5 10^{-1}	8.92 10^{-13}	2.06 10^{-12}	1.04 10^{-10}	1.99 10^{-12}	1.62 10^{-12}	1.75 10^{-12}	5.07 10^{-12}	**1.49 10^{-11}**
	Y 5 10^{-1}	4.96 10^{-13}	1.80 10^{-12}	1.11 10^{-10}	1.70 10^{-12}	1.31 10^{-12}	1.45 10^{-12}	5.28 10^{-12}	**1.56 10^{-11}**
Cu-61	D 5 10^{-1}	1.43 10^{-11}	1.04 10^{-11}	2.18 10^{-10}	1.13 10^{-11}	9.44 10^{-12}	9.06 10^{-12}	5.61 10^{-11}	**5.00 10^{-11}**
	W 5 10^{-1}	7.00 10^{-12}	5.82 10^{-12}	2.73 10^{-10}	6.19 10^{-12}	4.79 10^{-12}	4.81 10^{-12}	3.46 10^{-11}	**4.68 10^{-11}**
	Y 5 10^{-1}	6.77 10^{-12}	4.96 10^{-12}	2.93 10^{-10}	5.28 10^{-12}	3.74 10^{-12}	3.73 10^{-12}	4.06 10^{-11}	**5.06 10^{-11}**
Cu-64	D 5 10^{-1}	1.64 10^{-11}	1.23 10^{-11}	2.03 10^{-10}	1.34 10^{-11}	1.20 10^{-11}	1.16 10^{-11}	6.74 10^{-11}	**5.29 10^{-11}**
	W 5 10^{-1}	1.21 10^{-11}	7.26 10^{-12}	3.35 10^{-10}	7.99 10^{-12}	6.34 10^{-12}	6.10 10^{-12}	7.89 10^{-11}	**6.93 10^{-11}**
	Y 5 10^{-1}	1.24 10^{-11}	6.38 10^{-12}	3.50 10^{-10}	7.12 10^{-12}	5.29 10^{-12}	4.98 10^{-12}	9.20 10^{-11}	**7.48 10^{-11}**
Cu-67	D 5 10^{-1}	7.13 10^{-11}	6.10 10^{-11}	4.60 10^{-10}	7.24 10^{-11}	6.71 10^{-11}	5.81 10^{-11}	2.96 10^{-10}	**1.83 10^{-10}**
	W 5 10^{-1}	4.96 10^{-11}	3.50 10^{-11}	1.52 10^{-9}	4.43 10^{-11}	3.77 10^{-11}	3.05 10^{-11}	3.58 10^{-10}	**3.15 10^{-10}**
	Y 5 10^{-1}	4.77 10^{-11}	3.08 10^{-11}	1.59 10^{-9}	3.99 10^{-11}	3.29 10^{-11}	2.60 10^{-11}	3.95 10^{-10}	**3.32 10^{-10}**
Zinc									
Zn-62	Y 5 10^{-1}	6.74 10^{-11}	3.73 10^{-11}	2.78 10^{-9}	5.83 10^{-11}	4.71 10^{-11}	2.94 10^{-11}	6.40 10^{-10}	**5.57 10^{-10}**
Zn-63	Y 5 10^{-1}	3.78 10^{-13}	9.71 10^{-13}	1.64 10^{-10}	9.38 10^{-13}	7.21 10^{-13}	8.27 10^{-13}	6.25 10^{-12}	**2.20 10^{-11}**
Zn-65	Y 5 10^{-1}	2.03 10^{-9}	3.08 10^{-9}	2.10 10^{-8}	3.62 10^{-9}	3.36 10^{-9}	3.02 10^{-9}	4.66 10^{-9}	**5.51 10^{-9}**
Zn-69	Y 5 10^{-1}	2.77 10^{-14}	2.77 10^{-14}	8.00 10^{-11}	3.56 10^{-14}	3.43 10^{-14}	2.77 10^{-14}	3.21 10^{-12}	**1.06 10^{-11}**
Zn-69m	Y 5 10^{-1}	3.30 10^{-11}	1.73 10^{-11}	1.00 10^{-9}	2.98 10^{-11}	2.38 10^{-11}	1.35 10^{-11}	2.83 10^{-10}	**2.20 10^{-10}**
Zn-71m	Y 5 10^{-1}	1.61 10^{-11}	1.10 10^{-11}	5.87 10^{-10}	1.28 10^{-11}	9.25 10^{-12}	8.13 10^{-12}	8.99 10^{-11}	**1.05 10^{-10}**
Zn-72	Y 5 10^{-1}	5.18 10^{-10}	2.79 10^{-10}	5.21 10^{-9}	4.64 10^{-10}	5.53 10^{-10}	2.28 10^{-10}	1.59 10^{-9}	**1.35 10^{-9}**
Gallium									
Ga-65	D 1 10^{-3}	7.32 10^{-13}	8.97 10^{-13}	5.44 10^{-11}	9.90 10^{-13}	8.98 10^{-13}	7.69 10^{-13}	6.85 10^{-12}	**9.07 10^{-12}**
	W 1 10^{-3}	2.23 10^{-13}	5.17 10^{-13}	5.80 10^{-11}	5.42 10^{-13}	4.65 10^{-13}	4.66 10^{-13}	1.43 10^{-12}	**7.61 10^{-12}**
Ga-66	D 1 10^{-3}	1.37 10^{-10}	7.31 10^{-11}	1.36 10^{-9}	1.47 10^{-10}	1.30 10^{-10}	6.11 10^{-11}	6.39 10^{-10}	**4.23 10^{-10}**
	W 1 10^{-3}	1.10 10^{-10}	4.29 10^{-11}	2.07 10^{-9}	6.35 10^{-11}	4.59 10^{-11}	2.78 10^{-11}	7.03 10^{-10}	**5.03 10^{-10}**
Ga-67	D 1 10^{-3}	5.04 10^{-11}	2.80 10^{-11}	1.48 10^{-10}	8.00 10^{-11}	3.98 10^{-10}	2.25 10^{-11}	1.28 10^{-10}	**9.50 10^{-11}**
	W 1 10^{-3}	6.12 10^{-11}	1.83 10^{-11}	5.37 10^{-10}	3.71 10^{-11}	7.84 10^{-11}	9.43 10^{-12}	2.04 10^{-10}	**1.51 10^{-10}**
Ga-68	D 1 10^{-3}	5.49 10^{-12}	4.40 10^{-12}	1.88 10^{-10}	5.71 10^{-12}	4.91 10^{-12}	3.77 10^{-12}	3.95 10^{-11}	**3.74 10^{-11}**
	W 1 10^{-3}	1.69 10^{-12}	2.15 10^{-12}	2.15 10^{-10}	2.47 10^{-12}	2.06 10^{-12}	1.88 10^{-12}	1.26 10^{-11}	**3.07 10^{-11}**
Ga-70	D 1 10^{-3}	3.75 10^{-13}	3.76 10^{-13}	5.30 10^{-11}	4.45 10^{-13}	4.39 10^{-13}	3.75 10^{-13}	6.44 10^{-12}	**8.52 10^{-12}**
	W 1 10^{-3}	1.11 10^{-13}	1.14 10^{-13}	5.74 10^{-11}	1.34 10^{-13}	1.32 10^{-13}	1.14 10^{-13}	9.57 10^{-13}	**7.24 10^{-12}**

Table 2.1, Cont'd.

Nuclide	Class/f_1	Committed Dose Equivalent per Unit Intake (Sv/Bq)							
		Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Ga-72	D 1 10^{-3}	2.00 10^{-10}	9.75 10^{-11}	9.93 10^{-10}	1.77 10^{-10}	1.52 10^{-10}	7.53 10^{-11}	5.92 10^{-10}	**3.89 10^{-10}**
	W 1 10^{-3}	2.05 10^{-10}	6.86 10^{-11}	1.67 10^{-9}	9.44 10^{-11}	6.23 10^{-11}	3.99 10^{-11}	7.53 10^{-10}	**5.02 10^{-10}**
Ga-73	D 1 10^{-3}	1.55 10^{-11}	1.05 10^{-11}	4.14 10^{-10}	2.33 10^{-11}	3.50 10^{-11}	9.15 10^{-12}	1.39 10^{-10}	**1.01 10^{-10}**
	W 1 10^{-3}	7.82 10^{-12}	4.37 10^{-12}	5.54 10^{-10}	7.97 10^{-12}	9.85 10^{-12}	3.16 10^{-12}	1.09 10^{-10}	**1.03 10^{-10}**
Germanium									
Ge-66	D 1.0	1.85 10^{-11}	1.95 10^{-11}	3.45 10^{-10}	2.05 10^{-11}	1.87 10^{-11}	1.92 10^{-11}	4.22 10^{-11}	**6.52 10^{-11}**
	W 1.0	1.05 10^{-11}	1.45 10^{-11}	5.57 10^{-10}	1.48 10^{-11}	1.30 10^{-11}	1.37 10^{-11}	3.79 10^{-11}	**8.56 10^{-11}**
Ge-67	D 1.0	1.22 10^{-12}	1.63 10^{-12}	1.01 10^{-10}	1.66 10^{-12}	1.49 10^{-12}	1.47 10^{-12}	1.16 10^{-11}	**1.64 10^{-11}**
	W 1.0	3.90 10^{-13}	8.51 10^{-13}	1.10 10^{-10}	8.68 10^{-13}	7.39 10^{-13}	7.63 10^{-13}	2.61 10^{-12}	**1.44 10^{-11}**
Ge-68	D 1.0	1.54 10^{-10}	1.54 10^{-10}	2.36 10^{-9}	1.59 10^{-10}	1.52 10^{-10}	1.52 10^{-10}	2.54 10^{-10}	**4.49 10^{-10}**
	W 1.0	2.16 10^{-10}	7.50 10^{-10}	1.11 10^{-7}	7.17 10^{-10}	5.94 10^{-10}	6.90 10^{-10}	1.43 10^{-9}	**1.40 10^{-8}**
Ge-69	D 1.0	4.23 10^{-11}	4.59 10^{-11}	5.33 10^{-10}	4.81 10^{-11}	4.36 10^{-11}	4.53 10^{-11}	8.28 10^{-11}	**1.15 10^{-10}**
	W 1.0	3.00 10^{-11}	5.02 10^{-11}	1.44 10^{-9}	5.03 10^{-11}	4.35 10^{-11}	4.82 10^{-11}	1.02 10^{-10}	**2.27 10^{-10}**
Ge-71	D 1.0	1.20 10^{-12}	1.16 10^{-12}	2.53 10^{-11}	1.17 10^{-12}	1.15 10^{-12}	1.30 10^{-12}	2.08 10^{-12}	**4.35 10^{-12}**
	W 1.0	9.45 10^{-13}	1.36 10^{-12}	2.66 10^{-10}	9.22 10^{-13}	9.09 10^{-13}	1.02 10^{-12}	2.06 10^{-12}	**3.31 10^{-11}**
Ge-75	D 1.0	1.93 10^{-12}	1.96 10^{-12}	1.19 10^{-10}	1.98 10^{-12}	1.96 10^{-12}	1.94 10^{-12}	1.27 10^{-11}	**1.92 10^{-11}**
	W 1.0	5.78 10^{-13}	6.22 10^{-13}	1.39 10^{-10}	6.31 10^{-13}	6.15 10^{-13}	6.03 10^{-13}	4.20 10^{-12}	**1.83 10^{-11}**
Ge-77	D 1.0	4.42 10^{-11}	4.75 10^{-11}	1.07 10^{-9}	5.00 10^{-11}	4.66 10^{-11}	4.56 10^{-11}	1.12 10^{-10}	**1.89 10^{-10}**
	W 1.0	2.59 10^{-11}	3.43 10^{-11}	1.98 10^{-9}	3.56 10^{-11}	3.21 10^{-11}	3.18 10^{-11}	9.77 10^{-11}	**2.85 10^{-10}**
Ge-78	D 1.0	1.25 10^{-11}	1.34 10^{-11}	4.44 10^{-10}	1.38 10^{-11}	1.30 10^{-11}	1.29 10^{-11}	4.74 10^{-11}	**7.51 10^{-11}**
	W 1.0	4.59 10^{-12}	6.33 10^{-12}	5.51 10^{-10}	6.36 10^{-12}	5.74 10^{-12}	5.85 10^{-12}	2.74 10^{-11}	**7.75 10^{-11}**
Arsenic									
As-69	W 5 10^{-1}	9.99 10^{-13}	8.74 10^{-13}	9.52 10^{-11}	9.08 10^{-13}	7.18 10^{-13}	7.47 10^{-13}	4.03 10^{-12}	**1.32 10^{-11}**
As-70	W 5 10^{-1}	3.18 10^{-12}	5.36 10^{-12}	2.25 10^{-10}	5.26 10^{-12}	4.20 10^{-12}	4.70 10^{-12}	1.55 10^{-11}	**3.42 10^{-11}**
As-71	W 5 10^{-1}	1.16 10^{-10}	6.00 10^{-11}	1.53 10^{-9}	7.32 10^{-11}	5.26 10^{-11}	4.44 10^{-11}	3.68 10^{-10}	**3.44 10^{-10}**
As-72	W 5 10^{-1}	2.01 10^{-10}	1.09 10^{-10}	5.11 10^{-9}	1.20 10^{-10}	9.13 10^{-11}	8.85 10^{-11}	1.34 10^{-9}	**1.10 10^{-9}**
As-73	W 5 10^{-1}	3.01 10^{-11}	3.30 10^{-11}	6.94 10^{-9}	3.60 10^{-11}	3.31 10^{-11}	2.74 10^{-11}	2.76 10^{-10}	**9.34 10^{-10}**
As-74	W 5 10^{-1}	3.17 10^{-10}	2.91 10^{-10}	1.32 10^{-8}	3.04 10^{-10}	2.44 10^{-10}	2.55 10^{-10}	1.29 10^{-9}	**2.15 10^{-9}**
As-76	W 5 10^{-1}	7.54 10^{-11}	5.33 10^{-11}	5.02 10^{-9}	5.59 10^{-11}	4.90 10^{-11}	4.80 10^{-11}	1.24 10^{-9}	**1.01 10^{-9}**
As-77	W 5 10^{-1}	1.21 10^{-11}	1.13 10^{-11}	1.46 10^{-9}	1.15 10^{-11}	1.12 10^{-11}	1.11 10^{-11}	3.43 10^{-10}	**2.85 10^{-10}**
As-78	W 5 10^{-1}	3.55 10^{-12}	4.18 10^{-12}	5.07 10^{-10}	4.18 10^{-12}	3.54 10^{-12}	3.70 10^{-12}	3.04 10^{-11}	**7.22 10^{-11}**
Selenium									
Se-70	D 8 10^{-1}	1.16 10^{-11}	1.08 10^{-11}	2.28 10^{-10}	1.12 10^{-11}	9.43 10^{-12}	9.36 10^{-12}	4.56 10^{-11}	**4.75 10^{-11}**
	W 8 10^{-1}	3.80 10^{-12}	5.84 10^{-12}	2.61 10^{-10}	5.84 10^{-12}	4.74 10^{-12}	5.10 10^{-12}	1.82 10^{-11}	**3.96 10^{-11}**
Se-73	D 8 10^{-1}	3.70 10^{-11}	3.24 10^{-11}	4.83 10^{-10}	3.69 10^{-11}	3.21 10^{-11}	2.90 10^{-11}	1.18 10^{-10}	**1.14 10^{-10}**
	W 8 10^{-1}	2.24 10^{-11}	2.08 10^{-11}	7.05 10^{-10}	2.34 10^{-11}	1.93 10^{-11}	1.75 10^{-11}	8.92 10^{-11}	**1.24 10^{-10}**
Se-73m	D 8 10^{-1}	3.16 10^{-12}	2.85 10^{-12}	5.82 10^{-11}	3.17 10^{-12}	2.78 10^{-12}	2.56 10^{-12}	1.17 10^{-11}	**1.22 10^{-11}**
	W 8 10^{-1}	1.78 10^{-12}	1.75 10^{-12}	7.74 10^{-11}	1.94 10^{-12}	1.60 10^{-12}	1.50 10^{-12}	7.33 10^{-12}	**1.25 10^{-11}**
Se-75	D 8 10^{-1}	1.29 10^{-9}	1.08 10^{-9}	1.36 10^{-9}	1.54 10^{-9}	1.27 10^{-9}	8.52 10^{-10}	3.50 10^{-9}	**1.95 10^{-9}**
	W 8 10^{-1}	1.10 10^{-9}	1.09 10^{-9}	5.44 10^{-9}	1.50 10^{-9}	1.23 10^{-9}	8.39 10^{-10}	3.18 10^{-9}	**2.29 10^{-9}**
Se-79	D 8 10^{-1}	6.79 10^{-10}	6.79 10^{-10}	8.47 10^{-10}	6.79 10^{-10}	6.79 10^{-10}	6.79 10^{-10}	4.24 10^{-9}	**1.77 10^{-9}**
	W 8 10^{-1}	5.98 10^{-10}	5.98 10^{-10}	9.81 10^{-9}	5.98 10^{-10}	5.98 10^{-10}	5.98 10^{-10}	3.77 10^{-9}	**2.66 10^{-9}**
Se-81	D 8 10^{-1}	3.13 10^{-13}	3.15 10^{-13}	4.45 10^{-11}	3.15 10^{-13}	3.14 10^{-13}	3.14 10^{-13}	4.82 10^{-12}	**6.97 10^{-12}**
	W 8 10^{-1}	9.05 10^{-14}	9.32 10^{-14}	4.79 10^{-11}	9.34 10^{-14}	9.25 10^{-14}	9.26 10^{-14}	6.81 10^{-13}	**6.01 10^{-12}**
Se-81m	D 8 10^{-1}	2.14 10^{-12}	2.13 10^{-12}	1.37 10^{-10}	2.16 10^{-12}	2.13 10^{-12}	2.11 10^{-12}	2.06 10^{-11}	**2.39 10^{-11}**
	W 8 10^{-1}	6.02 10^{-13}	6.21 10^{-13}	1.59 10^{-10}	6.33 10^{-13}	6.21 10^{-13}	6.08 10^{-13}	6.35 10^{-12}	**2.13 10^{-11}**

Table 2.1, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Se-83	D 8 10^{-1}	$2.27\ 10^{-12}$	$2.60\ 10^{-12}$	$7.91\ 10^{-11}$	$2.62\ 10^{-12}$	$2.23\ 10^{-12}$	$2.23\ 10^{-12}$	$1.29\ 10^{-11}$	**$1.48\ 10^{-11}$**
	W 8 10^{-1}	$6.79\ 10^{-13}$	$1.45\ 10^{-12}$	$8.94\ 10^{-11}$	$1.43\ 10^{-12}$	$1.19\ 10^{-12}$	$1.29\ 10^{-12}$	$4.48\ 10^{-12}$	**$1.27\ 10^{-11}$**
Bromine									
Br-74	D 1.0	$3.34\ 10^{-12}$	$4.37\ 10^{-12}$	$1.27\ 10^{-10}$	$4.31\ 10^{-12}$	$3.74\ 10^{-12}$	$3.95\ 10^{-12}$	$1.93\ 10^{-11}$	**$2.33\ 10^{-11}$**
	W 1.0	$1.07\ 10^{-12}$	$2.52\ 10^{-12}$	$1.38\ 10^{-10}$	$2.45\ 10^{-12}$	$2.03\ 10^{-12}$	$2.25\ 10^{-12}$	$6.27\ 10^{-12}$	**$1.95\ 10^{-11}$**
Br-74m	D 1.0	$6.62\ 10^{-12}$	$8.30\ 10^{-12}$	$2.45\ 10^{-10}$	$8.27\ 10^{-12}$	$7.36\ 10^{-12}$	$7.64\ 10^{-12}$	$3.53\ 10^{-11}$	**$4.43\ 10^{-11}$**
	W 1.0	$2.07\ 10^{-12}$	$4.38\ 10^{-12}$	$2.71\ 10^{-10}$	$4.26\ 10^{-12}$	$3.60\ 10^{-12}$	$3.98\ 10^{-12}$	$1.21\ 10^{-11}$	**$3.81\ 10^{-11}$**
Br-75	D 1.0	$6.75\ 10^{-12}$	$8.01\ 10^{-12}$	$1.96\ 10^{-10}$	$8.43\ 10^{-12}$	$7.64\ 10^{-12}$	$7.42\ 10^{-12}$	$2.50\ 10^{-11}$	**$3.54\ 10^{-11}$**
	W 1.0	$2.40\ 10^{-12}$	$4.30\ 10^{-12}$	$2.30\ 10^{-10}$	$4.44\ 10^{-12}$	$3.82\ 10^{-12}$	$3.83\ 10^{-12}$	$1.23\ 10^{-11}$	**$3.33\ 10^{-11}$**
Br-76	D 1.0	$1.66\ 10^{-10}$	$1.58\ 10^{-10}$	$1.45\ 10^{-9}$	$1.65\ 10^{-10}$	$1.54\ 10^{-10}$	$1.57\ 10^{-10}$	$2.26\ 10^{-10}$	**$3.36\ 10^{-10}$**
	W 1.0	$1.01\ 10^{-10}$	$1.16\ 10^{-10}$	$2.55\ 10^{-9}$	$1.19\ 10^{-10}$	$1.08\ 10^{-10}$	$1.12\ 10^{-10}$	$2.07\ 10^{-10}$	**$4.32\ 10^{-10}$**
Br-77	D 1.0	$4.65\ 10^{-11}$	$4.28\ 10^{-11}$	$1.12\ 10^{-10}$	$4.97\ 10^{-11}$	$4.47\ 10^{-11}$	$4.20\ 10^{-11}$	$5.82\ 10^{-11}$	**$5.75\ 10^{-11}$**
	W 1.0	$3.38\ 10^{-11}$	$4.02\ 10^{-11}$	$2.80\ 10^{-10}$	$4.48\ 10^{-11}$	$3.92\ 10^{-11}$	$3.79\ 10^{-11}$	$6.29\ 10^{-11}$	**$7.46\ 10^{-11}$**
Br-80	D 1.0	$4.02\ 10^{-13}$	$4.25\ 10^{-13}$	$5.01\ 10^{-11}$	$4.24\ 10^{-13}$	$4.16\ 10^{-13}$	$4.19\ 10^{-13}$	$4.56\ 10^{-12}$	**$7.62\ 10^{-12}$**
	W 1.0	$1.11\ 10^{-13}$	$1.34\ 10^{-13}$	$5.37\ 10^{-11}$	$1.33\ 10^{-13}$	$1.27\ 10^{-13}$	$1.32\ 10^{-13}$	$6.71\ 10^{-13}$	**$6.72\ 10^{-12}$**
Br-80m	D 1.0	$1.80\ 10^{-11}$	$1.82\ 10^{-11}$	$5.84\ 10^{-10}$	$1.86\ 10^{-11}$	$1.84\ 10^{-11}$	$1.81\ 10^{-11}$	$3.87\ 10^{-11}$	**$9.22\ 10^{-11}$**
	W 1.0	$7.53\ 10^{-12}$	$7.94\ 10^{-12}$	$7.77\ 10^{-10}$	$8.08\ 10^{-12}$	$7.92\ 10^{-12}$	$7.75\ 10^{-12}$	$2.68\ 10^{-11}$	**$1.06\ 10^{-10}$**
Br-82	D 1.0	$2.52\ 10^{-10}$	$2.37\ 10^{-10}$	$7.82\ 10^{-10}$	$2.54\ 10^{-10}$	$2.31\ 10^{-10}$	$2.38\ 10^{-10}$	$3.15\ 10^{-10}$	**$3.31\ 10^{-10}$**
	W 1.0	$1.69\ 10^{-10}$	$2.10\ 10^{-10}$	$1.68\ 10^{-9}$	$2.18\ 10^{-10}$	$1.92\ 10^{-10}$	$2.06\ 10^{-10}$	$3.31\ 10^{-10}$	**$4.13\ 10^{-10}$**
Br-83	D 1.0	$3.28\ 10^{-12}$	$3.29\ 10^{-12}$	$1.50\ 10^{-10}$	$3.30\ 10^{-12}$	$3.29\ 10^{-12}$	$3.29\ 10^{-12}$	$1.13\ 10^{-11}$	**$2.33\ 10^{-11}$**
	W 1.0	$1.13\ 10^{-12}$	$1.14\ 10^{-12}$	$1.82\ 10^{-10}$	$1.14\ 10^{-12}$	$1.14\ 10^{-12}$	$1.14\ 10^{-12}$	$5.31\ 10^{-12}$	**$2.41\ 10^{-11}$**
Br-84	D 1.0	$2.84\ 10^{-12}$	$3.31\ 10^{-12}$	$1.56\ 10^{-10}$	$3.27\ 10^{-12}$	$2.99\ 10^{-12}$	$3.12\ 10^{-12}$	$1.87\ 10^{-11}$	**$2.61\ 10^{-11}$**
	W 1.0	$8.51\ 10^{-13}$	$1.55\ 10^{-12}$	$1.71\ 10^{-10}$	$1.51\ 10^{-12}$	$1.31\ 10^{-12}$	$1.43\ 10^{-12}$	$4.98\ 10^{-12}$	**$2.27\ 10^{-11}$**
Rubidium									
Rb-79	D 1.0	$1.21\ 10^{-12}$	$1.70\ 10^{-12}$	$7.94\ 10^{-11}$	$1.76\ 10^{-12}$	$1.62\ 10^{-12}$	$1.53\ 10^{-12}$	$9.83\ 10^{-12}$	**$1.33\ 10^{-11}$**
Rb-81	D 1.0	$9.79\ 10^{-12}$	$1.09\ 10^{-11}$	$1.83\ 10^{-10}$	$1.35\ 10^{-11}$	$1.50\ 10^{-11}$	$1.03\ 10^{-11}$	$2.22\ 10^{-11}$	**$3.51\ 10^{-11}$**
Rb-81m	D 1.0	$1.31\ 10^{-12}$	$1.43\ 10^{-12}$	$2.99\ 10^{-11}$	$1.77\ 10^{-12}$	$1.98\ 10^{-12}$	$1.35\ 10^{-12}$	$3.28\ 10^{-12}$	**$5.43\ 10^{-12}$**
Rb-82m	D 1.0	$3.80\ 10^{-11}$	$4.53\ 10^{-11}$	$2.53\ 10^{-10}$	$5.22\ 10^{-11}$	$4.94\ 10^{-11}$	$4.37\ 10^{-11}$	$7.54\ 10^{-11}$	**$7.83\ 10^{-11}$**
Rb-83	D 1.0	$1.25\ 10^{-9}$	$1.10\ 10^{-9}$	$1.35\ 10^{-9}$	$1.64\ 10^{-9}$	$1.90\ 10^{-9}$	$1.10\ 10^{-9}$	$1.36\ 10^{-9}$	**$1.33\ 10^{-9}$**
Rb-84	D 1.0	$1.58\ 10^{-9}$	$1.44\ 10^{-9}$	$2.03\ 10^{-9}$	$2.15\ 10^{-9}$	$2.77\ 10^{-9}$	$1.44\ 10^{-9}$	$1.75\ 10^{-9}$	**$1.76\ 10^{-9}$**
Rb-86	D 1.0	$1.34\ 10^{-9}$	$1.33\ 10^{-9}$	$3.30\ 10^{-9}$	$2.32\ 10^{-9}$	$4.27\ 10^{-9}$	$1.33\ 10^{-9}$	$1.38\ 10^{-9}$	**$1.79\ 10^{-9}$**
Rb-87	D 1.0	$7.16\ 10^{-10}$	$7.16\ 10^{-10}$	$1.05\ 10^{-9}$	$1.27\ 10^{-9}$	$2.40\ 10^{-9}$	$7.16\ 10^{-10}$	$7.20\ 10^{-10}$	**$8.74\ 10^{-10}$**
Rb-88	D 1.0	$1.31\ 10^{-12}$	$1.43\ 10^{-12}$	$1.47\ 10^{-10}$	$1.45\ 10^{-12}$	$1.47\ 10^{-12}$	$1.37\ 10^{-12}$	$1.38\ 10^{-11}$	**$2.26\ 10^{-11}$**
Rb-89	D 1.0	$1.34\ 10^{-12}$	$1.73\ 10^{-12}$	$6.80\ 10^{-11}$	$2.02\ 10^{-12}$	$2.54\ 10^{-12}$	$1.61\ 10^{-12}$	$8.14\ 10^{-12}$	**$1.16\ 10^{-11}$**
Strontium									
Sr-80	D 3 10^{-1}	$1.68\ 10^{-11}$	$1.42\ 10^{-11}$	$6.99\ 10^{-10}$	$1.53\ 10^{-11}$	$1.04\ 10^{-11}$	$1.30\ 10^{-11}$	$1.43\ 10^{-10}$	**$1.36\ 10^{-10}$**
	Y 1 10^{-2}	$3.35\ 10^{-12}$	$3.21\ 10^{-12}$	$8.87\ 10^{-10}$	$3.26\ 10^{-12}$	$2.23\ 10^{-12}$	$2.42\ 10^{-12}$	$7.31\ 10^{-11}$	**$1.30\ 10^{-10}$**
Sr-81	D 3 10^{-1}	$3.53\ 10^{-12}$	$2.94\ 10^{-12}$	$1.21\ 10^{-10}$	$3.16\ 10^{-12}$	$2.33\ 10^{-12}$	$2.48\ 10^{-12}$	$2.14\ 10^{-11}$	**$2.28\ 10^{-11}$**
	Y 1 10^{-2}	$1.43\ 10^{-12}$	$1.26\ 10^{-12}$	$1.45\ 10^{-10}$	$1.35\ 10^{-12}$	$9.28\ 10^{-13}$	$9.15\ 10^{-13}$	$9.61\ 10^{-12}$	**$2.10\ 10^{-11}$**
Sr-82	D 3 10^{-1}	$1.37\ 10^{-9}$	$1.23\ 10^{-9}$	$5.54\ 10^{-9}$	$8.22\ 10^{-9}$	$1.15\ 10^{-8}$	$1.21\ 10^{-9}$	$3.53\ 10^{-9}$	**$3.62\ 10^{-9}$**
	Y 1 10^{-2}	$6.26\ 10^{-10}$	$4.65\ 10^{-10}$	$1.10\ 10^{-7}$	$6.08\ 10^{-10}$	$5.19\ 10^{-10}$	$3.64\ 10^{-10}$	$1.01\ 10^{-8}$	**$1.66\ 10^{-8}$**
Sr-83	D 3 10^{-1}	$1.10\ 10^{-10}$	$6.60\ 10^{-11}$	$4.69\ 10^{-10}$	$1.49\ 10^{-10}$	$3.67\ 10^{-10}$	$5.80\ 10^{-11}$	$2.56\ 10^{-10}$	**$2.01\ 10^{-10}$**
	Y 1 10^{-2}	$1.75\ 10^{-10}$	$5.07\ 10^{-11}$	$1.36\ 10^{-9}$	$6.35\ 10^{-11}$	$3.95\ 10^{-11}$	$2.71\ 10^{-11}$	$6.23\ 10^{-10}$	**$4.11\ 10^{-10}$**
Sr-85	D 3 10^{-1}	$4.44\ 10^{-10}$	$3.72\ 10^{-10}$	$4.66\ 10^{-10}$	$9.20\ 10^{-10}$	$1.02\ 10^{-9}$	$3.63\ 10^{-10}$	$4.76\ 10^{-10}$	**$5.18\ 10^{-10}$**
	Y 1 10^{-2}	$3.34\ 10^{-10}$	$4.65\ 10^{-10}$	$7.15\ 10^{-9}$	$4.65\ 10^{-10}$	$3.50\ 10^{-10}$	$3.85\ 10^{-10}$	$9.05\ 10^{-10}$	**$1.36\ 10^{-9}$**
Sr-85m	D 3 10^{-1}	$1.26\ 10^{-12}$	$8.92\ 10^{-13}$	$6.41\ 10^{-12}$	$1.50\ 10^{-12}$	$1.94\ 10^{-12}$	$6.62\ 10^{-13}$	$2.58\ 10^{-12}$	**$2.25\ 10^{-12}$**
	Y 1 10^{-2}	$5.11\ 10^{-13}$	$6.79\ 10^{-13}$	$1.20\ 10^{-11}$	$7.53\ 10^{-13}$	$5.56\ 10^{-13}$	$4.64\ 10^{-13}$	$1.69\ 10^{-12}$	**$2.30\ 10^{-12}$**

Table 2.1, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Sr-87m	D 3 10^{-1}	4.54 10^{-12}	2.74 10^{-12}	4.47 10^{-11}	3.29 10^{-12}	2.33 10^{-12}	2.11 10^{-12}	1.38 10^{-11}	**1.16 10^{-11}**
	Y 1 10^{-2}	2.48 10^{-12}	1.43 10^{-12}	5.81 10^{-11}	1.66 10^{-12}	1.04 10^{-12}	8.54 10^{-13}	1.03 10^{-11}	**1.12 10^{-11}**
Sr-89	D 3 10^{-1}	4.16 10^{-10}	4.16 10^{-10}	2.16 10^{-9}	5.63 10^{-9}	8.37 10^{-9}	4.16 10^{-10}	1.32 10^{-9}	**1.76 10^{-9}**
	Y 1 10^{-2}	7.95 10^{-12}	7.96 10^{-12}	8.35 10^{-8}	1.07 10^{-10}	1.59 10^{-10}	7.96 10^{-12}	3.97 10^{-9}	**1.12 10^{-8}**
Sr-90	D 3 10^{-1}	2.64 10^{-9}	2.64 10^{-9}	3.73 10^{-9}	3.36 10^{-7}	**7.27 10^{-7}**	2.64 10^{-9}	3.36 10^{-9}	6.47 10^{-8}
	Y 1 10^{-2}	2.69 10^{-10}	2.69 10^{-10}	2.86 10^{-6}	3.28 10^{-8}	7.09 10^{-8}	2.69 10^{-10}	5.73 10^{-9}	**3.51 10^{-7}**
Sr-91	D 3 10^{-1}	6.41 10^{-11}	4.45 10^{-11}	9.21 10^{-10}	1.23 10^{-10}	1.14 10^{-10}	4.08 10^{-11}	3.33 10^{-10}	**2.52 10^{-10}**
	Y 1 10^{-2}	5.65 10^{-11}	1.74 10^{-11}	2.13 10^{-9}	2.23 10^{-11}	1.27 10^{-11}	9.64 10^{-12}	5.78 10^{-10}	**4.49 10^{-10}**
Sr-92	D 3 10^{-1}	3.03 10^{-11}	2.44 10^{-11}	7.12 10^{-10}	3.68 10^{-11}	2.56 10^{-11}	2.19 10^{-11}	2.25 10^{-10}	**1.70 10^{-10}**
	Y 1 10^{-2}	1.02 10^{-11}	6.49 10^{-12}	1.05 10^{-9}	6.98 10^{-12}	4.36 10^{-12}	3.92 10^{-12}	2.90 10^{-10}	**2.18 10^{-10}**
Yttrium									
Y-86	W 1 10^{-4}	2.86 10^{-10}	9.16 10^{-11}	1.12 10^{-9}	1.27 10^{-10}	8.39 10^{-11}	4.97 10^{-11}	6.06 10^{-10}	**4.21 10^{-10}**
	Y 1 10^{-4}	3.30 10^{-10}	9.05 10^{-11}	1.16 10^{-9}	1.12 10^{-10}	5.87 10^{-11}	4.32 10^{-11}	7.10 10^{-10}	**4.65 10^{-10}**
Y-86m	W 1 10^{-4}	1.63 10^{-11}	5.26 10^{-12}	6.66 10^{-11}	7.33 10^{-12}	4.93 10^{-12}	2.82 10^{-12}	3.47 10^{-11}	**2.44 10^{-11}**
	Y 1 10^{-4}	1.88 10^{-11}	5.19 10^{-12}	6.91 10^{-11}	6.49 10^{-12}	3.40 10^{-12}	2.44 10^{-12}	4.06 10^{-11}	**2.69 10^{-11}**
Y-87	W 1 10^{-4}	2.71 10^{-10}	8.24 10^{-11}	1.36 10^{-9}	1.45 10^{-10}	1.32 10^{-10}	4.54 10^{-11}	6.08 10^{-10}	**4.48 10^{-10}**
	Y 1 10^{-4}	3.01 10^{-10}	7.75 10^{-11}	1.42 10^{-9}	1.03 10^{-10}	5.70 10^{-11}	3.73 10^{-11}	6.73 10^{-10}	**4.74 10^{-10}**
Y-88	W 1 10^{-4}	2.81 10^{-9}	2.94 10^{-9}	1.58 10^{-8}	4.76 10^{-9}	5.66 10^{-9}	1.83 10^{-9}	5.72 10^{-9}	**5.55 10^{-9}**
	Y 1 10^{-4}	1.79 10^{-9}	3.29 10^{-9}	3.53 10^{-8}	3.32 10^{-9}	2.64 10^{-9}	2.62 10^{-9}	6.20 10^{-9}	**7.59 10^{-9}**
Y-90	W 1 10^{-4}	9.52 10^{-12}	9.52 10^{-12}	8.89 10^{-9}	2.79 10^{-10}	2.78 10^{-10}	9.52 10^{-12}	3.40 10^{-9}	**2.13 10^{-9}**
	Y 1 10^{-4}	5.17 10^{-13}	5.17 10^{-13}	9.31 10^{-9}	1.52 10^{-11}	1.51 10^{-11}	5.17 10^{-13}	3.87 10^{-9}	**2.28 10^{-9}**
Y-90m	W 1 10^{-4}	6.01 10^{-12}	3.81 10^{-12}	4.85 10^{-10}	1.85 10^{-11}	1.75 10^{-11}	2.64 10^{-12}	1.85 10^{-10}	**1.19 10^{-10}**
	Y 1 10^{-4}	6.27 10^{-12}	3.26 10^{-12}	5.09 10^{-10}	4.61 10^{-12}	3.14 10^{-12}	1.91 10^{-12}	2.12 10^{-10}	**1.27 10^{-10}**
Y-91	W 1 10^{-4}	1.11 10^{-10}	1.11 10^{-10}	5.25 10^{-8}	5.55 10^{-9}	5.54 10^{-9}	1.10 10^{-10}	5.12 10^{-9}	**8.72 10^{-9}**
	Y 1 10^{-4}	8.20 10^{-12}	8.92 10^{-12}	9.87 10^{-8}	3.19 10^{-10}	3.18 10^{-10}	8.50 10^{-12}	4.20 10^{-9}	**1.32 10^{-8}**
Y-91m	W 1 10^{-4}	4.33 10^{-13}	7.13 10^{-13}	4.19 10^{-11}	3.94 10^{-12}	3.79 10^{-12}	6.23 10^{-13}	4.15 10^{-12}	**7.09 10^{-12}**
	Y 1 10^{-4}	3.21 10^{-13}	6.08 10^{-13}	7.00 10^{-11}	7.74 10^{-13}	6.21 10^{-13}	5.02 10^{-13}	3.74 10^{-12}	**9.82 10^{-12}**
Y-92	W 1 10^{-4}	4.86 10^{-12}	4.07 10^{-12}	1.16 10^{-9}	1.28 10^{-11}	1.23 10^{-11}	3.69 10^{-12}	1.67 10^{-10}	**1.93 10^{-10}**
	Y 1 10^{-4}	2.61 10^{-12}	1.50 10^{-12}	1.24 10^{-9}	2.07 10^{-12}	1.51 10^{-12}	1.05 10^{-12}	2.03 10^{-10}	**2.11 10^{-10}**
Y-93	W 1 10^{-4}	8.65 10^{-12}	5.79 10^{-12}	2.40 10^{-9}	4.14 10^{-11}	4.04 10^{-11}	5.06 10^{-12}	7.74 10^{-10}	**5.29 10^{-10}**
	Y 1 10^{-4}	5.31 10^{-12}	1.74 10^{-12}	2.52 10^{-9}	4.04 10^{-12}	3.14 10^{-12}	9.26 10^{-13}	9.25 10^{-10}	**5.82 10^{-10}**
Y-94	W 1 10^{-4}	3.90 10^{-13}	6.90 10^{-13}	1.39 10^{-10}	7.46 10^{-13}	6.58 10^{-13}	6.68 10^{-13}	2.80 10^{-12}	**1.78 10^{-11}**
	Y 1 10^{-4}	1.23 10^{-13}	4.40 10^{-13}	1.48 10^{-10}	4.18 10^{-13}	3.28 10^{-13}	4.12 10^{-13}	3.08 10^{-12}	**1.89 10^{-11}**
Y-95	W 1 10^{-4}	2.61 10^{-13}	3.99 10^{-13}	7.44 10^{-11}	6.75 10^{-13}	2.76 10^{-12}	3.46 10^{-13}	1.20 10^{-12}	**9.59 10^{-12}**
	Y 1 10^{-4}	1.07 10^{-13}	3.17 10^{-13}	8.04 10^{-11}	3.20 10^{-13}	3.79 10^{-13}	2.79 10^{-13}	1.25 10^{-12}	**1.02 10^{-11}**
Zirconium									
Zr-86	D 2 10^{-3}	2.84 10^{-10}	1.34 10^{-10}	5.01 10^{-10}	3.16 10^{-10}	3.77 10^{-10}	1.00 10^{-10}	4.71 10^{-10}	**3.45 10^{-10}**
	W 2 10^{-3}	4.19 10^{-10}	1.11 10^{-10}	1.24 10^{-9}	1.69 10^{-10}	1.24 10^{-10}	5.60 10^{-11}	8.39 10^{-10}	**5.48 10^{-10}**
	Y 2 10^{-3}	4.72 10^{-10}	1.05 10^{-10}	1.26 10^{-9}	1.40 10^{-10}	7.02 10^{-11}	4.34 10^{-11}	9.64 10^{-10}	**5.94 10^{-10}**
Zr-88	D 2 10^{-3}	3.75 10^{-9}	4.33 10^{-9}	4.02 10^{-9}	1.34 10^{-8}	2.29 10^{-8}	2.32 10^{-9}	4.34 10^{-9}	**5.73 10^{-9}**
	W 2 10^{-3}	1.24 10^{-9}	1.60 10^{-9}	9.38 10^{-9}	3.68 10^{-9}	5.67 10^{-9}	9.95 10^{-10}	2.07 10^{-9}	**2.94 10^{-9}**
	Y 2 10^{-3}	7.05 10^{-10}	2.64 10^{-9}	3.39 10^{-8}	2.70 10^{-9}	2.33 10^{-9}	2.15 10^{-9}	4.94 10^{-9}	**6.58 10^{-9}**
Zr-89	D 2 10^{-3}	2.77 10^{-10}	1.69 10^{-10}	5.47 10^{-10}	5.07 10^{-10}	5.94 10^{-10}	1.36 10^{-10}	4.84 10^{-10}	**3.88 10^{-10}**
	W 2 10^{-3}	3.62 10^{-10}	1.22 10^{-10}	1.83 10^{-9}	1.98 10^{-10}	1.61 10^{-10}	7.94 10^{-11}	8.21 10^{-10}	**6.06 10^{-10}**
	Y 2 10^{-3}	3.94 10^{-10}	1.10 10^{-10}	1.91 10^{-9}	1.38 10^{-10}	7.70 10^{-11}	6.37 10^{-11}	9.19 10^{-10}	**6.41 10^{-10}**

Table 2.1, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Zr-93	D 2 10^{-3}	$2.18\ 10^{-11}$	$4.68\ 10^{-11}$	$8.68\ 10^{-11}$	$1.77\ 10^{-7}$	**$2.18\ 10^{-6}$**	$1.74\ 10^{-11}$	$8.48\ 10^{-11}$	$8.67\ 10^{-8}$
	W 2 10^{-3}	$5.58\ 10^{-12}$	$1.20\ 10^{-11}$	$3.30\ 10^{-9}$	$4.49\ 10^{-8}$	**$5.54\ 10^{-7}$**	$4.45\ 10^{-12}$	$1.54\ 10^{-10}$	$2.25\ 10^{-8}$
	Y 2 10^{-3}	$2.82\ 10^{-12}$	$1.90\ 10^{-11}$	$8.72\ 10^{-8}$	$1.93\ 10^{-8}$	**$2.38\ 10^{-7}$**	$2.28\ 10^{-12}$	$1.73\ 10^{-10}$	$2.00\ 10^{-8}$
Zr-95	D 2 10^{-3}	$1.88\ 10^{-9}$	$1.91\ 10^{-9}$	$2.17\ 10^{-9}$	$1.30\ 10^{-8}$	**$1.03\ 10^{-7}$**	$1.44\ 10^{-9}$	$2.28\ 10^{-9}$	$6.39\ 10^{-9}$
	W 2 10^{-3}	$8.40\ 10^{-10}$	$9.32\ 10^{-10}$	$1.86\ 10^{-8}$	$3.24\ 10^{-9}$	$2.17\ 10^{-8}$	$7.82\ 10^{-10}$	$2.13\ 10^{-9}$	**$4.29\ 10^{-9}$**
	Y 2 10^{-3}	$5.73\ 10^{-10}$	$1.23\ 10^{-9}$	$4.07\ 10^{-8}$	$1.35\ 10^{-9}$	$2.33\ 10^{-9}$	$1.16\ 10^{-9}$	$2.77\ 10^{-9}$	**$6.31\ 10^{-9}$**
Zr-97	D 2 10^{-3}	$1.83\ 10^{-10}$	$1.09\ 10^{-10}$	$2.09\ 10^{-9}$	$4.99\ 10^{-10}$	$5.09\ 10^{-10}$	$9.56\ 10^{-11}$	$1.15\ 10^{-9}$	**$7.37\ 10^{-10}$**
	W 2 10^{-3}	$1.70\ 10^{-10}$	$5.79\ 10^{-11}$	$3.95\ 10^{-9}$	$1.43\ 10^{-10}$	$1.23\ 10^{-10}$	$3.75\ 10^{-11}$	$1.72\ 10^{-9}$	**$1.06\ 10^{-9}$**
	Y 2 10^{-3}	$1.84\ 10^{-10}$	$4.70\ 10^{-11}$	$4.10\ 10^{-9}$	$6.37\ 10^{-11}$	$3.50\ 10^{-11}$	$2.31\ 10^{-11}$	$2.04\ 10^{-9}$	**$1.17\ 10^{-9}$**
Niobium									
Nb-88	W 1 10^{-2}	$2.59\ 10^{-13}$	$8.10\ 10^{-13}$	$4.96\ 10^{-11}$	$8.46\ 10^{-13}$	$7.68\ 10^{-13}$	$7.56\ 10^{-13}$	$1.74\ 10^{-12}$	**$6.81\ 10^{-12}$**
	Y 1 10^{-2}	$1.53\ 10^{-13}$	$8.37\ 10^{-13}$	$5.31\ 10^{-11}$	$7.99\ 10^{-13}$	$6.37\ 10^{-13}$	$7.68\ 10^{-13}$	$1.98\ 10^{-12}$	**$7.27\ 10^{-12}$**
Nb-89	W 1 10^{-2}	$1.55\ 10^{-11}$	$8.64\ 10^{-12}$	$6.08\ 10^{-10}$	$1.47\ 10^{-11}$	$1.27\ 10^{-11}$	$6.44\ 10^{-12}$	$7.42\ 10^{-11}$	**$1.03\ 10^{-10}$**
122 m	1 10^{-2}	$1.53\ 10^{-11}$	$6.88\ 10^{-12}$	$6.55\ 10^{-10}$	$8.04\ 10^{-12}$	$5.14\ 10^{-12}$	$4.42\ 10^{-12}$	$8.76\ 10^{-11}$	**$1.11\ 10^{-10}$**
Nb-89	W 1 10^{-2}	$7.83\ 10^{-12}$	$5.41\ 10^{-12}$	$2.75\ 10^{-10}$	$7.53\ 10^{-12}$	$6.34\ 10^{-12}$	$4.27\ 10^{-12}$	$2.72\ 10^{-11}$	**$4.52\ 10^{-11}$**
66 m	Y 1 10^{-2}	$7.66\ 10^{-12}$	$4.57\ 10^{-12}$	$2.96\ 10^{-10}$	$5.02\ 10^{-12}$	$3.36\ 10^{-12}$	$3.30\ 10^{-12}$	$3.12\ 10^{-11}$	**$4.83\ 10^{-11}$**
Nb-90	W 1 10^{-2}	$3.23\ 10^{-10}$	$1.05\ 10^{-10}$	$1.65\ 10^{-9}$	$1.63\ 10^{-10}$	$1.50\ 10^{-10}$	$5.49\ 10^{-11}$	$8.18\ 10^{-10}$	**$5.66\ 10^{-10}$**
	Y 1 10^{-2}	$3.68\ 10^{-10}$	$1.00\ 10^{-10}$	$1.71\ 10^{-9}$	$1.28\ 10^{-10}$	$7.18\ 10^{-11}$	$4.54\ 10^{-11}$	$9.60\ 10^{-10}$	**$6.19\ 10^{-10}$**
Nb-93m	W 1 10^{-2}	$4.16\ 10^{-10}$	$3.32\ 10^{-11}$	$4.86\ 10^{-9}$	$2.85\ 10^{-10}$	$7.43\ 10^{-10}$	$3.04\ 10^{-11}$	$3.95\ 10^{-10}$	**$8.68\ 10^{-10}$**
	Y 1 10^{-2}	$1.55\ 10^{-10}$	$4.36\ 10^{-11}$	$6.45\ 10^{-8}$	$1.14\ 10^{-10}$	$2.84\ 10^{-10}$	$1.14\ 10^{-11}$	$3.04\ 10^{-10}$	**$7.90\ 10^{-9}$**
Nb-94	W 1 10^{-2}	$4.76\ 10^{-9}$	$3.08\ 10^{-9}$	$4.18\ 10^{-8}$	$6.37\ 10^{-9}$	$9.10\ 10^{-9}$	$2.63\ 10^{-9}$	$6.58\ 10^{-9}$	**$9.76\ 10^{-9}$**
	Y 1 10^{-2}	$4.42\ 10^{-9}$	$2.24\ 10^{-8}$	$7.48\ 10^{-7}$	$2.26\ 10^{-8}$	$1.97\ 10^{-8}$	$2.22\ 10^{-8}$	$4.45\ 10^{-8}$	**$1.12\ 10^{-7}$**
Nb-95	W 1 10^{-2}	$4.84\ 10^{-10}$	$3.77\ 10^{-10}$	$5.49\ 10^{-9}$	$6.72\ 10^{-10}$	$2.42\ 10^{-9}$	$3.14\ 10^{-10}$	$9.86\ 10^{-10}$	**$1.29\ 10^{-9}$**
	Y 1 10^{-2}	$4.32\ 10^{-10}$	$4.07\ 10^{-10}$	$8.32\ 10^{-9}$	$4.42\ 10^{-10}$	$5.13\ 10^{-10}$	$3.58\ 10^{-10}$	$1.07\ 10^{-9}$	**$1.57\ 10^{-9}$**
Nb-95m	W 1 10^{-2}	$6.72\ 10^{-11}$	$4.49\ 10^{-11}$	$2.63\ 10^{-9}$	$1.59\ 10^{-10}$	$3.52\ 10^{-10}$	$3.68\ 10^{-11}$	$7.69\ 10^{-10}$	**$6.01\ 10^{-10}$**
	Y 1 10^{-2}	$4.96\ 10^{-11}$	$4.53\ 10^{-11}$	$3.07\ 10^{-9}$	$5.87\ 10^{-11}$	$6.61\ 10^{-11}$	$3.86\ 10^{-11}$	$8.69\ 10^{-10}$	**$6.59\ 10^{-10}$**
Nb-96	W 1 10^{-2}	$3.38\ 10^{-10}$	$1.03\ 10^{-10}$	$1.56\ 10^{-9}$	$1.67\ 10^{-10}$	$1.18\ 10^{-10}$	$5.89\ 10^{-11}$	$8.49\ 10^{-10}$	**$5.67\ 10^{-10}$**
	Y 1 10^{-2}	$3.83\ 10^{-10}$	$9.82\ 10^{-11}$	$1.61\ 10^{-9}$	$1.28\ 10^{-10}$	$6.70\ 10^{-11}$	$4.81\ 10^{-11}$	$9.90\ 10^{-10}$	**$6.19\ 10^{-10}$**
Nb-97	W 1 10^{-2}	$1.21\ 10^{-12}$	$1.50\ 10^{-12}$	$1.44\ 10^{-10}$	$2.07\ 10^{-12}$	$1.79\ 10^{-12}$	$1.34\ 10^{-12}$	$8.89\ 10^{-12}$	**$2.08\ 10^{-11}$**
	Y 1 10^{-2}	$8.65\ 10^{-13}$	$1.12\ 10^{-12}$	$1.56\ 10^{-10}$	$1.14\ 10^{-12}$	$8.26\ 10^{-13}$	$9.20\ 10^{-13}$	$1.05\ 10^{-11}$	**$2.24\ 10^{-11}$**
Nb-98	W 1 10^{-2}	$2.16\ 10^{-12}$	$3.36\ 10^{-12}$	$2.13\ 10^{-10}$	$3.88\ 10^{-12}$	$3.23\ 10^{-12}$	$2.97\ 10^{-12}$	$1.24\ 10^{-11}$	**$3.10\ 10^{-11}$**
	Y 1 10^{-2}	$1.54\ 10^{-12}$	$2.76\ 10^{-12}$	$2.30\ 10^{-10}$	$2.70\ 10^{-12}$	$2.00\ 10^{-12}$	$2.30\ 10^{-12}$	$1.42\ 10^{-11}$	**$3.31\ 10^{-11}$**
Molybdenum									
Mo-90	D 8 10^{-1}	$8.77\ 10^{-11}$	$7.23\ 10^{-11}$	$5.36\ 10^{-10}$	$1.06\ 10^{-10}$	$1.18\ 10^{-10}$	$5.79\ 10^{-11}$	$2.52\ 10^{-10}$	**$1.91\ 10^{-10}$**
	Y 5 10^{-2}	$1.91\ 10^{-10}$	$4.90\ 10^{-11}$	$9.36\ 10^{-10}$	$6.42\ 10^{-11}$	$3.44\ 10^{-11}$	$2.14\ 10^{-11}$	$5.24\ 10^{-10}$	**$3.34\ 10^{-10}$**
Mo-93	D 8 10^{-1}	$9.27\ 10^{-11}$	$7.48\ 10^{-11}$	$1.15\ 10^{-10}$	$2.11\ 10^{-10}$	$8.59\ 10^{-10}$	$7.06\ 10^{-11}$	$5.70\ 10^{-10}$	**$2.72\ 10^{-10}$**
	Y 5 10^{-2}	$2.45\ 10^{-11}$	$2.82\ 10^{-10}$	$6.29\ 10^{-8}$	$1.06\ 10^{-10}$	$2.35\ 10^{-10}$	$1.17\ 10^{-11}$	$2.10\ 10^{-10}$	**$7.68\ 10^{-9}$**
Mo-93m	D 8 10^{-1}	$4.42\ 10^{-11}$	$3.67\ 10^{-11}$	$2.28\ 10^{-10}$	$4.32\ 10^{-11}$	$3.64\ 10^{-11}$	$2.83\ 10^{-11}$	$9.25\ 10^{-11}$	**$7.88\ 10^{-11}$**
	Y 5 10^{-2}	$6.36\ 10^{-11}$	$2.54\ 10^{-11}$	$3.11\ 10^{-10}$	$2.93\ 10^{-11}$	$1.65\ 10^{-11}$	$1.23\ 10^{-11}$	$1.41\ 10^{-10}$	**$1.04\ 10^{-10}$**
Mo-99	D 8 10^{-1}	$1.32\ 10^{-10}$	$1.29\ 10^{-10}$	$1.17\ 10^{-9}$	$3.71\ 10^{-10}$	$5.40\ 10^{-10}$	$1.17\ 10^{-10}$	$9.49\ 10^{-10}$	**$5.42\ 10^{-10}$**
	Y 5 10^{-2}	$9.51\ 10^{-11}$	$2.75\ 10^{-11}$	$4.29\ 10^{-9}$	$5.24\ 10^{-11}$	$4.13\ 10^{-11}$	$1.52\ 10^{-11}$	$1.74\ 10^{-9}$	**$1.07\ 10^{-9}$**
Mo-101	D 8 10^{-1}	$1.03\ 10^{-12}$	$1.22\ 10^{-12}$	$6.53\ 10^{-11}$	$1.28\ 10^{-12}$	$1.11\ 10^{-12}$	$1.04\ 10^{-12}$	$9.15\ 10^{-12}$	**$1.12\ 10^{-11}$**
	Y 5 10^{-2}	$1.23\ 10^{-13}$	$5.14\ 10^{-13}$	$7.52\ 10^{-11}$	$5.00\ 10^{-13}$	$3.89\ 10^{-13}$	$4.22\ 10^{-13}$	$2.20\ 10^{-12}$	**$9.87\ 10^{-12}$**
Technetium									
Tc-93	D 8 10^{-1}	$9.76\ 10^{-12}$	$8.68\ 10^{-12}$	$4.32\ 10^{-11}$	$8.64\ 10^{-12}$	$6.90\ 10^{-12}$	$6.10\ 10^{-11}$	$2.41\ 10^{-11}$	**$1.92\ 10^{-11}$**
	W 8 10^{-1}	$4.42\ 10^{-12}$	$5.87\ 10^{-12}$	$4.94\ 10^{-11}$	$5.64\ 10^{-12}$	$4.36\ 10^{-12}$	$2.23\ 10^{-11}$	$1.42\ 10^{-11}$	**$1.36\ 10^{-11}$**

Table 2.1, Cont'd.

Nuclide	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Tc-93m	D 8 10^{-1}	$3.42\ 10^{-12}$	$3.05\ 10^{-12}$	$2.70\ 10^{-11}$	$3.10\ 10^{-12}$	$2.49\ 10^{-12}$	$3.03\ 10^{-11}$	$1.05\ 10^{-11}$	**$9.06\ 10^{-12}$**
	W 8 10^{-1}	$1.46\ 10^{-12}$	$2.01\ 10^{-12}$	$3.03\ 10^{-11}$	$1.97\ 10^{-12}$	$1.53\ 10^{-12}$	$1.01\ 10^{-11}$	$5.17\ 10^{-12}$	**$6.44\ 10^{-12}$**
Tc-94	D 8 10^{-1}	$3.22\ 10^{-11}$	$3.06\ 10^{-11}$	$1.63\ 10^{-10}$	$3.17\ 10^{-11}$	$2.56\ 10^{-11}$	$2.93\ 10^{-10}$	$9.05\ 10^{-11}$	**$7.27\ 10^{-11}$**
	W 8 10^{-1}	$1.97\ 10^{-11}$	$2.21\ 10^{-11}$	$2.01\ 10^{-10}$	$2.22\ 10^{-11}$	$1.72\ 10^{-11}$	$1.22\ 10^{-10}$	$5.86\ 10^{-11}$	**$5.68\ 10^{-11}$**
Tc-94m	D 8 10^{-1}	$4.85\ 10^{-12}$	$5.00\ 10^{-12}$	$1.59\ 10^{-10}$	$5.04\ 10^{-12}$	$4.26\ 10^{-12}$	$1.60\ 10^{-10}$	$3.86\ 10^{-11}$	**$3.81\ 10^{-11}$**
	W 8 10^{-1}	$1.47\ 10^{-12}$	$2.67\ 10^{-12}$	$1.78\ 10^{-10}$	$2.60\ 10^{-12}$	$2.14\ 10^{-12}$	$4.63\ 10^{-11}$	$1.17\ 10^{-11}$	**$2.74\ 10^{-11}$**
Tc-95	D 8 10^{-1}	$3.44\ 10^{-11}$	$3.08\ 10^{-11}$	$1.14\ 10^{-10}$	$3.26\ 10^{-11}$	$2.70\ 10^{-11}$	$2.44\ 10^{-10}$	$8.70\ 10^{-11}$	**$6.50\ 10^{-11}$**
	W 8 10^{-1}	$3.36\ 10^{-11}$	$2.83\ 10^{-11}$	$1.99\ 10^{-10}$	$2.94\ 10^{-11}$	$2.27\ 10^{-11}$	$1.41\ 10^{-10}$	$7.54\ 10^{-11}$	**$6.76\ 10^{-11}$**
Tc-95m	D 8 10^{-1}	$1.44\ 10^{-10}$	$1.27\ 10^{-10}$	$2.86\ 10^{-10}$	$1.42\ 10^{-10}$	$1.22\ 10^{-10}$	$6.03\ 10^{-10}$	$4.16\ 10^{-10}$	**$2.53\ 10^{-10}$**
	W 8 10^{-1}	$1.98\ 10^{-10}$	$3.84\ 10^{-10}$	$5.07\ 10^{-9}$	$3.86\ 10^{-10}$	$3.08\ 10^{-10}$	$7.19\ 10^{-10}$	$8.51\ 10^{-10}$	**$1.05\ 10^{-9}$**
Tc-96	D 8 10^{-1}	$2.54\ 10^{-10}$	$2.36\ 10^{-10}$	$5.61\ 10^{-10}$	$2.51\ 10^{-10}$	$2.12\ 10^{-10}$	$1.14\ 10^{-9}$	$6.40\ 10^{-10}$	**$4.29\ 10^{-10}$**
	W 8 10^{-1}	$3.02\ 10^{-10}$	$3.05\ 10^{-10}$	$2.00\ 10^{-9}$	$3.13\ 10^{-10}$	$2.46\ 10^{-10}$	$8.70\ 10^{-10}$	$7.00\ 10^{-10}$	**$6.42\ 10^{-10}$**
Tc-96m	D 8 10^{-1}	$2.22\ 10^{-12}$	$2.07\ 10^{-12}$	$1.05\ 10^{-11}$	$2.19\ 10^{-12}$	$1.86\ 10^{-12}$	$1.53\ 10^{-11}$	$6.46\ 10^{-12}$	**$4.84\ 10^{-12}$**
	W 8 10^{-1}	$2.52\ 10^{-12}$	$2.58\ 10^{-12}$	$2.31\ 10^{-11}$	$2.64\ 10^{-12}$	$2.08\ 10^{-12}$	$8.86\ 10^{-12}$	$6.08\ 10^{-12}$	**$6.26\ 10^{-12}$**
Tc-97	D 8 10^{-1}	$9.85\ 10^{-12}$	$7.75\ 10^{-12}$	$4.35\ 10^{-11}$	$9.24\ 10^{-12}$	$8.78\ 10^{-12}$	$1.32\ 10^{-10}$	$6.27\ 10^{-11}$	**$3.30\ 10^{-11}$**
	W 8 10^{-1}	$1.04\ 10^{-11}$	$2.22\ 10^{-11}$	$1.97\ 10^{-9}$	$1.31\ 10^{-11}$	$1.21\ 10^{-11}$	$1.17\ 10^{-10}$	$6.90\ 10^{-11}$	**$2.68\ 10^{-10}$**
Tc-97m	D 8 10^{-1}	$4.04\ 10^{-11}$	$3.92\ 10^{-11}$	$3.15\ 10^{-10}$	$4.05\ 10^{-11}$	$4.01\ 10^{-11}$	$1.08\ 10^{-9}$	$4.75\ 10^{-10}$ **$2.01\ 10^{-9}$**	$2.35\ 10^{-10}$ ST wall
	W 8 10^{-1}	$3.37\ 10^{-11}$	$3.94\ 10^{-11}$	$9.46\ 10^{-9}$	$3.56\ 10^{-11}$	$3.48\ 10^{-11}$	$8.58\ 10^{-10}$	$4.76\ 10^{-10}$	**$1.32\ 10^{-9}$**
Tc-98	D 8 10^{-1}	$3.61\ 10^{-10}$	$3.41\ 10^{-10}$	$1.02\ 10^{-9}$	$3.61\ 10^{-10}$	$3.21\ 10^{-10}$	$2.67\ 10^{-9}$	$1.61\ 10^{-9}$	**$8.81\ 10^{-10}$**
	W 8 10^{-1}	$5.60\ 10^{-10}$	$1.35\ 10^{-9}$	$3.78\ 10^{-8}$	$1.31\ 10^{-9}$	$1.06\ 10^{-9}$	$3.36\ 10^{-9}$	$3.38\ 10^{-9}$	**$6.18\ 10^{-9}$**
Tc-99	D 8 10^{-1}	$4.52\ 10^{-11}$	$4.52\ 10^{-11}$	$3.51\ 10^{-10}$	$4.52\ 10^{-11}$	$4.52\ 10^{-11}$	$1.21\ 10^{-9}$	$5.78\ 10^{-10}$ **$2.47\ 10^{-9}$**	$2.77\ 10^{-10}$ ST wall
	W 8 10^{-1}	$3.99\ 10^{-11}$	$3.99\ 10^{-11}$	$1.67\ 10^{-8}$	$3.99\ 10^{-11}$	$3.99\ 10^{-11}$	$1.07\ 10^{-9}$	$6.26\ 10^{-10}$	**$2.25\ 10^{-9}$**
Tc-99m	D 8 10^{-1}	$2.77\ 10^{-12}$	$2.15\ 10^{-12}$	$2.28\ 10^{-11}$	$3.36\ 10^{-12}$	$2.62\ 10^{-12}$	$5.01\ 10^{-11}$	$1.02\ 10^{-11}$	**$8.80\ 10^{-12}$**
	W 8 10^{-1}	$1.70\ 10^{-12}$	$1.52\ 10^{-12}$	$3.07\ 10^{-11}$	$2.39\ 10^{-12}$	$1.78\ 10^{-12}$	$2.09\ 10^{-11}$	$6.34\ 10^{-12}$	**$7.21\ 10^{-12}$**
Tc-101	D 8 10^{-1}	$2.50\ 10^{-13}$	$3.03\ 10^{-13}$	$2.83\ 10^{-11}$	$3.19\ 10^{-13}$	$2.80\ 10^{-13}$	$7.72\ 10^{-12}$	$3.52\ 10^{-12}$	**$4.84\ 10^{-12}$**
	W 8 10^{-1}	$7.31\ 10^{-14}$	$1.52\ 10^{-13}$	$3.01\ 10^{-11}$	$1.60\ 10^{-13}$	$1.36\ 10^{-13}$	$2.31\ 10^{-12}$	$6.60\ 10^{-13}$	**$3.94\ 10^{-12}$**
Tc-104	D 8 10^{-1}	$1.56\ 10^{-12}$	$1.82\ 10^{-12}$	$1.21\ 10^{-10}$	$1.81\ 10^{-12}$	$1.58\ 10^{-12}$	$4.50\ 10^{-11}$	$1.80\ 10^{-11}$	**$2.22\ 10^{-11}$**
	W 8 10^{-1}	$4.59\ 10^{-13}$	$9.59\ 10^{-13}$	$1.30\ 10^{-10}$	$9.41\ 10^{-13}$	$7.93\ 10^{-13}$	$1.34\ 10^{-11}$	$3.85\ 10^{-12}$	**$1.76\ 10^{-11}$**
Ruthenium									
Ru-94	D 5 10^{-2}	$9.81\ 10^{-12}$	$6.66\ 10^{-12}$	$1.51\ 10^{-10}$	$7.18\ 10^{-12}$	$5.66\ 10^{-12}$	$5.49\ 10^{-12}$	$4.34\ 10^{-11}$	**$3.58\ 10^{-11}$**
	W 5 10^{-2}	$3.24\ 10^{-12}$	$3.58\ 10^{-12}$	$1.79\ 10^{-10}$	$3.64\ 10^{-12}$	$2.84\ 10^{-12}$	$3.04\ 10^{-12}$	$1.75\ 10^{-11}$	**$2.87\ 10^{-11}$**
	Y 5 10^{-2}	$2.76\ 10^{-12}$	$2.93\ 10^{-12}$	$1.94\ 10^{-10}$	$2.95\ 10^{-12}$	$2.06\ 10^{-12}$	$2.24\ 10^{-12}$	$2.04\ 10^{-11}$	**$3.10\ 10^{-11}$**
Ru-97	D 5 10^{-2}	$7.21\ 10^{-11}$	$3.45\ 10^{-11}$	$1.09\ 10^{-10}$	$4.70\ 10^{-11}$	$3.77\ 10^{-11}$	$2.86\ 10^{-11}$	$9.65\ 10^{-11}$	**$7.29\ 10^{-11}$**
	W 5 10^{-2}	$9.01\ 10^{-11}$	$2.56\ 10^{-11}$	$3.28\ 10^{-10}$	$3.65\ 10^{-11}$	$2.17\ 10^{-11}$	$1.27\ 10^{-11}$	$1.47\ 10^{-10}$	**$1.15\ 10^{-10}$**
	Y 5 10^{-2}	$9.78\ 10^{-11}$	$2.33\ 10^{-11}$	$3.40\ 10^{-10}$	$3.44\ 10^{-11}$	$1.82\ 10^{-11}$	$9.15\ 10^{-12}$	$1.62\ 10^{-10}$	**$1.22\ 10^{-10}$**
Ru-103	D 5 10^{-2}	$7.31\ 10^{-10}$	$6.07\ 10^{-10}$	$1.02\ 10^{-9}$	$6.66\ 10^{-10}$	$6.18\ 10^{-10}$	$5.97\ 10^{-10}$	$1.04\ 10^{-9}$	**$8.24\ 10^{-10}$**
	W 5 10^{-2}	$3.94\ 10^{-10}$	$3.18\ 10^{-10}$	$9.86\ 10^{-9}$	$3.39\ 10^{-10}$	$2.71\ 10^{-10}$	$2.75\ 10^{-10}$	$1.20\ 10^{-9}$	**$1.75\ 10^{-9}$**
	Y 5 10^{-2}	$3.07\ 10^{-10}$	$3.11\ 10^{-10}$	$1.56\ 10^{-8}$	$3.19\ 10^{-10}$	$2.37\ 10^{-10}$	$2.57\ 10^{-10}$	$1.25\ 10^{-9}$	**$2.42\ 10^{-9}$**
Ru-105	D 5 10^{-2}	$2.70\ 10^{-11}$	$1.72\ 10^{-11}$	$3.66\ 10^{-10}$	$1.88\ 10^{-11}$	$1.57\ 10^{-11}$	$1.50\ 10^{-11}$	$1.40\ 10^{-10}$	**$9.84\ 10^{-11}$**
	W 5 10^{-2}	$1.57\ 10^{-11}$	$8.48\ 10^{-12}$	$5.42\ 10^{-10}$	$9.50\ 10^{-12}$	$6.79\ 10^{-12}$	$6.46\ 10^{-12}$	$1.36\ 10^{-10}$	**$1.13\ 10^{-10}$**
	Y 5 10^{-2}	$1.59\ 10^{-11}$	$6.61\ 10^{-12}$	$5.73\ 10^{-10}$	$7.70\ 10^{-12}$	$4.62\ 10^{-12}$	$4.15\ 10^{-12}$	$1.61\ 10^{-10}$	**$1.23\ 10^{-10}$**
Ru-106	D 5 10^{-2}	$1.38\ 10^{-8}$	$1.37\ 10^{-8}$	$1.80\ 10^{-8}$	$1.37\ 10^{-8}$	$1.37\ 10^{-8}$	$1.37\ 10^{-8}$	$1.69\ 10^{-8}$	**$1.52\ 10^{-8}$**
	W 5 10^{-2}	$4.03\ 10^{-9}$	$4.03\ 10^{-9}$	$2.11\ 10^{-7}$	$4.06\ 10^{-9}$	$4.00\ 10^{-9}$	$4.01\ 10^{-9}$	$1.39\ 10^{-8}$	**$3.18\ 10^{-8}$**
	Y 5 10^{-2}	$1.30\ 10^{-9}$	$1.78\ 10^{-9}$	$1.04\ 10^{-6}$	$1.76\ 10^{-9}$	$1.61\ 10^{-9}$	$1.72\ 10^{-9}$	$1.20\ 10^{-8}$	**$1.29\ 10^{-7}$**

Table 2.1, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Rhodium									
Rh-99	D $5\ 10^{-2}$	$4.49\ 10^{-10}$	$3.16\ 10^{-10}$	$5.45\ 10^{-10}$	$3.98\ 10^{-10}$	$3.49\ 10^{-10}$	$2.99\ 10^{-10}$	$5.79\ 10^{-10}$	**$4.66\ 10^{-10}$**
	W $5\ 10^{-2}$	$3.61\ 10^{-10}$	$2.07\ 10^{-10}$	$3.20\ 10^{-9}$	$2.54\ 10^{-10}$	$1.83\ 10^{-10}$	$1.54\ 10^{-10}$	$6.90\ 10^{-10}$	**$7.53\ 10^{-10}$**
	Y $5\ 10^{-2}$	$3.39\ 10^{-10}$	$1.93\ 10^{-10}$	$3.93\ 10^{-9}$	$2.32\ 10^{-10}$	$1.56\ 10^{-10}$	$1.32\ 10^{-10}$	$7.12\ 10^{-10}$	**$8.36\ 10^{-10}$**
Rh-99m	D $5\ 10^{-2}$	$1.67\ 10^{-11}$	$8.15\ 10^{-12}$	$5.87\ 10^{-11}$	$9.68\ 10^{-12}$	$6.94\ 10^{-12}$	$5.99\ 10^{-12}$	$3.13\ 10^{-11}$	**$2.34\ 10^{-11}$**
	W $5\ 10^{-2}$	$1.11\ 10^{-11}$	$5.67\ 10^{-12}$	$7.44\ 10^{-11}$	$6.50\ 10^{-12}$	$4.25\ 10^{-12}$	$3.71\ 10^{-12}$	$2.35\ 10^{-11}$	**$2.06\ 10^{-11}$**
	Y $5\ 10^{-2}$	$1.24\ 10^{-11}$	$5.37\ 10^{-12}$	$7.87\ 10^{-11}$	$6.24\ 10^{-12}$	$3.67\ 10^{-12}$	$3.03\ 10^{-12}$	$2.73\ 10^{-11}$	**$2.25\ 10^{-11}$**
Rh-100	D $5\ 10^{-2}$	$2.68\ 10^{-10}$	$1.18\ 10^{-10}$	$4.29\ 10^{-10}$	$1.36\ 10^{-10}$	$1.03\ 10^{-10}$	$9.34\ 10^{-11}$	$3.66\ 10^{-10}$	**$2.68\ 10^{-10}$**
	W $5\ 10^{-2}$	$3.09\ 10^{-10}$	$9.66\ 10^{-11}$	$7.57\ 10^{-10}$	$1.16\ 10^{-10}$	$6.80\ 10^{-11}$	$5.29\ 10^{-11}$	$4.80\ 10^{-10}$	**$3.44\ 10^{-10}$**
	Y $5\ 10^{-2}$	$3.47\ 10^{-10}$	$9.29\ 10^{-11}$	$7.76\ 10^{-10}$	$1.15\ 10^{-10}$	$6.04\ 10^{-11}$	$4.18\ 10^{-11}$	$5.49\ 10^{-10}$	**$3.75\ 10^{-10}$**
Rh-101	D $5\ 10^{-2}$	$2.82\ 10^{-9}$	$2.21\ 10^{-9}$	$2.47\ 10^{-9}$	$3.09\ 10^{-9}$	$2.76\ 10^{-9}$	$2.02\ 10^{-9}$	$3.02\ 10^{-9}$	**$2.75\ 10^{-9}$**
	W $5\ 10^{-2}$	$1.02\ 10^{-9}$	$8.76\ 10^{-10}$	$8.98\ 10^{-9}$	$1.20\ 10^{-9}$	$1.02\ 10^{-9}$	$7.26\ 10^{-10}$	$1.47\ 10^{-9}$	**$2.10\ 10^{-9}$**
	Y $5\ 10^{-2}$	$6.41\ 10^{-10}$	$2.07\ 10^{-9}$	$7.20\ 10^{-8}$	$2.51\ 10^{-9}$	$2.00\ 10^{-9}$	$1.35\ 10^{-9}$	$3.91\ 10^{-9}$	**$1.07\ 10^{-8}$**
Rh-101m	D $5\ 10^{-2}$	$1.14\ 10^{-10}$	$6.21\ 10^{-11}$	$1.66\ 10^{-10}$	$8.08\ 10^{-11}$	$6.70\ 10^{-11}$	$5.44\ 10^{-11}$	$1.55\ 10^{-10}$	**$1.18\ 10^{-10}$**
	W $5\ 10^{-2}$	$1.33\ 10^{-10}$	$4.37\ 10^{-11}$	$5.97\ 10^{-10}$	$5.84\ 10^{-11}$	$3.66\ 10^{-11}$	$2.50\ 10^{-11}$	$2.31\ 10^{-10}$	**$1.90\ 10^{-10}$**
	Y $5\ 10^{-2}$	$1.41\ 10^{-10}$	$3.95\ 10^{-11}$	$6.47\ 10^{-10}$	$5.41\ 10^{-11}$	$3.04\ 10^{-11}$	$1.87\ 10^{-11}$	$2.52\ 10^{-10}$	**$2.02\ 10^{-10}$**
Rh-102	D $5\ 10^{-2}$	$1.47\ 10^{-8}$	$1.20\ 10^{-8}$	$1.26\ 10^{-8}$	$1.35\ 10^{-8}$	$1.23\ 10^{-8}$	$1.24\ 10^{-8}$	$1.67\ 10^{-8}$	**$1.43\ 10^{-8}$**
	W $5\ 10^{-2}$	$5.07\ 10^{-9}$	$5.15\ 10^{-9}$	$2.24\ 10^{-8}$	$5.59\ 10^{-9}$	$4.79\ 10^{-9}$	$5.06\ 10^{-9}$	$7.52\ 10^{-9}$	**$7.95\ 10^{-9}$**
	Y $5\ 10^{-2}$	$4.09\ 10^{-9}$	$1.40\ 10^{-8}$	$1.58\ 10^{-7}$	$1.34\ 10^{-8}$	$1.07\ 10^{-8}$	$1.32\ 10^{-8}$	$2.66\ 10^{-8}$	**$3.24\ 10^{-8}$**
Rh-102m	D $5\ 10^{-2}$	$2.55\ 10^{-9}$	$2.27\ 10^{-9}$	$2.91\ 10^{-9}$	$2.46\ 10^{-9}$	$2.32\ 10^{-9}$	$2.27\ 10^{-9}$	$3.12\ 10^{-9}$	**$2.70\ 10^{-9}$**
	W $5\ 10^{-2}$	$9.67\ 10^{-10}$	$9.51\ 10^{-10}$	$2.64\ 10^{-8}$	$1.00\ 10^{-9}$	$8.77\ 10^{-10}$	$8.87\ 10^{-10}$	$2.39\ 10^{-9}$	**$4.44\ 10^{-9}$**
	Y $5\ 10^{-2}$	$5.82\ 10^{-10}$	$1.37\ 10^{-9}$	$9.53\ 10^{-8}$	$1.33\ 10^{-9}$	$1.06\ 10^{-9}$	$1.20\ 10^{-9}$	$3.10\ 10^{-9}$	**$1.29\ 10^{-8}$**
Rh-103m	D $5\ 10^{-2}$	$8.91\ 10^{-14}$	$8.80\ 10^{-14}$	$7.75\ 10^{-12}$	$8.84\ 10^{-14}$	$8.73\ 10^{-14}$	$8.49\ 10^{-14}$	$1.34\ 10^{-12}$	**$1.38\ 10^{-12}$**
	W $5\ 10^{-2}$	$2.54\ 10^{-14}$	$2.78\ 10^{-14}$	$8.81\ 10^{-12}$	$2.66\ 10^{-14}$	$2.62\ 10^{-14}$	$2.43\ 10^{-14}$	$3.49\ 10^{-13}$	**$1.18\ 10^{-12}$**
	Y $5\ 10^{-2}$	$2.91\ 10^{-15}$	$5.51\ 10^{-15}$	$9.53\ 10^{-12}$	$3.62\ 10^{-15}$	$3.21\ 10^{-15}$	$1.48\ 10^{-15}$	$4.19\ 10^{-13}$	**$1.27\ 10^{-12}$**
Rh-105	D $5\ 10^{-2}$	$3.49\ 10^{-11}$	$2.70\ 10^{-11}$	$3.67\ 10^{-10}$	$2.90\ 10^{-11}$	$2.71\ 10^{-11}$	$2.57\ 10^{-11}$	$2.20\ 10^{-10}$	**$1.28\ 10^{-10}$**
	W $5\ 10^{-2}$	$2.23\ 10^{-11}$	$9.19\ 10^{-12}$	$9.26\ 10^{-10}$	$1.12\ 10^{-11}$	$8.25\ 10^{-12}$	$6.77\ 10^{-12}$	$3.89\ 10^{-10}$	**$2.37\ 10^{-10}$**
	Y $5\ 10^{-2}$	$2.11\ 10^{-11}$	$5.61\ 10^{-12}$	$9.58\ 10^{-10}$	$7.77\ 10^{-12}$	$4.46\ 10^{-12}$	$2.88\ 10^{-12}$	$4.53\ 10^{-10}$	**$2.58\ 10^{-10}$**
Rh-106m	D $5\ 10^{-2}$	$2.69\ 10^{-11}$	$1.65\ 10^{-11}$	$1.97\ 10^{-10}$	$1.80\ 10^{-11}$	$1.34\ 10^{-11}$	$1.28\ 10^{-11}$	$7.31\ 10^{-11}$	**$5.77\ 10^{-11}$**
	W $5\ 10^{-2}$	$1.16\ 10^{-11}$	$1.02\ 10^{-11}$	$2.32\ 10^{-10}$	$1.06\ 10^{-11}$	$7.71\ 10^{-12}$	$8.07\ 10^{-12}$	$3.69\ 10^{-11}$	**$4.51\ 10^{-11}$**
	Y $5\ 10^{-2}$	$1.18\ 10^{-11}$	$9.29\ 10^{-12}$	$2.49\ 10^{-10}$	$9.61\ 10^{-12}$	$6.39\ 10^{-12}$	$6.65\ 10^{-12}$	$4.22\ 10^{-11}$	**$4.84\ 10^{-11}$**
Rh-107	D $5\ 10^{-2}$	$4.75\ 10^{-13}$	$4.97\ 10^{-13}$	$3.89\ 10^{-11}$	$5.29\ 10^{-13}$	$4.63\ 10^{-13}$	$4.25\ 10^{-13}$	$5.25\ 10^{-12}$	**$6.53\ 10^{-12}$**
	W $5\ 10^{-2}$	$1.33\ 10^{-13}$	$2.36\ 10^{-13}$	$4.21\ 10^{-11}$	$2.49\ 10^{-13}$	$2.13\ 10^{-13}$	$1.98\ 10^{-13}$	$9.52\ 10^{-13}$	**$5.45\ 10^{-12}$**
	Y $5\ 10^{-2}$	$4.05\ 10^{-14}$	$1.53\ 10^{-13}$	$4.49\ 10^{-11}$	$1.62\ 10^{-13}$	$1.25\ 10^{-13}$	$1.12\ 10^{-13}$	$1.05\ 10^{-12}$	**$5.76\ 10^{-12}$**
Palladium									
Pd-100	D $5\ 10^{-3}$	$3.82\ 10^{-10}$	$2.48\ 10^{-10}$	$6.92\ 10^{-10}$	$3.76\ 10^{-10}$	$4.13\ 10^{-10}$	$7.39\ 10^{-11}$	$2.21\ 10^{-9}$	**$9.40\ 10^{-10}$**
	W $5\ 10^{-3}$	$7.18\ 10^{-10}$	$2.48\ 10^{-10}$	$2.97\ 10^{-9}$	$3.24\ 10^{-10}$	$2.16\ 10^{-10}$	$1.20\ 10^{-10}$	$1.43\ 10^{-9}$	**$1.05\ 10^{-9}$**
	Y $5\ 10^{-3}$	$7.86\ 10^{-10}$	$2.36\ 10^{-10}$	$3.12\ 10^{-9}$	$3.05\ 10^{-10}$	$1.71\ 10^{-10}$	$1.19\ 10^{-10}$	$1.36\ 10^{-9}$	**$1.06\ 10^{-9}$**
Pd-101	D $5\ 10^{-3}$	$2.03\ 10^{-11}$	$9.53\ 10^{-12}$	$8.71\ 10^{-11}$	$1.39\ 10^{-11}$	$1.68\ 10^{-11}$	$4.81\ 10^{-12}$	$8.08\ 10^{-11}$	**$4.35\ 10^{-11}$**
	W $5\ 10^{-3}$	$2.45\ 10^{-11}$	$8.20\ 10^{-12}$	$1.58\ 10^{-10}$	$1.06\ 10^{-11}$	$7.55\ 10^{-12}$	$3.92\ 10^{-12}$	$6.13\ 10^{-11}$	**$4.63\ 10^{-11}$**
	Y $5\ 10^{-3}$	$2.80\ 10^{-11}$	$7.99\ 10^{-12}$	$1.68\ 10^{-10}$	$1.03\ 10^{-11}$	$5.58\ 10^{-12}$	$3.52\ 10^{-12}$	$6.80\ 10^{-11}$	**$5.03\ 10^{-11}$**
Pd-103	D $5\ 10^{-3}$	$1.04\ 10^{-11}$	$7.92\ 10^{-12}$	$1.52\ 10^{-10}$	$2.46\ 10^{-11}$	$4.38\ 10^{-11}$	$4.09\ 10^{-12}$	$6.93\ 10^{-10}$	**$2.34\ 10^{-10}$**
	W $5\ 10^{-3}$	$1.81\ 10^{-11}$	$8.14\ 10^{-12}$	$2.11\ 10^{-9}$	$9.76\ 10^{-12}$	$1.09\ 10^{-11}$	$7.78\ 10^{-13}$	$3.86\ 10^{-10}$	**$3.76\ 10^{-10}$**
	Y $5\ 10^{-3}$	$1.92\ 10^{-11}$	$8.69\ 10^{-12}$	$2.67\ 10^{-9}$	$7.04\ 10^{-12}$	$4.67\ 10^{-12}$	$1.42\ 10^{-13}$	$3.21\ 10^{-10}$	**$4.24\ 10^{-10}$**

Table 2.1, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Pd-107	D 5 10^{-3}	9.45 10^{-13}	9.45 10^{-13}	2.89 10^{-11}	5.11 10^{-12}	1.36 10^{-11}	9.45 10^{-13}	2.15 10^{-10} **6.40 10^{-10}**	6.94 10^{-11} Kidneys
	W 5 10^{-3}	2.43 10^{-13}	2.43 10^{-13}	1.53 10^{-9}	1.31 10^{-12}	3.50 10^{-12}	2.43 10^{-13}	1.17 10^{-10}	**2.19 10^{-10}**
	Y 5 10^{-3}	1.05 10^{-13}	1.05 10^{-13}	2.85 10^{-8}	5.68 10^{-13}	1.51 10^{-12}	1.05 10^{-13}	9.71 10^{-11}	**3.45 10^{-9}**
Pd-109	D 5 10^{-3}	9.26 10^{-12}	8.36 10^{-12}	6.62 10^{-10}	2.16 10^{-11}	4.64 10^{-11}	8.09 10^{-12}	4.51 10^{-10}	**2.23 10^{-10}**
	W 5 10^{-3}	3.33 10^{-12}	2.03 10^{-12}	1.15 10^{-9}	4.94 10^{-12}	9.75 10^{-12}	1.69 10^{-12}	4.41 10^{-10}	**2.72 10^{-10}**
	Y 5 10^{-3}	2.13 10^{-12}	5.11 10^{-13}	1.20 10^{-9}	9.82 10^{-13}	9.58 10^{-13}	1.55 10^{-13}	5.04 10^{-10}	**2.96 10^{-10}**
Silver									
Ag-102	D 5 10^{-2}	1.07 10^{-12}	1.47 10^{-12}	5.12 10^{-11}	1.45 10^{-12}	1.17 10^{-12}	1.20 10^{-12}	7.44 10^{-12}	**9.11 10^{-12}**
	W 5 10^{-2}	3.23 10^{-13}	9.74 10^{-13}	5.40 10^{-11}	9.33 10^{-13}	7.57 10^{-13}	8.54 10^{-13}	2.25 10^{-12}	**7.54 10^{-12}**
	Y 5 10^{-2}	1.71 10^{-13}	8.74 10^{-13}	5.68 10^{-11}	8.19 10^{-13}	6.41 10^{-13}	7.43 10^{-13}	2.30 10^{-12}	**7.82 10^{-12}**
Ag-103	D 5 10^{-2}	3.33 10^{-12}	2.57 10^{-12}	7.04 10^{-11}	2.83 10^{-12}	2.21 10^{-12}	1.98 10^{-12}	1.87 10^{-11}	**1.58 10^{-11}**
	W 5 10^{-2}	1.07 10^{-12}	1.44 10^{-12}	8.52 10^{-11}	1.49 10^{-12}	1.17 10^{-12}	1.15 10^{-12}	6.48 10^{-12}	**1.29 10^{-11}**
	Y 5 10^{-2}	8.63 10^{-13}	1.20 10^{-12}	9.31 10^{-11}	1.24 10^{-12}	8.90 10^{-13}	8.88 10^{-13}	6.94 10^{-12}	**1.39 10^{-11}**
Ag-104	D 5 10^{-2}	9.75 10^{-12}	7.06 10^{-12}	5.68 10^{-11}	7.47 10^{-12}	5.44 10^{-12}	5.25 10^{-12}	2.55 10^{-11}	**1.92 10^{-11}**
	W 5 10^{-2}	3.19 10^{-12}	4.49 10^{-12}	6.24 10^{-11}	4.45 10^{-12}	3.37 10^{-12}	3.77 10^{-12}	1.06 10^{-11}	**1.29 10^{-11}**
	Y 5 10^{-2}	3.02 10^{-12}	4.19 10^{-12}	6.70 10^{-11}	4.09 10^{-12}	2.94 10^{-12}	3.36 10^{-12}	1.15 10^{-11}	**1.36 10^{-11}**
Ag-104m	D 5 10^{-2}	3.93 10^{-12}	3.06 10^{-12}	7.98 10^{-11}	3.21 10^{-12}	2.48 10^{-12}	2.38 10^{-12}	1.79 10^{-11}	**1.69 10^{-11}**
	W 5 10^{-2}	1.25 10^{-12}	1.78 10^{-12}	8.80 10^{-11}	1.77 10^{-12}	1.39 10^{-12}	1.50 10^{-12}	5.37 10^{-12}	**1.31 10^{-11}**
	Y 5 10^{-2}	1.02 10^{-12}	1.54 10^{-12}	9.46 10^{-11}	1.50 10^{-12}	1.09 10^{-12}	1.21 10^{-12}	5.93 10^{-12}	**1.39 10^{-11}**
Ag-105	D 5 10^{-2}	3.53 10^{-10}	4.57 10^{-10}	9.87 10^{-10}	5.09 10^{-10}	3.81 10^{-10}	1.87 10^{-10}	3.03 10^{-9}	**1.26 10^{-9}**
	W 5 10^{-2}	3.55 10^{-10}	3.13 10^{-10}	3.99 10^{-9}	3.49 10^{-10}	2.47 10^{-10}	1.83 10^{-10}	1.18 10^{-9}	**1.02 10^{-9}**
	Y 5 10^{-2}	3.40 10^{-10}	3.53 10^{-10}	6.23 10^{-9}	3.82 10^{-10}	2.74 10^{-10}	2.39 10^{-10}	8.92 10^{-10}	**1.21 10^{-9}**
Ag-106	D 5 10^{-2}	8.50 10^{-13}	9.25 10^{-13}	5.06 10^{-11}	9.37 10^{-13}	7.93 10^{-13}	7.83 10^{-13}	7.79 10^{-12}	**8.92 10^{-12}**
	W 5 10^{-2}	2.37 10^{-13}	4.99 10^{-13}	5.48 10^{-11}	4.86 10^{-13}	4.07 10^{-13}	4.45 10^{-13}	1.67 10^{-12}	**7.30 10^{-12}**
	Y 5 10^{-2}	1.03 10^{-13}	3.84 10^{-13}	5.86 10^{-11}	3.63 10^{-13}	2.82 10^{-13}	3.25 10^{-13}	1.78 10^{-12}	**7.71 10^{-12}**
Ag-106m	D 5 10^{-2}	8.85 10^{-10}	7.91 10^{-10}	1.73 10^{-9}	8.10 10^{-10}	5.87 10^{-10}	3.30 10^{-10}	4.20 10^{-9}	**1.93 10^{-9}**
	W 5 10^{-2}	1.15 10^{-9}	5.68 10^{-10}	3.94 10^{-9}	6.26 10^{-10}	3.99 10^{-10}	3.35 10^{-10}	2.01 10^{-9}	**1.55 10^{-9}**
	Y 5 10^{-2}	1.21 10^{-9}	5.18 10^{-10}	4.23 10^{-9}	5.85 10^{-10}	3.58 10^{-10}	3.27 10^{-10}	1.71 10^{-9}	**1.49 10^{-9}**
Ag-108m	D 5 10^{-2}	1.87 10^{-9}	3.05 10^{-9}	5.99 10^{-9}	3.09 10^{-9}	2.33 10^{-9}	1.24 10^{-9}	2.01 10^{-8}	**8.14 10^{-9}**
	W 5 10^{-2}	1.52 10^{-9}	2.23 10^{-9}	2.73 10^{-8}	2.25 10^{-9}	1.67 10^{-9}	1.49 10^{-9}	8.29 10^{-9}	**6.84 10^{-9}**
	Y 5 10^{-2}	3.79 10^{-9}	2.24 10^{-8}	4.56 10^{-7}	2.14 10^{-8}	1.68 10^{-8}	2.01 10^{-8}	4.63 10^{-8}	**7.66 10^{-8}**
Ag-110m	D 5 10^{-2}	3.26 10^{-9}	4.14 10^{-9}	8.11 10^{-9}	4.03 10^{-9}	3.05 10^{-9}	1.70 10^{-9}	2.55 10^{-8}	**1.07 10^{-8}**
	W 5 10^{-2}	2.33 10^{-9}	2.93 10^{-9}	3.15 10^{-8}	2.88 10^{-9}	2.13 10^{-9}	2.01 10^{-9}	1.02 10^{-8}	**8.34 10^{-9}**
	Y 5 10^{-2}	2.43 10^{-9}	7.10 10^{-9}	1.20 10^{-7}	6.74 10^{-9}	5.19 10^{-9}	6.39 10^{-9}	1.51 10^{-8}	**2.17 10^{-8}**
Ag-111	D 5 10^{-2}	7.60 10^{-11}	7.48 10^{-11}	1.08 10^{-9}	7.62 10^{-11}	7.37 10^{-11}	7.06 10^{-11}	2.46 10^{-9} **8.69 10^{-9}**	9.12 10^{-10} Liver
	W 5 10^{-2}	2.59 10^{-11}	1.89 10^{-11}	7.81 10^{-9}	2.03 10^{-11}	1.78 10^{-11}	1.63 10^{-11}	2.07 10^{-9}	**1.57 10^{-9}**
	Y 5 10^{-2}	1.69 10^{-11}	8.47 10^{-12}	8.70 10^{-9}	9.92 10^{-12}	7.41 10^{-12}	6.19 10^{-12}	2.03 10^{-9}	**1.66 10^{-9}**
Ag-112	D 5 10^{-2}	1.79 10^{-11}	1.41 10^{-11}	7.98 10^{-10}	1.46 10^{-11}	1.30 10^{-11}	1.25 10^{-11}	2.42 10^{-10}	**1.78 10^{-10}**
	W 5 10^{-2}	7.06 10^{-12}	5.65 10^{-12}	1.00 10^{-9}	5.82 10^{-12}	4.75 10^{-12}	4.65 10^{-12}	1.35 10^{-10}	**1.64 10^{-10}**
	Y 5 10^{-2}	5.27 10^{-12}	3.24 10^{-12}	1.08 10^{-9}	3.44 10^{-12}	2.26 10^{-12}	2.14 10^{-12}	1.56 10^{-10}	**1.79 10^{-10}**
Ag-115	D 5 10^{-2}	1.50 10^{-12}	1.40 10^{-12}	9.08 10^{-11}	1.46 10^{-12}	1.27 10^{-12}	1.15 10^{-12}	2.01 10^{-11}	**1.78 10^{-11}**
	W 5 10^{-2}	9.65 10^{-13}	6.87 10^{-13}	1.15 10^{-10}	7.47 10^{-13}	5.73 10^{-13}	5.20 10^{-13}	1.23 10^{-11}	**1.80 10^{-11}**
	Y 5 10^{-2}	8.36 10^{-13}	4.79 10^{-13}	1.22 10^{-10}	5.42 10^{-13}	3.58 10^{-13}	3.10 10^{-13}	1.32 10^{-11}	**1.90 10^{-11}**
Cadmium									
Cd-104	D 5 10^{-2}	1.22 10^{-11}	7.09 10^{-12}	5.43 10^{-11}	8.07 10^{-12}	5.63 10^{-12}	5.05 10^{-12}	2.83 10^{-11}	**2.04 10^{-11}**
	W 5 10^{-2}	4.73 10^{-12}	4.47 10^{-12}	6.26 10^{-11}	4.67 10^{-12}	3.36 10^{-12}	3.44 10^{-12}	1.30 10^{-11}	**1.40 10^{-11}**
	Y 5 10^{-2}	4.89 10^{-12}	4.15 10^{-12}	6.73 10^{-11}	4.28 10^{-12}	2.88 10^{-12}	2.98 10^{-12}	1.46 10^{-11}	**1.50 10^{-11}**

Table 2.1, Cont'd.

Nuclide	Class/f_1	Committed Dose Equivalent per Unit Intake (Sv/Bq)							
		Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Cd-107	D $5\ 10^{-2}$	$3.36\ 10^{-12}$	$2.25\ 10^{-12}$	$9.54\ 10^{-11}$	$2.68\ 10^{-12}$	$2.30\ 10^{-12}$	$1.85\ 10^{-12}$	$4.95\ 10^{-11}$	**$2.79\ 10^{-11}$**
	W $5\ 10^{-2}$	$1.94\ 10^{-12}$	$9.52\ 10^{-13}$	$1.35\ 10^{-10}$	$1.13\ 10^{-12}$	$8.27\ 10^{-13}$	$4.99\ 10^{-13}$	$3.52\ 10^{-11}$	**$2.76\ 10^{-11}$**
	Y $5\ 10^{-2}$	$1.89\ 10^{-12}$	$6.12\ 10^{-13}$	$1.43\ 10^{-10}$	$7.64\ 10^{-13}$	$4.32\ 10^{-13}$	$1.21\ 10^{-13}$	$3.84\ 10^{-11}$	**$2.94\ 10^{-11}$**
Cd-109	D $5\ 10^{-2}$	$2.71\ 10^{-9}$	$2.97\ 10^{-9}$	$3.34\ 10^{-9}$	$3.45\ 10^{-9}$	$3.14\ 10^{-9}$	$2.66\ 10^{-9}$	$9.59\ 10^{-8}$ **$3.95\ 10^{-7}$**	$3.09\ 10^{-8}$ Kidneys
	W $5\ 10^{-2}$	$8.11\ 10^{-10}$	$8.90\ 10^{-10}$	$1.46\ 10^{-8}$	$1.02\ 10^{-9}$	$9.26\ 10^{-10}$	$7.66\ 10^{-10}$	$2.81\ 10^{-8}$ **$1.14\ 10^{-7}$**	$1.07\ 10^{-8}$ Kidneys
	Y $5\ 10^{-2}$	$2.66\ 10^{-10}$	$4.54\ 10^{-10}$	$7.81\ 10^{-8}$	$4.45\ 10^{-10}$	$3.94\ 10^{-10}$	$2.40\ 10^{-10}$	$8.80\ 10^{-9}$	**$1.22\ 10^{-8}$**
Cd-113	D $5\ 10^{-2}$	$3.63\ 10^{-8}$	$3.63\ 10^{-8}$	$3.66\ 10^{-8}$	$3.63\ 10^{-8}$	$3.63\ 10^{-8}$	$3.63\ 10^{-8}$	$1.42\ 10^{-6}$ **$5.96\ 10^{-6}$**	$4.51\ 10^{-7}$ Kidneys
	W $5\ 10^{-2}$	$1.09\ 10^{-8}$	$1.09\ 10^{-8}$	$2.63\ 10^{-8}$	$1.09\ 10^{-8}$	$1.09\ 10^{-8}$	$1.09\ 10^{-8}$	$4.27\ 10^{-7}$ **$1.79\ 10^{-6}$**	$1.38\ 10^{-7}$ Kidneys
	Y $5\ 10^{-2}$	$5.73\ 10^{-9}$	$5.73\ 10^{-9}$	$2.93\ 10^{-7}$	$5.73\ 10^{-9}$	$5.73\ 10^{-9}$	$5.73\ 10^{-9}$	$2.25\ 10^{-7}$	**$1.06\ 10^{-7}$**
Cd-113m	D $5\ 10^{-2}$	$3.32\ 10^{-8}$	$3.32\ 10^{-8}$	$3.38\ 10^{-8}$	$3.32\ 10^{-8}$	$3.32\ 10^{-8}$	$3.32\ 10^{-8}$	$1.30\ 10^{-6}$ **$5.46\ 10^{-6}$**	$4.13\ 10^{-7}$ Kidneys
	W $5\ 10^{-2}$	$9.95\ 10^{-9}$	$9.95\ 10^{-9}$	$4.02\ 10^{-8}$	$9.95\ 10^{-9}$	$9.95\ 10^{-9}$	$9.95\ 10^{-9}$	$3.89\ 10^{-7}$ **$1.63\ 10^{-6}$**	$1.27\ 10^{-7}$ Kidneys
	Y $5\ 10^{-2}$	$4.72\ 10^{-9}$	$4.72\ 10^{-9}$	$4.09\ 10^{-7}$	$4.72\ 10^{-9}$	$4.72\ 10^{-9}$	$4.72\ 10^{-9}$	$1.86\ 10^{-7}$	**$1.08\ 10^{-7}$**
Cd-115	D $5\ 10^{-2}$	$1.41\ 10^{-10}$	$1.06\ 10^{-10}$	$1.19\ 10^{-9}$	$1.23\ 10^{-10}$	$1.00\ 10^{-10}$	$8.40\ 10^{-11}$	$2.83\ 10^{-9}$	**$1.06\ 10^{-9}$**
	W $5\ 10^{-2}$	$1.28\ 10^{-10}$	$4.65\ 10^{-11}$	$4.05\ 10^{-9}$	$5.87\ 10^{-11}$	$3.77\ 10^{-11}$	$2.85\ 10^{-11}$	$2.01\ 10^{-9}$	**$1.14\ 10^{-9}$**
	Y $5\ 10^{-2}$	$1.32\ 10^{-10}$	$3.47\ 10^{-11}$	$4.21\ 10^{-9}$	$4.65\ 10^{-11}$	$2.54\ 10^{-11}$	$1.71\ 10^{-11}$	$1.97\ 10^{-9}$	**$1.14\ 10^{-9}$**
Cd-115m	D $5\ 10^{-2}$	$1.57\ 10^{-9}$	$1.57\ 10^{-9}$	$3.39\ 10^{-9}$	$1.58\ 10^{-9}$	$1.57\ 10^{-9}$	$1.55\ 10^{-9}$	$6.06\ 10^{-8}$ **$2.49\ 10^{-7}$**	$1.95\ 10^{-8}$ Kidneys
	W $5\ 10^{-2}$	$3.80\ 10^{-10}$	$3.78\ 10^{-10}$	$4.66\ 10^{-8}$	$3.81\ 10^{-10}$	$3.74\ 10^{-10}$	$3.73\ 10^{-10}$	$1.76\ 10^{-8}$	**$1.11\ 10^{-8}$**
	Y $5\ 10^{-2}$	$1.06\ 10^{-10}$	$1.08\ 10^{-10}$	$7.78\ 10^{-8}$	$1.08\ 10^{-10}$	$1.03\ 10^{-10}$	$1.05\ 10^{-10}$	$7.41\ 10^{-9}$	**$1.16\ 10^{-8}$**
Cd-117	D $5\ 10^{-2}$	$2.31\ 10^{-11}$	$1.49\ 10^{-11}$	$4.57\ 10^{-10}$	$1.68\ 10^{-11}$	$1.32\ 10^{-11}$	$1.16\ 10^{-11}$	$1.88\ 10^{-10}$	**$1.22\ 10^{-10}$**
	W $5\ 10^{-2}$	$1.08\ 10^{-11}$	$7.63\ 10^{-12}$	$5.85\ 10^{-10}$	$8.48\ 10^{-12}$	$6.12\ 10^{-12}$	$5.48\ 10^{-12}$	$1.05\ 10^{-10}$	**$1.07\ 10^{-10}$**
	Y $5\ 10^{-2}$	$1.04\ 10^{-11}$	$5.96\ 10^{-12}$	$6.27\ 10^{-10}$	$6.78\ 10^{-12}$	$4.24\ 10^{-12}$	$3.61\ 10^{-12}$	$1.14\ 10^{-10}$	**$1.14\ 10^{-10}$**
Cd-117m	D $5\ 10^{-2}$	$4.50\ 10^{-11}$	$2.50\ 10^{-11}$	$3.70\ 10^{-10}$	$2.88\ 10^{-11}$	$2.06\ 10^{-11}$	$1.77\ 10^{-11}$	$1.80\ 10^{-10}$	**$1.18\ 10^{-10}$**
	W $5\ 10^{-2}$	$2.45\ 10^{-11}$	$1.54\ 10^{-11}$	$4.69\ 10^{-10}$	$1.71\ 10^{-11}$	$1.17\ 10^{-11}$	$1.07\ 10^{-11}$	$1.02\ 10^{-10}$	**$9.81\ 10^{-11}$**
	Y $5\ 10^{-2}$	$2.61\ 10^{-11}$	$1.39\ 10^{-11}$	$5.01\ 10^{-10}$	$1.55\ 10^{-11}$	$9.60\ 10^{-12}$	$8.57\ 10^{-12}$	$1.13\ 10^{-10}$	**$1.05\ 10^{-10}$**
Indium									
In-109	D $2\ 10^{-2}$	$1.63\ 10^{-11}$	$8.52\ 10^{-12}$	$6.52\ 10^{-11}$	$4.48\ 10^{-11}$	$2.41\ 10^{-11}$	$6.07\ 10^{-12}$	$4.22\ 10^{-11}$	**$3.21\ 10^{-11}$**
	W $2\ 10^{-2}$	$9.62\ 10^{-12}$	$5.30\ 10^{-12}$	$8.57\ 10^{-11}$	$1.51\ 10^{-11}$	$8.42\ 10^{-12}$	$3.41\ 10^{-12}$	$2.41\ 10^{-11}$	**$2.29\ 10^{-11}$**
In-110	D $2\ 10^{-2}$	$7.38\ 10^{-11}$	$3.57\ 10^{-11}$	$1.48\ 10^{-10}$	$5.12\ 10^{-11}$	$3.17\ 10^{-11}$	$2.60\ 10^{-11}$	$1.13\ 10^{-10}$	**$8.32\ 10^{-11}$**
69.1 m	W $2\ 10^{-2}$	$5.10\ 10^{-11}$	$2.57\ 10^{-11}$	$1.80\ 10^{-10}$	$3.09\ 10^{-11}$	$1.90\ 10^{-11}$	$1.83\ 10^{-11}$	$8.31\ 10^{-11}$	**$6.79\ 10^{-11}$**
In-110	D $2\ 10^{-2}$	$7.50\ 10^{-12}$	$5.61\ 10^{-12}$	$1.71\ 10^{-10}$	$1.01\ 10^{-11}$	$6.75\ 10^{-12}$	$4.56\ 10^{-12}$	$3.95\ 10^{-11}$	**$3.66\ 10^{-11}$**
4.9 h	W $2\ 10^{-2}$	$2.37\ 10^{-12}$	$3.05\ 10^{-12}$	$1.95\ 10^{-10}$	$4.23\ 10^{-12}$	$2.99\ 10^{-12}$	$2.59\ 10^{-12}$	$1.34\ 10^{-11}$	**$2.92\ 10^{-11}$**
In-111	D $2\ 10^{-2}$	$1.32\ 10^{-10}$	$6.42\ 10^{-11}$	$2.17\ 10^{-10}$	$3.27\ 10^{-10}$	$1.71\ 10^{-10}$	$3.99\ 10^{-11}$	$3.15\ 10^{-10}$	**$2.09\ 10^{-10}$**
	W $2\ 10^{-2}$	$1.57\ 10^{-10}$	$4.37\ 10^{-11}$	$6.25\ 10^{-10}$	$1.11\ 10^{-10}$	$5.75\ 10^{-11}$	$1.91\ 10^{-11}$	$3.01\ 10^{-10}$	**$2.27\ 10^{-10}$**
In-112	D $2\ 10^{-2}$	$1.63\ 10^{-13}$	$2.03\ 10^{-13}$	$1.50\ 10^{-11}$	$2.47\ 10^{-13}$	$1.97\ 10^{-13}$	$1.75\ 10^{-13}$	$1.76\ 10^{-12}$	**$2.44\ 10^{-12}$**
	W $2\ 10^{-2}$	$4.77\ 10^{-14}$	$1.13\ 10^{-13}$	$1.59\ 10^{-11}$	$1.22\ 10^{-13}$	$9.87\ 10^{-14}$	$1.01\ 10^{-13}$	$3.28\ 10^{-13}$	**$2.06\ 10^{-12}$**
In-113m	D $2\ 10^{-2}$	$2.32\ 10^{-12}$	$1.55\ 10^{-12}$	$4.98\ 10^{-11}$	$3.63\ 10^{-12}$	$2.30\ 10^{-12}$	$1.19\ 10^{-12}$	$1.26\ 10^{-11}$	**$1.11\ 10^{-11}$**
	W $2\ 10^{-2}$	$8.23\ 10^{-13}$	$8.22\ 10^{-13}$	$5.83\ 10^{-11}$	$1.41\ 10^{-12}$	$9.38\ 10^{-13}$	$6.12\ 10^{-13}$	$4.99\ 10^{-12}$	**$9.04\ 10^{-12}$**
In-114m	D $2\ 10^{-2}$	$2.95\ 10^{-9}$	$2.87\ 10^{-9}$	$5.56\ 10^{-9}$	$8.33\ 10^{-8}$	$4.30\ 10^{-8}$	$2.80\ 10^{-9}$	$3.60\ 10^{-8}$	**$2.40\ 10^{-8}$**
	W $2\ 10^{-2}$	$6.81\ 10^{-10}$	$6.52\ 10^{-10}$	$7.19\ 10^{-8}$	$1.77\ 10^{-8}$	$9.13\ 10^{-9}$	$6.20\ 10^{-10}$	$1.26\ 10^{-8}$	**$1.51\ 10^{-8}$**
In-115	D $2\ 10^{-2}$	$1.17\ 10^{-7}$	$1.17\ 10^{-7}$	$1.17\ 10^{-7}$	$3.67\ 10^{-6}$	$1.89\ 10^{-6}$	$1.17\ 10^{-7}$	$1.49\ 10^{-6}$	**$1.01\ 10^{-6}$**
	W $2\ 10^{-2}$	$3.16\ 10^{-8}$	$3.16\ 10^{-8}$	$5.67\ 10^{-8}$	$9.96\ 10^{-7}$	$5.14\ 10^{-7}$	$3.16\ 10^{-8}$	$4.04\ 10^{-7}$	**$2.76\ 10^{-7}$**

Table 2.1, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
In-115m	D 2 10^{-2}	$6.19\ 10^{-12}$	$3.76\ 10^{-12}$	$1.38\ 10^{-10}$	$1.96\ 10^{-11}$	$1.11\ 10^{-11}$	$3.02\ 10^{-12}$	$4.83\ 10^{-11}$	**$3.59\ 10^{-11}$**
	W 2 10^{-2}	$3.29\ 10^{-12}$	$1.80\ 10^{-12}$	$1.81\ 10^{-10}$	$5.91\ 10^{-12}$	$3.39\ 10^{-12}$	$1.19\ 10^{-12}$	$3.44\ 10^{-11}$	**$3.40\ 10^{-11}$**
In-116m	D 2 10^{-2}	$6.66\ 10^{-12}$	$5.21\ 10^{-12}$	$8.33\ 10^{-11}$	$6.78\ 10^{-12}$	$4.76\ 10^{-12}$	$3.97\ 10^{-12}$	$2.36\ 10^{-11}$	**$2.06\ 10^{-11}$**
	W 2 10^{-2}	$2.02\ 10^{-12}$	$3.14\ 10^{-12}$	$9.27\ 10^{-11}$	$3.48\ 10^{-12}$	$2.59\ 10^{-12}$	$2.61\ 10^{-12}$	$8.51\ 10^{-12}$	**$1.52\ 10^{-11}$**
In-117	D 2 10^{-2}	$1.79\ 10^{-12}$	$1.52\ 10^{-12}$	$4.88\ 10^{-11}$	$2.38\ 10^{-12}$	$1.67\ 10^{-12}$	$1.20\ 10^{-12}$	$1.02\ 10^{-11}$	**$9.95\ 10^{-12}$**
	W 2 10^{-2}	$5.02\ 10^{-13}$	$8.49\ 10^{-13}$	$5.42\ 10^{-11}$	$1.10\ 10^{-12}$	$8.23\ 10^{-13}$	$7.16\ 10^{-13}$	$2.88\ 10^{-12}$	**$7.80\ 10^{-12}$**
In-117m	D 2 10^{-2}	$6.82\ 10^{-12}$	$4.66\ 10^{-12}$	$2.18\ 10^{-10}$	$1.64\ 10^{-11}$	$9.91\ 10^{-12}$	$3.94\ 10^{-12}$	$5.63\ 10^{-11}$	**$4.78\ 10^{-11}$**
	W 2 10^{-2}	$2.57\ 10^{-12}$	$2.06\ 10^{-12}$	$2.63\ 10^{-10}$	$5.33\ 10^{-12}$	$3.31\ 10^{-12}$	$1.62\ 10^{-12}$	$2.54\ 10^{-11}$	**$4.09\ 10^{-11}$**
In-119m	D 2 10^{-2}	$4.95\ 10^{-13}$	$4.97\ 10^{-13}$	$7.54\ 10^{-11}$	$8.22\ 10^{-13}$	$6.56\ 10^{-13}$	$4.94\ 10^{-13}$	$8.61\ 10^{-12}$	**$1.20\ 10^{-11}$**
	W 2 10^{-2}	$1.47\ 10^{-13}$	$1.54\ 10^{-13}$	$8.11\ 10^{-11}$	$2.50\ 10^{-13}$	$2.00\ 10^{-13}$	$1.53\ 10^{-13}$	$1.20\ 10^{-12}$	**$1.02\ 10^{-11}$**
Tin									
Sn-110	D 2 10^{-2}	$4.47\ 10^{-11}$	$2.15\ 10^{-11}$	$4.69\ 10^{-10}$	$4.33\ 10^{-11}$	$3.93\ 10^{-11}$	$1.63\ 10^{-11}$	$1.89\ 10^{-10}$	**$1.34\ 10^{-10}$**
	W 2 10^{-2}	$2.90\ 10^{-11}$	$1.39\ 10^{-11}$	$6.39\ 10^{-10}$	$2.04\ 10^{-11}$	$1.56\ 10^{-11}$	$9.15\ 10^{-12}$	$1.54\ 10^{-10}$	**$1.36\ 10^{-10}$**
Sn-111	D 2 10^{-2}	$1.69\ 10^{-12}$	$1.17\ 10^{-12}$	$3.45\ 10^{-11}$	$2.05\ 10^{-12}$	$4.23\ 10^{-12}$	$9.16\ 10^{-13}$	$7.34\ 10^{-12}$	**$7.34\ 10^{-12}$**
	W 2 10^{-2}	$1.56\ 10^{-12}$	$8.23\ 10^{-13}$	$4.17\ 10^{-11}$	$1.15\ 10^{-12}$	$1.27\ 10^{-12}$	$5.55\ 10^{-13}$	$3.90\ 10^{-12}$	**$6.88\ 10^{-12}$**
Sn-113	D 2 10^{-2}	$5.83\ 10^{-10}$	$5.28\ 10^{-10}$	$9.52\ 10^{-10}$	$2.49\ 10^{-9}$	$5.05\ 10^{-9}$	$5.07\ 10^{-10}$	$9.21\ 10^{-10}$	**$1.08\ 10^{-9}$**
	W 2 10^{-2}	$3.16\ 10^{-10}$	$2.99\ 10^{-10}$	$1.84\ 10^{-8}$	$7.71\ 10^{-10}$	$1.32\ 10^{-9}$	$2.27\ 10^{-10}$	$1.38\ 10^{-9}$	**$2.88\ 10^{-9}$**
Sn-117m	D 2 10^{-2}	$1.08\ 10^{-10}$	$7.93\ 10^{-11}$	$5.80\ 10^{-10}$	$1.06\ 10^{-9}$	**$1.09\ 10^{-8}$**	$6.92\ 10^{-11}$	$4.39\ 10^{-10}$	$6.96\ 10^{-10}$
	W 2 10^{-2}	$1.07\ 10^{-10}$	$5.14\ 10^{-11}$	$6.12\ 10^{-9}$	$2.55\ 10^{-10}$	$2.06\ 10^{-9}$	$2.93\ 10^{-11}$	$1.01\ 10^{-9}$	**$1.17\ 10^{-9}$**
Sn-119m	D 2 10^{-2}	$2.25\ 10^{-10}$	$2.17\ 10^{-10}$	$4.67\ 10^{-10}$	$1.76\ 10^{-9}$	$4.32\ 10^{-9}$	$2.13\ 10^{-10}$	$3.96\ 10^{-10}$	**$6.11\ 10^{-10}$**
	W 2 10^{-2}	$7.14\ 10^{-11}$	$7.05\ 10^{-11}$	$1.15\ 10^{-8}$	$4.62\ 10^{-10}$	$1.10\ 10^{-9}$	$5.45\ 10^{-11}$	$6.28\ 10^{-10}$	**$1.69\ 10^{-9}$**
Sn-121	D 2 10^{-2}	$4.39\ 10^{-12}$	$4.39\ 10^{-12}$	$2.33\ 10^{-10}$	$4.90\ 10^{-11}$	$5.51\ 10^{-10}$	$4.39\ 10^{-12}$	$1.27\ 10^{-10}$	**$9.05\ 10^{-11}$**
	W 2 10^{-2}	$8.47\ 10^{-13}$	$8.47\ 10^{-13}$	$5.38\ 10^{-10}$	$9.47\ 10^{-12}$	$1.06\ 10^{-10}$	$8.47\ 10^{-13}$	$2.28\ 10^{-10}$	**$1.38\ 10^{-10}$**
Sn-121m	D 2 10^{-2}	$6.97\ 10^{-10}$	$6.90\ 10^{-10}$	$8.97\ 10^{-10}$	$5.46\ 10^{-9}$	$1.46\ 10^{-8}$	$6.86\ 10^{-10}$	$8.71\ 10^{-10}$	**$1.76\ 10^{-9}$**
	W 2 10^{-2}	$1.96\ 10^{-10}$	$1.96\ 10^{-10}$	$2.04\ 10^{-8}$	$1.49\ 10^{-9}$	$3.98\ 10^{-9}$	$1.87\ 10^{-10}$	$9.22\ 10^{-10}$	**$3.11\ 10^{-9}$**
Sn-123	D 2 10^{-2}	$7.52\ 10^{-10}$	$7.52\ 10^{-10}$	$2.32\ 10^{-9}$	$5.73\ 10^{-9}$	$1.58\ 10^{-8}$	$7.49\ 10^{-10}$	$1.88\ 10^{-9}$	**$2.33\ 10^{-9}$**
	W 2 10^{-2}	$1.81\ 10^{-10}$	$1.82\ 10^{-10}$	$6.11\ 10^{-8}$	$1.36\ 10^{-9}$	$3.75\ 10^{-9}$	$1.81\ 10^{-10}$	$3.70\ 10^{-9}$	**$8.79\ 10^{-9}$**
Sn-123m	D 2 10^{-2}	$8.85\ 10^{-13}$	$8.20\ 10^{-13}$	$7.12\ 10^{-11}$	$1.21\ 10^{-12}$	$1.24\ 10^{-12}$	$7.31\ 10^{-13}$	$1.14\ 10^{-11}$	**$1.25\ 10^{-11}$**
	W 2 10^{-2}	$2.49\ 10^{-13}$	$3.16\ 10^{-13}$	$7.94\ 10^{-11}$	$4.55\ 10^{-13}$	$4.44\ 10^{-13}$	$2.68\ 10^{-13}$	$2.51\ 10^{-12}$	**$1.05\ 10^{-11}$**
Sn-125	D 2 10^{-2}	$2.60\ 10^{-10}$	$2.28\ 10^{-10}$	$2.57\ 10^{-9}$	$3.62\ 10^{-9}$	$5.19\ 10^{-9}$	$2.10\ 10^{-10}$	$1.87\ 10^{-9}$	**$1.56\ 10^{-9}$**
	W 2 10^{-2}	$1.59\ 10^{-10}$	$9.37\ 10^{-11}$	$2.24\ 10^{-8}$	$7.26\ 10^{-10}$	$1.07\ 10^{-9}$	$7.62\ 10^{-11}$	$4.38\ 10^{-9}$	**$4.18\ 10^{-9}$**
Sn-126	D 2 10^{-2}	$1.43\ 10^{-8}$	$1.41\ 10^{-8}$	$1.61\ 10^{-8}$	$5.62\ 10^{-8}$	$1.18\ 10^{-7}$	$1.31\ 10^{-8}$	$1.76\ 10^{-8}$	**$2.36\ 10^{-8}$**
	W 2 10^{-2}	$4.95\ 10^{-9}$	$5.39\ 10^{-9}$	$1.51\ 10^{-7}$	$1.69\ 10^{-8}$	$3.33\ 10^{-8}$	$4.90\ 10^{-9}$	$1.20\ 10^{-8}$	**$2.69\ 10^{-8}$**
Sn-127	D 2 10^{-2}	$2.11\ 10^{-11}$	$1.34\ 10^{-11}$	$2.78\ 10^{-10}$	$3.93\ 10^{-11}$	$4.95\ 10^{-11}$	$1.08\ 10^{-11}$	$9.49\ 10^{-11}$	**$7.56\ 10^{-11}$**
	W 2 10^{-2}	$1.26\ 10^{-11}$	$8.28\ 10^{-12}$	$4.56\ 10^{-10}$	$1.37\ 10^{-11}$	$1.40\ 10^{-11}$	$6.41\ 10^{-12}$	$8.70\ 10^{-11}$	**$8.75\ 10^{-11}$**
Sn-128	D 2 10^{-2}	$1.14\ 10^{-11}$	$8.61\ 10^{-12}$	$2.73\ 10^{-10}$	$1.14\ 10^{-11}$	$1.06\ 10^{-11}$	$7.02\ 10^{-12}$	$6.50\ 10^{-11}$	**$5.83\ 10^{-11}$**
	W 2 10^{-2}	$3.43\ 10^{-12}$	$4.62\ 10^{-12}$	$3.14\ 10^{-10}$	$5.33\ 10^{-12}$	$4.70\ 10^{-12}$	$3.94\ 10^{-12}$	$2.10\ 10^{-11}$	**$4.64\ 10^{-11}$**
Antimony									
Sb-115	D 1 10^{-1}	$1.29\ 10^{-12}$	$1.27\ 10^{-12}$	$3.47\ 10^{-11}$	$1.37\ 10^{-12}$	$1.11\ 10^{-12}$	$1.01\ 10^{-12}$	$7.12\ 10^{-12}$	**$7.04\ 10^{-12}$**
	W 1 10^{-2}	$3.53\ 10^{-13}$	$7.59\ 10^{-13}$	$3.79\ 10^{-11}$	$7.60\ 10^{-13}$	$6.19\ 10^{-13}$	$6.54\ 10^{-13}$	$1.99\ 10^{-12}$	**$5.48\ 10^{-12}$**
Sb-116	D 1 10^{-1}	$9.32\ 10^{-13}$	$1.17\ 10^{-12}$	$3.33\ 10^{-11}$	$1.16\ 10^{-12}$	$9.40\ 10^{-13}$	$9.41\ 10^{-13}$	$5.56\ 10^{-12}$	**$6.27\ 10^{-12}$**
	W 1 10^{-2}	$2.71\ 10^{-13}$	$7.61\ 10^{-13}$	$3.53\ 10^{-11}$	$7.32\ 10^{-13}$	$5.93\ 10^{-13}$	$6.63\ 10^{-13}$	$1.74\ 10^{-12}$	**$5.07\ 10^{-12}$**
Sb-116m	D 1 10^{-1}	$9.46\ 10^{-12}$	$7.17\ 10^{-12}$	$6.81\ 10^{-11}$	$7.88\ 10^{-12}$	$6.31\ 10^{-12}$	$5.51\ 10^{-12}$	$2.59\ 10^{-11}$	**$2.07\ 10^{-11}$**
	W 1 10^{-2}	$2.97\ 10^{-12}$	$4.53\ 10^{-12}$	$7.51\ 10^{-11}$	$4.60\ 10^{-12}$	$3.66\ 10^{-12}$	$3.84\ 10^{-12}$	$1.06\ 10^{-11}$	**$1.44\ 10^{-11}$**
Sb-117	D 1 10^{-1}	$3.00\ 10^{-12}$	$1.57\ 10^{-12}$	$2.37\ 10^{-11}$	$2.63\ 10^{-12}$	$3.34\ 10^{-12}$	$9.84\ 10^{-13}$	$8.34\ 10^{-12}$	**$6.78\ 10^{-12}$**
	W 1 10^{-2}	$1.51\ 10^{-12}$	$1.00\ 10^{-12}$	$2.88\ 10^{-11}$	$1.51\ 10^{-12}$	$1.41\ 10^{-12}$	$5.48\ 10^{-13}$	$4.85\ 10^{-12}$	**$5.68\ 10^{-12}$**

Table 2.1, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Sb-118m	D 1 10^{-1}	5.61 10^{-11}	2.93 10^{-11}	1.50 10^{-10}	3.58 10^{-11}	3.00 10^{-11}	2.16 10^{-11}	9.54 10^{-11}	**7.09 10^{-11}**
	W 1 10^{-2}	4.14 10^{-11}	2.16 10^{-11}	1.89 10^{-10}	2.47 10^{-11}	1.70 10^{-11}	1.45 10^{-11}	7.76 10^{-11}	**6.35 10^{-11}**
Sb-119	D 1 10^{-1}	9.90 10^{-12}	5.12 10^{-12}	7.97 10^{-11}	1.68 10^{-11}	8.47 10^{-11}	4.35 10^{-12}	4.79 10^{-11}	**3.19 10^{-11}**
	W 1 10^{-2}	1.25 10^{-11}	2.77 10^{-12}	2.11 10^{-10}	6.54 10^{-12}	1.64 10^{-11}	8.23 10^{-13}	8.91 10^{-11}	**5.69 10^{-11}**
Sb-120	D 1 10^{-1}	2.82 10^{-13}	3.52 10^{-13}	2.12 10^{-11}	3.66 10^{-13}	3.13 10^{-13}	2.97 10^{-13}	2.72 10^{-12}	**3.54 10^{-12}**
15.89 m	W 1 10^{-2}	8.16 10^{-14}	2.02 10^{-13}	2.26 10^{-11}	2.00 10^{-13}	1.68 10^{-13}	1.78 10^{-13}	5.54 10^{-13}	**2.96 10^{-12}**
Sb-120	D 1 10^{-1}	5.60 10^{-10}	3.24 10^{-10}	7.33 10^{-10}	4.88 10^{-10}	7.51 10^{-10}	2.63 10^{-10}	8.27 10^{-10}	**6.14 10^{-10}**
5.76 d	W 1 10^{-2}	8.99 10^{-10}	3.37 10^{-10}	3.01 10^{-9}	4.30 10^{-10}	3.25 10^{-10}	2.23 10^{-10}	1.31 10^{-9}	**1.10 10^{-9}**
Sb-122	D 1 10^{-1}	1.61 10^{-10}	1.20 10^{-10}	1.57 10^{-9}	3.86 10^{-10}	3.54 10^{-10}	1.12 10^{-10}	1.07 10^{-9}	**6.28 10^{-10}**
	W 1 10^{-2}	1.44 10^{-10}	5.27 10^{-11}	5.65 10^{-9}	1.05 10^{-10}	8.12 10^{-11}	3.63 10^{-11}	2.18 10^{-9}	**1.39 10^{-9}**
Sb-124	D 1 10^{-1}	9.15 10^{-10}	6.51 10^{-10}	2.03 10^{-9}	1.53 10^{-9}	3.41 10^{-9}	5.68 10^{-10}	2.10 10^{-9}	**1.50 10^{-9}**
	W 1 10^{-2}	1.04 10^{-9}	8.94 10^{-10}	4.14 10^{-8}	1.09 10^{-9}	1.24 10^{-9}	6.74 10^{-10}	4.18 10^{-9}	**6.80 10^{-9}**
Sb-124m	D 1 10^{-1}	4.42 10^{-13}	4.31 10^{-13}	1.08 10^{-11}	6.07 10^{-13}	9.18 10^{-13}	3.62 10^{-13}	2.10 10^{-12}	**2.21 10^{-12}**
	W 1 10^{-2}	2.68 10^{-13}	3.52 10^{-13}	1.89 10^{-11}	3.85 10^{-13}	3.86 10^{-13}	2.93 10^{-13}	1.16 10^{-12}	**2.80 10^{-12}**
Sb-125	D 1 10^{-1}	3.19 10^{-10}	2.51 10^{-10}	6.38 10^{-10}	6.49 10^{-10}	2.73 10^{-9}	2.28 10^{-10}	7.16 10^{-10}	**5.75 10^{-10}**
	W 1 10^{-2}	3.60 10^{-10}	4.16 10^{-10}	2.17 10^{-8}	5.35 10^{-10}	9.78 10^{-10}	3.24 10^{-10}	1.45 10^{-9}	**3.30 10^{-9}**
Sb-126	D 1 10^{-1}	9.11 10^{-10}	5.89 10^{-10}	1.77 10^{-9}	1.09 10^{-9}	1.71 10^{-9}	5.08 10^{-10}	1.81 10^{-9}	**1.27 10^{-9}**
	W 1 10^{-2}	1.32 10^{-9}	6.44 10^{-10}	1.38 10^{-8}	7.97 10^{-10}	6.75 10^{-10}	4.80 10^{-10}	3.19 10^{-9}	**3.17 10^{-9}**
Sb-126m	D 1 10^{-1}	1.19 10^{-12}	1.33 10^{-12}	5.04 10^{-11}	1.46 10^{-12}	1.32 10^{-12}	1.13 10^{-12}	7.92 10^{-12}	**9.17 10^{-12}**
	W 1 10^{-2}	4.91 10^{-13}	8.45 10^{-13}	5.57 10^{-11}	8.63 10^{-13}	7.12 10^{-13}	7.63 10^{-13}	2.12 10^{-12}	**7.72 10^{-12}**
Sb-127	D 1 10^{-1}	2.34 10^{-10}	1.65 10^{-10}	1.36 10^{-9}	4.94 10^{-10}	5.45 10^{-10}	1.50 10^{-10}	1.09 10^{-9}	**6.55 10^{-10}**
	W 1 10^{-2}	2.52 10^{-10}	9.12 10^{-11}	6.94 10^{-9}	1.61 10^{-10}	1.34 10^{-10}	6.15 10^{-11}	2.33 10^{-9}	**1.63 10^{-9}**
Sb-128	D 1 10^{-1}	6.32 10^{-13}	1.02 10^{-12}	2.53 10^{-11}	1.01 10^{-12}	8.11 10^{-13}	8.74 10^{-13}	4.11 10^{-12}	**4.75 10^{-12}**
10.4 m	W 1 10^{-2}	1.94 10^{-13}	7.25 10^{-13}	2.64 10^{-11}	7.01 10^{-13}	5.65 10^{-13}	6.82 10^{-13}	1.57 10^{-12}	**3.92 10^{-12}**
Sb-128	D 1 10^{-1}	1.10 10^{-10}	6.22 10^{-11}	1.27 10^{-9}	1.11 10^{-10}	9.46 10^{-11}	5.20 10^{-11}	5.51 10^{-10}	**3.72 10^{-10}**
9.01 h	W 1 10^{-2}	9.47 10^{-11}	3.72 10^{-11}	1.91 10^{-9}	5.25 10^{-11}	3.61 10^{-11}	2.49 10^{-11}	6.31 10^{-10}	**4.56 10^{-10}**
Sb-129	D 1 10^{-1}	3.79 10^{-11}	2.44 10^{-11}	6.37 10^{-10}	3.97 10^{-11}	4.21 10^{-11}	2.07 10^{-11}	2.26 10^{-10}	**1.64 10^{-10}**
	W 1 10^{-2}	2.15 10^{-11}	1.28 10^{-11}	8.98 10^{-10}	1.70 10^{-11}	1.46 10^{-11}	9.72 10^{-12}	1.87 10^{-10}	**1.74 10^{-10}**
Sb-130	D 1 10^{-1}	6.27 10^{-12}	5.53 10^{-12}	1.31 10^{-10}	6.07 10^{-12}	4.88 10^{-12}	4.53 10^{-12}	2.96 10^{-11}	**2.80 10^{-11}**
	W 1 10^{-2}	1.76 10^{-12}	3.27 10^{-12}	1.44 10^{-10}	3.34 10^{-12}	2.70 10^{-12}	2.94 10^{-12}	8.97 10^{-12}	**2.15 10^{-11}**
Sb-131	D 1 10^{-1}	2.93 10^{-12}	2.90 10^{-12}	1.12 10^{-10}	3.27 10^{-12}	3.23 10^{-12}	**5.78 10^{-10}**	2.11 10^{-11}	3.88 10^{-11}
	W 1 10^{-2}	1.12 10^{-12}	1.64 10^{-12}	1.26 10^{-10}	1.71 10^{-12}	1.49 10^{-12}	**5.84 10^{-10}**	6.19 10^{-12}	3.53 10^{-11}
Tellurium									
Te-116	D 2 10^{-1}	2.59 10^{-11}	1.61 10^{-11}	2.74 10^{-10}	1.94 10^{-11}	1.68 10^{-11}	1.27 10^{-11}	8.93 10^{-11}	**7.18 10^{-11}**
	W 2 10^{-1}	1.17 10^{-11}	9.50 10^{-12}	3.36 10^{-10}	1.04 10^{-11}	8.22 10^{-12}	7.12 10^{-12}	4.90 10^{-11}	**6.11 10^{-11}**
Te-121	D 2 10^{-1}	2.73 10^{-10}	1.97 10^{-10}	3.08 10^{-10}	4.87 10^{-10}	1.00 10^{-9}	1.82 10^{-10}	3.08 10^{-10}	**3.21 10^{-10}**
	W 2 10^{-1}	2.96 10^{-10}	1.98 10^{-10}	1.88 10^{-9}	3.04 10^{-10}	4.26 10^{-10}	1.56 10^{-10}	4.38 10^{-10}	**5.15 10^{-10}**
Te-121m	D 2 10^{-1}	1.18 10^{-9}	1.23 10^{-9}	1.41 10^{-9}	9.42 10^{-9}	**6.94 10^{-8}**	1.12 10^{-9}	1.38 10^{-9}	4.31 10^{-9}
	W 2 10^{-1}	6.70 10^{-10}	8.70 10^{-10}	1.56 10^{-8}	4.18 10^{-9}	2.81 10^{-8}	7.30 10^{-10}	1.50 10^{-9}	**3.99 10^{-9}**
Te-123	D 2 10^{-1}	7.21 10^{-12}	6.92 10^{-12}	1.61 10^{-11}	5.86 10^{-9}	**7.13 10^{-8}**	5.03 10^{-12}	1.15 10^{-11}	2.85 10^{-9}
	W 2 10^{-1}	3.31 10^{-12}	3.28 10^{-12}	5.19 10^{-10}	2.57 10^{-9}	**3.12 10^{-8}**	2.22 10^{-12}	2.03 10^{-11}	1.31 10^{-9}
Te-123m	D 2 10^{-1}	2.77 10^{-10}	2.80 10^{-10}	6.05 10^{-10}	5.79 10^{-9}	**6.09 10^{-8}**	2.40 10^{-10}	4.75 10^{-10}	2.86 10^{-9}
	W 2 10^{-1}	1.88 10^{-10}	2.04 10^{-10}	1.27 10^{-8}	2.41 10^{-9}	2.40 10^{-8}	1.46 10^{-10}	8.06 10^{-10}	**2.86 10^{-9}**
Te-125m	D 2 10^{-1}	1.24 10^{-10}	1.07 10^{-10}	4.66 10^{-10}	3.01 10^{-9}	**3.21 10^{-8}**	9.93 10^{-11}	3.14 10^{-10}	1.52 10^{-9}
	W 2 10^{-1}	7.93 10^{-11}	7.08 10^{-11}	1.04 10^{-8}	1.15 10^{-9}	1.18 10^{-8}	3.87 10^{-11}	6.75 10^{-10}	**1.97 10^{-9}**

Table 2.1, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Te-127	D 2 10^{-1}	$6.63\ 10^{-12}$	$6.49\ 10^{-12}$	$2.77\ 10^{-10}$	$1.43\ 10^{-11}$	$1.44\ 10^{-11}$	$6.46\ 10^{-12}$	$9.74\ 10^{-11}$	**$6.74\ 10^{-11}$**
	W 2 10^{-1}	$2.02\ 10^{-12}$	$1.88\ 10^{-12}$	$4.27\ 10^{-10}$	$4.09\ 10^{-12}$	$4.09\ 10^{-12}$	$1.84\ 10^{-12}$	$1.11\ 10^{-10}$	**$8.60\ 10^{-11}$**
Te-127m	D 2 10^{-1}	$2.49\ 10^{-10}$	$2.43\ 10^{-10}$	$8.91\ 10^{-10}$	$1.37\ 10^{-8}$	**$5.24\ 10^{-8}$**	$2.39\ 10^{-10}$	$6.90\ 10^{-10}$	$3.64\ 10^{-9}$
	W 2 10^{-1}	$1.10\ 10^{-10}$	$1.10\ 10^{-10}$	$3.34\ 10^{-8}$	$5.36\ 10^{-9}$	$2.04\ 10^{-8}$	$9.66\ 10^{-11}$	$1.66\ 10^{-9}$	**$5.81\ 10^{-9}$**
Te-129	D 2 10^{-1}	$1.75\ 10^{-12}$	$1.68\ 10^{-12}$	$1.33\ 10^{-10}$	$1.97\ 10^{-12}$	$2.03\ 10^{-12}$	$1.63\ 10^{-12}$	$2.40\ 10^{-11}$	**$2.42\ 10^{-11}$**
	W 2 10^{-1}	$5.05\ 10^{-13}$	$5.39\ 10^{-13}$	$1.53\ 10^{-10}$	$6.19\ 10^{-13}$	$6.22\ 10^{-13}$	$5.09\ 10^{-13}$	$7.28\ 10^{-12}$	**$2.09\ 10^{-11}$**
Te-129m	D 2 10^{-1}	$4.12\ 10^{-10}$	$4.00\ 10^{-10}$	$2.16\ 10^{-9}$	$8.77\ 10^{-9}$	$2.01\ 10^{-8}$	$3.95\ 10^{-10}$	$1.47\ 10^{-9}$	**$2.53\ 10^{-9}$**
	W 2 10^{-1}	$1.78\ 10^{-10}$	$1.69\ 10^{-10}$	$4.03\ 10^{-8}$	$3.10\ 10^{-9}$	$7.05\ 10^{-9}$	$1.56\ 10^{-10}$	$3.27\ 10^{-9}$	**$6.47\ 10^{-9}$**
Te-131	D 2 10^{-1}	$6.14\ 10^{-12}$	$5.53\ 10^{-12}$	$2.54\ 10^{-10}$	$6.64\ 10^{-12}$	$6.21\ 10^{-12}$	**$2.63\ 10^{-9}$**	$5.42\ 10^{-11}$	$1.29\ 10^{-10}$
	W 2 10^{-1}	$2.17\ 10^{-12}$	$2.67\ 10^{-12}$	$2.99\ 10^{-10}$	$2.94\ 10^{-12}$	$2.61\ 10^{-12}$	**$2.66\ 10^{-9}$**	$2.21\ 10^{-11}$	$1.24\ 10^{-10}$
Te-131m	D 2 10^{-1}	$1.93\ 10^{-10}$	$1.15\ 10^{-10}$	$9.43\ 10^{-10}$	$2.39\ 10^{-10}$	$6.37\ 10^{-10}$	**$3.28\ 10^{-8}$**	$5.63\ 10^{-10}$	$1.38\ 10^{-9}$
	W 2 10^{-1}	$2.34\ 10^{-10}$	$9.25\ 10^{-11}$	$2.23\ 10^{-9}$	$1.41\ 10^{-10}$	$2.27\ 10^{-10}$	**$3.61\ 10^{-8}$**	$9.46\ 10^{-10}$	$1.73\ 10^{-9}$
Te-132	D 2 10^{-1}	$3.77\ 10^{-10}$	$3.52\ 10^{-10}$	$6.50\ 10^{-10}$	$4.95\ 10^{-10}$	$1.53\ 10^{-9}$	**$5.87\ 10^{-8}$**	$5.65\ 10^{-10}$	$2.26\ 10^{-9}$
	W 2 10^{-1}	$4.15\ 10^{-10}$	$3.63\ 10^{-10}$	$1.67\ 10^{-9}$	$4.27\ 10^{-10}$	$7.12\ 10^{-10}$	**$6.28\ 10^{-8}$**	$7.89\ 10^{-10}$	$2.55\ 10^{-9}$
Te-133	D 2 10^{-1}	$6.70\ 10^{-13}$	$8.48\ 10^{-13}$	$4.39\ 10^{-11}$	$8.39\ 10^{-13}$	$7.49\ 10^{-13}$	**$5.91\ 10^{-10}$**	$5.02\ 10^{-12}$	$2.49\ 10^{-11}$
	W 2 10^{-1}	$3.59\ 10^{-13}$	$6.05\ 10^{-13}$	$4.64\ 10^{-11}$	$5.83\ 10^{-13}$	$5.21\ 10^{-13}$	**$5.91\ 10^{-10}$**	$1.18\ 10^{-12}$	$2.39\ 10^{-11}$
Te-133m	D 2 10^{-1}	$8.97\ 10^{-12}$	$7.82\ 10^{-12}$	$1.82\ 10^{-10}$	$8.32\ 10^{-12}$	$6.94\ 10^{-12}$	**$2.61\ 10^{-9}$**	$4.14\ 10^{-11}$	$1.17\ 10^{-10}$
	W 2 10^{-1}	$3.39\ 10^{-12}$	$4.91\ 10^{-12}$	$2.06\ 10^{-10}$	$4.89\ 10^{-12}$	$4.13\ 10^{-12}$	**$2.63\ 10^{-9}$**	$1.43\ 10^{-11}$	$1.10\ 10^{-10}$
Te-134	D 2 10^{-1}	$9.00\ 10^{-12}$	$8.72\ 10^{-12}$	$6.02\ 10^{-11}$	$9.30\ 10^{-12}$	$8.58\ 10^{-12}$	**$5.54\ 10^{-10}$**	$1.88\ 10^{-11}$	$3.44\ 10^{-11}$
	W 2 10^{-1}	$7.90\ 10^{-12}$	$7.96\ 10^{-12}$	$6.60\ 10^{-11}$	$8.38\ 10^{-12}$	$7.78\ 10^{-12}$	**$5.56\ 10^{-10}$**	$1.09\ 10^{-11}$	$3.23\ 10^{-11}$
Iodine									
I-120	D 1.0	$1.07\ 10^{-11}$	$1.28\ 10^{-11}$	$4.33\ 10^{-10}$	$1.28\ 10^{-11}$	$1.17\ 10^{-11}$	**$1.55\ 10^{-9}$**	$5.02\ 10^{-11}$	$1.20\ 10^{-10}$
I-120m	D 1.0	$9.01\ 10^{-12}$	$1.23\ 10^{-11}$	$2.87\ 10^{-10}$	$1.22\ 10^{-11}$	$1.07\ 10^{-11}$	$5.84\ 10^{-10}$	$4.55\ 10^{-11}$	**$7.15\ 10^{-11}$**
I-121	D 1.0	$1.96\ 10^{-12}$	$3.53\ 10^{-12}$	$4.69\ 10^{-11}$	$3.44\ 10^{-12}$	$3.02\ 10^{-12}$	**$7.54\ 10^{-10}$**	$7.65\ 10^{-12}$	$3.21\ 10^{-11}$
I-123	D 1.0	$2.89\ 10^{-12}$	$4.87\ 10^{-12}$	$6.57\ 10^{-11}$	$5.97\ 10^{-12}$	$5.18\ 10^{-12}$	**$2.25\ 10^{-9}$**	$7.89\ 10^{-12}$	$8.01\ 10^{-11}$
I-124	D 1.0	$3.49\ 10^{-11}$	$1.15\ 10^{-10}$	$7.45\ 10^{-10}$	$8.63\ 10^{-11}$	$7.78\ 10^{-11}$	**$1.69\ 10^{-7}$**	$1.22\ 10^{-10}$	$5.23\ 10^{-9}$
I-125	D 1.0	$1.84\ 10^{-11}$	$9.25\ 10^{-11}$	$1.19\ 10^{-10}$	$4.41\ 10^{-11}$	$4.27\ 10^{-11}$	**$2.16\ 10^{-7}$**	$3.33\ 10^{-11}$	$6.53\ 10^{-9}$
I-126	D 1.0	$3.48\ 10^{-11}$	$1.37\ 10^{-10}$	$6.34\ 10^{-10}$	$9.84\ 10^{-11}$	$9.02\ 10^{-11}$	**$3.94\ 10^{-7}$**	$1.21\ 10^{-10}$	$1.20\ 10^{-8}$
I-128	D 1.0	$6.80\ 10^{-13}$	$7.15\ 10^{-13}$	$7.22\ 10^{-11}$	$7.17\ 10^{-13}$	$7.03\ 10^{-13}$	$5.34\ 10^{-11}$	$7.02\ 10^{-12}$	**$1.28\ 10^{-11}$**
I-129	D 1.0	$8.69\ 10^{-11}$	$2.09\ 10^{-10}$	$3.14\ 10^{-10}$	$1.40\ 10^{-10}$	$1.38\ 10^{-10}$	**$1.56\ 10^{-6}$**	$1.18\ 10^{-10}$	$4.69\ 10^{-8}$
I-130	D 1.0	$2.81\ 10^{-11}$	$4.87\ 10^{-11}$	$6.03\ 10^{-10}$	$4.55\ 10^{-11}$	$4.03\ 10^{-11}$	**$1.99\ 10^{-8}$**	$8.02\ 10^{-11}$	$7.14\ 10^{-10}$
I-131	D 1.0	$2.53\ 10^{-11}$	$7.88\ 10^{-11}$	$6.57\ 10^{-10}$	$6.26\ 10^{-11}$	$5.73\ 10^{-11}$	**$2.92\ 10^{-7}$**	$8.03\ 10^{-11}$	$8.89\ 10^{-9}$
I-132	D 1.0	$9.95\ 10^{-12}$	$1.41\ 10^{-11}$	$2.71\ 10^{-10}$	$1.40\ 10^{-11}$	$1.24\ 10^{-11}$	**$1.74\ 10^{-9}$**	$3.78\ 10^{-11}$	$1.03\ 10^{-10}$
I-132m	D 1.0	$6.48\ 10^{-12}$	$8.88\ 10^{-12}$	$1.77\ 10^{-10}$	$8.86\ 10^{-12}$	$7.95\ 10^{-12}$	**$1.65\ 10^{-9}$**	$2.01\ 10^{-11}$	$8.10\ 10^{-11}$
I-133	D 1.0	$1.95\ 10^{-11}$	$2.94\ 10^{-11}$	$8.20\ 10^{-10}$	$2.72\ 10^{-11}$	$2.52\ 10^{-11}$	**$4.86\ 10^{-8}$**	$5.00\ 10^{-11}$	$1.58\ 10^{-9}$
I-134	D 1.0	$4.25\ 10^{-12}$	$6.17\ 10^{-12}$	$1.43\ 10^{-10}$	$6.08\ 10^{-12}$	$5.31\ 10^{-12}$	$2.88\ 10^{-10}$	$2.27\ 10^{-11}$	**$3.55\ 10^{-11}$**
I-135	D 1.0	$1.70\ 10^{-11}$	$2.34\ 10^{-11}$	$4.41\ 10^{-10}$	$2.24\ 10^{-11}$	$2.01\ 10^{-11}$	**$8.46\ 10^{-9}$**	$4.70\ 10^{-11}$	$3.32\ 10^{-10}$
Cesium									
Cs-125	D 1.0	$1.46\ 10^{-12}$	$1.89\ 10^{-12}$	$6.36\ 10^{-11}$	$1.95\ 10^{-12}$	$1.76\ 10^{-12}$	$1.71\ 10^{-12}$	$8.46\ 10^{-12}$	**$1.12\ 10^{-11}$**
Cs-127	D 1.0	$7.12\ 10^{-12}$	$7.92\ 10^{-12}$	$5.98\ 10^{-11}$	$9.54\ 10^{-12}$	$8.40\ 10^{-12}$	$7.08\ 10^{-12}$	$1.38\ 10^{-11}$	**$1.59\ 10^{-11}$**
Cs-129	D 1.0	$3.04\ 10^{-11}$	$2.83\ 10^{-11}$	$1.08\ 10^{-10}$	$3.80\ 10^{-11}$	$3.40\ 10^{-11}$	$2.60\ 10^{-11}$	$3.93\ 10^{-11}$	**$4.29\ 10^{-11}$**
Cs-130	D 1.0	$7.83\ 10^{-13}$	$1.02\ 10^{-12}$	$4.82\ 10^{-11}$	$1.04\ 10^{-12}$	$9.41\ 10^{-13}$	$9.28\ 10^{-13}$	$5.84\ 10^{-12}$	**$8.07\ 10^{-12}$**
Cs-131	D 1.0	$3.77\ 10^{-11}$	$3.30\ 10^{-11}$	$7.29\ 10^{-11}$	$6.21\ 10^{-11}$	$5.58\ 10^{-11}$	$3.00\ 10^{-11}$	$3.95\ 10^{-11}$	**$4.50\ 10^{-11}$**
Cs-132	D 1.0	$3.20\ 10^{-10}$	$2.69\ 10^{-10}$	$4.20\ 10^{-10}$	$3.17\ 10^{-10}$	$2.87\ 10^{-10}$	$2.73\ 10^{-10}$	$3.54\ 10^{-10}$	**$3.32\ 10^{-10}$**
Cs-134	D 1.0	$1.30\ 10^{-8}$	$1.08\ 10^{-8}$	$1.18\ 10^{-8}$	$1.18\ 10^{-8}$	$1.10\ 10^{-8}$	$1.11\ 10^{-8}$	$1.39\ 10^{-8}$	**$1.25\ 10^{-8}$**
Cs-134m	D 1.0	$3.61\ 10^{-12}$	$3.39\ 10^{-12}$	$6.40\ 10^{-11}$	$3.76\ 10^{-12}$	$3.55\ 10^{-12}$	$3.34\ 10^{-12}$	$6.90\ 10^{-12}$	**$1.18\ 10^{-11}$**

Table 2.1, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Cs-135	D 1.0	1.20 10^{-9}	1.20 10^{-9}	1.41 10^{-9}	1.20 10^{-9}	1.20 10^{-9}	1.20 10^{-9}	1.20 10^{-9}	**1.23 10^{-9}**
Cs-135m	D 1.0	1.96 10^{-12}	3.15 10^{-12}	2.28 10^{-11}	3.15 10^{-12}	2.66 10^{-12}	3.00 10^{-12}	8.13 10^{-12}	**6.68 10^{-12}**
Cs-136	D 1.0	1.88 10^{-9}	1.67 10^{-9}	2.32 10^{-9}	1.86 10^{-9}	1.70 10^{-9}	1.73 10^{-9}	2.19 10^{-9}	**1.98 10^{-9}**
Cs-137	D 1.0	8.76 10^{-9}	7.84 10^{-9}	8.82 10^{-9}	8.30 10^{-9}	7.94 10^{-9}	7.93 10^{-9}	9.12 10^{-9}	**8.63 10^{-9}**
Cs-138	D 1.0	3.28 10^{-12}	4.02 10^{-12}	1.59 10^{-10}	3.95 10^{-12}	3.55 10^{-12}	3.57 10^{-12}	2.06 10^{-11}	**2.74 10^{-11}**
Barium									
Ba-126	D 1 10^{-1}	1.20 10^{-11}	8.98 10^{-12}	4.98 10^{-10}	1.17 10^{-11}	8.50 10^{-12}	7.59 10^{-12}	1.11 10^{-10}	**9.92 10^{-11}**
Ba-128	D 1 10^{-1}	2.02 10^{-10}	1.05 10^{-10}	2.29 10^{-9}	3.47 10^{-10}	3.43 10^{-10}	8.95 10^{-11}	1.41 10^{-9}	**8.20 10^{-10}**
Ba-131	D 1 10^{-1}	1.28 10^{-10}	5.84 10^{-11}	2.62 10^{-10}	1.70 10^{-10}	7.05 10^{-10}	4.62 10^{-11}	2.19 10^{-10}	**1.81 10^{-10}**
Ba-131m	D 1 10^{-1}	1.76 10^{-13}	1.29 10^{-13}	7.04 10^{-12}	2.70 10^{-13}	6.19 10^{-13}	9.71 10^{-14}	9.53 10^{-13}	**1.25 10^{-12}**
Ba-133	D 1 10^{-1}	1.07 10^{-9}	1.10 10^{-9}	1.29 10^{-9}	6.56 10^{-9}	9.51 10^{-9}	9.99 10^{-10}	1.41 10^{-9}	**2.11 10^{-9}**
Ba-133m	D 1 10^{-1}	2.30 10^{-11}	1.48 10^{-11}	5.20 10^{-10}	5.79 10^{-11}	1.05 10^{-10}	1.33 10^{-11}	2.90 10^{-10}	**1.68 10^{-10}**
Ba-135m	D 1 10^{-1}	1.77 10^{-11}	1.12 10^{-11}	4.45 10^{-10}	3.82 10^{-11}	4.06 10^{-11}	9.93 10^{-12}	2.34 10^{-10}	**1.36 10^{-10}**
Ba-139	D 1 10^{-1}	2.56 10^{-12}	2.46 10^{-12}	2.53 10^{-10}	3.41 10^{-12}	2.49 10^{-12}	2.40 10^{-12}	4.82 10^{-11}	**4.64 10^{-11}**
Ba-140	D 1 10^{-1}	4.30 10^{-10}	2.87 10^{-10}	1.66 10^{-9}	1.29 10^{-9}	2.41 10^{-9}	2.56 10^{-10}	1.41 10^{-9}	**1.01 10^{-9}**
Ba-141	D 1 10^{-1}	1.41 10^{-12}	1.47 10^{-12}	1.16 10^{-10}	2.49 10^{-12}	4.73 10^{-12}	1.33 10^{-12}	2.27 10^{-11}	**2.18 10^{-11}**
Ba-142	D 1 10^{-1}	2.16 10^{-12}	1.60 10^{-12}	5.48 10^{-11}	1.93 10^{-12}	1.42 10^{-12}	1.27 10^{-12}	1.14 10^{-11}	**1.11 10^{-11}**
Lanthanum									
La-131	D 1 10^{-3}	3.43 10^{-12}	2.87 10^{-12}	5.42 10^{-11}	4.60 10^{-12}	1.02 10^{-11}	1.94 10^{-12}	1.78 10^{-11}	**1.40 10^{-11}**
	W 1 10^{-3}	1.70 10^{-12}	1.62 10^{-12}	6.81 10^{-11}	2.10 10^{-12}	2.72 10^{-12}	1.14 10^{-12}	6.43 10^{-12}	**1.11 10^{-11}**
La-132	D 1 10^{-3}	5.10 10^{-11}	2.71 10^{-11}	4.97 10^{-10}	3.97 10^{-11}	3.25 10^{-11}	1.91 10^{-11}	2.17 10^{-10}	**1.48 10^{-10}**
	W 1 10^{-3}	3.33 10^{-11}	1.71 10^{-11}	6.52 10^{-10}	2.13 10^{-11}	1.51 10^{-11}	1.11 10^{-11}	1.56 10^{-10}	**1.39 10^{-10}**
La-135	D 1 10^{-3}	6.39 10^{-12}	2.44 10^{-12}	2.57 10^{-11}	6.81 10^{-12}	1.65 10^{-11}	1.11 10^{-12}	2.14 10^{-11}	**1.28 10^{-11}**
	W 1 10^{-3}	8.72 10^{-12}	2.00 10^{-12}	4.75 10^{-11}	4.66 10^{-12}	4.71 10^{-12}	4.37 10^{-13}	2.37 10^{-11}	**1.60 10^{-11}**
La-137	D 1 10^{-3}	3.45 10^{-9}	5.31 10^{-9}	1.07 10^{-8}	2.31 10^{-8}	9.96 10^{-8}	2.49 10^{-9}	4.97 10^{-8} **2.05 10^{-7}**	2.37 10^{-8} Liver
	W 1 10^{-3}	9.06 10^{-10}	1.38 10^{-9}	4.69 10^{-9}	5.91 10^{-9}	2.53 10^{-8}	6.34 10^{-10}	1.26 10^{-8} **5.20 10^{-8}**	6.27 10^{-9} Liver
La-138	D 1 10^{-3}	1.49 10^{-7}	1.56 10^{-7}	2.53 10^{-7}	2.41 10^{-7}	6.24 10^{-7}	8.35 10^{-8}	7.61 10^{-7}	**3.70 10^{-7}**
	W 1 10^{-3}	3.85 10^{-8}	4.04 10^{-8}	7.97 10^{-8}	6.19 10^{-8}	1.59 10^{-7}	2.18 10^{-8}	1.94 10^{-7}	**9.63 10^{-8}**
La-140	D 1 10^{-3}	3.62 10^{-10}	2.05 10^{-10}	1.66 10^{-9}	4.56 10^{-10}	4.03 10^{-10}	1.22 10^{-10}	1.81 10^{-9}	**9.33 10^{-10}**
	W 1 10^{-3}	4.54 10^{-10}	1.45 10^{-10}	4.21 10^{-9}	2.14 10^{-10}	1.41 10^{-10}	6.87 10^{-11}	2.12 10^{-9}	**1.31 10^{-9}**
La-141	D 1 10^{-3}	1.01 10^{-11}	9.84 10^{-12}	6.46 10^{-10}	2.93 10^{-11}	1.20 10^{-10}	9.40 10^{-12}	2.28 10^{-10}	**1.57 10^{-10}**
	W 1 10^{-3}	2.89 10^{-12}	2.68 10^{-12}	8.88 10^{-10}	7.06 10^{-12}	2.36 10^{-11}	2.45 10^{-12}	1.43 10^{-10}	**1.52 10^{-10}**
La-142	D 1 10^{-3}	1.66 10^{-11}	1.13 10^{-11}	3.01 10^{-10}	1.36 10^{-11}	1.11 10^{-11}	8.74 10^{-12}	8.07 10^{-11}	**6.84 10^{-11}**
	W 1 10^{-3}	5.91 10^{-12}	6.28 10^{-12}	3.50 10^{-10}	6.83 10^{-12}	5.39 10^{-12}	4.91 10^{-12}	3.14 10^{-11}	**5.50 10^{-11}**
La-143	D 1 10^{-3}	1.02 10^{-12}	8.61 10^{-13}	8.32 10^{-11}	2.86 10^{-12}	3.32 10^{-12}	7.81 10^{-13}	1.64 10^{-11}	**1.58 10^{-11}**
	W 1 10^{-3}	6.53 10^{-13}	3.20 10^{-13}	1.06 10^{-10}	7.30 10^{-13}	7.29 10^{-13}	2.44 10^{-13}	1.05 10^{-11}	**1.62 10^{-11}**
Cerium									
Ce-134	W 3 10^{-4}	2.55 10^{-10}	8.66 10^{-11}	8.27 10^{-9}	2.11 10^{-10}	1.80 10^{-10}	4.79 10^{-11}	3.44 10^{-9}	**2.13 10^{-9}**
	Y 3 10^{-4}	2.74 10^{-10}	7.02 10^{-11}	8.67 10^{-9}	1.01 10^{-10}	5.59 10^{-11}	3.32 10^{-11}	3.57 10^{-9}	**2.21 10^{-9}**
Ce-135	W 3 10^{-4}	2.11 10^{-10}	6.18 10^{-11}	1.15 10^{-9}	8.73 10^{-11}	7.66 10^{-11}	3.10 10^{-11}	6.09 10^{-10}	**3.96 10^{-10}**
	Y 3 10^{-4}	2.44 10^{-10}	5.90 10^{-11}	1.19 10^{-9}	7.94 10^{-11}	4.12 10^{-11}	2.62 10^{-11}	6.83 10^{-10}	**4.29 10^{-10}**
Ce-137	W 3 10^{-4}	3.17 10^{-12}	9.78 10^{-13}	4.09 10^{-11}	2.11 10^{-12}	3.02 10^{-12}	2.52 10^{-13}	1.41 10^{-11}	**1.04 10^{-11}**
	Y 3 10^{-4}	3.68 10^{-12}	9.00 10^{-13}	4.29 10^{-11}	1.87 10^{-12}	1.03 10^{-12}	1.32 10^{-13}	1.62 10^{-11}	**1.13 10^{-11}**
Ce-137m	W 3 10^{-4}	3.42 10^{-11}	8.69 10^{-12}	1.32 10^{-9}	2.99 10^{-11}	3.63 10^{-11}	3.36 10^{-12}	6.18 10^{-10}	**3.58 10^{-10}**
	Y 3 10^{-4}	3.74 10^{-11}	6.66 10^{-12}	1.37 10^{-9}	1.61 10^{-11}	8.30 10^{-12}	1.29 10^{-12}	6.83 10^{-10}	**3.82 10^{-10}**

Table 2.1, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Ce-139	W 3 10^{-4}	2.75 10^{-10}	3.33 10^{-10}	6.14 10^{-9}	9.29 10^{-10}	4.36 10^{-9}	1.53 10^{-10}	2.84 10^{-9}	**1.95 10^{-9}**
	Y 3 10^{-4}	1.56 10^{-10}	3.31 10^{-10}	1.67 10^{-8}	4.96 10^{-10}	6.42 10^{-10}	1.66 10^{-10}	9.05 10^{-10}	**2.45 10^{-9}**
Ce-141	W 3 10^{-4}	8.44 10^{-11}	7.12 10^{-11}	1.12 10^{-8}	4.19 10^{-10}	3.79 10^{-9}	4.61 10^{-11}	2.36 10^{-9}	**2.25 10^{-9}**
	Y 3 10^{-4}	5.54 10^{-11}	4.46 10^{-11}	1.67 10^{-8}	8.96 10^{-11}	2.54 10^{-10}	2.55 10^{-11}	1.26 10^{-9}	**2.42 10^{-9}**
Ce-143	W 3 10^{-4}	7.06 10^{-11}	2.22 10^{-11}	3.54 10^{-9}	7.77 10^{-11}	7.90 10^{-11}	1.21 10^{-11}	1.36 10^{-9}	**8.66 10^{-10}**
	Y 3 10^{-4}	7.53 10^{-11}	1.66 10^{-11}	3.88 10^{-9}	2.96 10^{-11}	1.64 10^{-11}	6.23 10^{-12}	1.42 10^{-9}	**9.16 10^{-10}**
Ce-144	W 3 10^{-4}	1.93 10^{-9}	1.97 10^{-9}	1.83 10^{-7}	2.67 10^{-8}	4.54 10^{-8}	1.88 10^{-9}	1.03 10^{-7}	**5.84 10^{-8}**
	Y 3 10^{-4}	2.39 10^{-10}	3.48 10^{-10}	7.91 10^{-7}	2.88 10^{-9}	4.72 10^{-9}	2.92 10^{-10}	1.91 10^{-8}	**1.01 10^{-7}**
Praseodymium									
Pr-136	W 3 10^{-4}	9.56 10^{-14}	5.39 10^{-13}	4.73 10^{-11}	5.44 10^{-13}	4.62 10^{-13}	4.64 10^{-13}	1.47 10^{-12}	**6.32 10^{-12}**
	Y 3 10^{-4}	1.03 10^{-13}	5.66 10^{-13}	4.99 10^{-11}	5.37 10^{-13}	4.23 10^{-13}	4.86 10^{-13}	1.62 10^{-12}	**6.68 10^{-12}**
Pr-137	W 3 10^{-4}	1.10 10^{-12}	9.87 10^{-13}	7.47 10^{-11}	1.36 10^{-12}	1.54 10^{-12}	6.42 10^{-13}	7.11 10^{-12}	**1.17 10^{-11}**
	Y 3 10^{-4}	1.33 10^{-12}	1.06 10^{-12}	8.09 10^{-11}	1.25 10^{-12}	8.59 10^{-13}	6.83 10^{-13}	8.50 10^{-12}	**1.29 10^{-11}**
Pr-138m	W 3 10^{-4}	7.99 10^{-12}	7.05 10^{-12}	1.69 10^{-10}	7.92 10^{-12}	5.89 10^{-12}	5.34 10^{-12}	2.75 10^{-11}	**3.29 10^{-11}**
	Y 3 10^{-4}	9.72 10^{-12}	7.56 10^{-12}	1.83 10^{-10}	8.00 10^{-12}	5.33 10^{-12}	5.68 10^{-12}	3.23 10^{-11}	**3.65 10^{-11}**
Pr-139	W 3 10^{-4}	2.38 10^{-12}	1.36 10^{-12}	6.35 10^{-11}	2.96 10^{-12}	9.27 10^{-12}	5.79 10^{-13}	1.45 10^{-11}	**1.34 10^{-11}**
	Y 3 10^{-4}	2.79 10^{-12}	1.51 10^{-12}	8.18 10^{-11}	2.16 10^{-12}	1.89 10^{-12}	6.74 10^{-13}	1.50 10^{-11}	**1.56 10^{-11}**
Pr-142	W 3 10^{-4}	5.29 10^{-12}	1.75 10^{-12}	2.85 10^{-9}	3.16 10^{-11}	3.48 10^{-11}	6.71 10^{-13}	1.22 10^{-9}	**7.14 10^{-10}**
	Y 3 10^{-4}	6.13 10^{-12}	1.78 10^{-12}	2.97 10^{-9}	3.78 10^{-12}	2.95 10^{-12}	6.38 10^{-13}	1.40 10^{-9}	**7.79 10^{-10}**
Pr-142m	W 3 10^{-4}	6.81 10^{-14}	2.23 10^{-14}	3.63 10^{-11}	4.06 10^{-13}	4.51 10^{-13}	8.51 10^{-15}	1.57 10^{-11}	**9.14 10^{-12}**
	Y 3 10^{-4}	7.90 10^{-14}	2.27 10^{-14}	3.78 10^{-11}	4.85 10^{-14}	3.81 10^{-14}	8.08 10^{-15}	1.80 10^{-11}	**9.98 10^{-12}**
Pr-143	W 3 10^{-4}	4.25 10^{-18}	2.45 10^{-18}	1.10 10^{-8}	2.73 10^{-10}	2.74 10^{-10}	1.58 10^{-18}	2.25 10^{-9}	**2.04 10^{-9}**
	Y 3 10^{-4}	4.37 10^{-18}	2.22 10^{-18}	1.33 10^{-8}	1.48 10^{-11}	1.49 10^{-11}	1.68 10^{-18}	1.97 10^{-9}	**2.19 10^{-9}**
Pr-144	W 3 10^{-4}	2.20 10^{-15}	9.91 10^{-15}	8.85 10^{-11}	8.08 10^{-14}	1.35 10^{-13}	8.01 10^{-15}	1.19 10^{-12}	**1.10 10^{-11}**
	Y 3 10^{-4}	2.41 10^{-15}	1.05 10^{-14}	9.40 10^{-11}	1.38 10^{-14}	1.47 10^{-14}	8.47 10^{-15}	1.40 10^{-12}	**1.17 10^{-11}**
Pr-145	W 3 10^{-4}	2.93 10^{-13}	1.27 10^{-13}	8.69 10^{-10}	5.42 10^{-12}	6.02 10^{-12}	7.71 10^{-14}	1.99 10^{-10}	**1.65 10^{-10}**
	Y 3 10^{-4}	3.53 10^{-13}	1.34 10^{-13}	9.24 10^{-10}	4.49 10^{-13}	4.14 10^{-13}	7.96 10^{-14}	2.36 10^{-10}	**1.82 10^{-10}**
Pr-147	W 3 10^{-4}	1.09 10^{-13}	2.72 10^{-13}	5.68 10^{-11}	5.40 10^{-13}	1.43 10^{-12}	2.08 10^{-13}	2.40 10^{-12}	**7.72 10^{-12}**
	Y 3 10^{-4}	1.17 10^{-13}	2.81 10^{-13}	6.15 10^{-11}	3.24 10^{-13}	3.76 10^{-13}	2.17 10^{-13}	2.39 10^{-12}	**8.22 10^{-12}**
Neodymium									
Nd-136	W 3 10^{-4}	1.43 10^{-12}	2.54 10^{-12}	1.93 10^{-10}	3.20 10^{-12}	3.33 10^{-12}	1.92 10^{-12}	1.26 10^{-11}	**2.82 10^{-11}**
	Y 3 10^{-4}	1.72 10^{-12}	2.75 10^{-12}	2.11 10^{-10}	2.85 10^{-12}	2.12 10^{-12}	2.06 10^{-12}	1.53 10^{-11}	**3.12 10^{-11}**
Nd-138	W 3 10^{-4}	1.62 10^{-11}	7.15 10^{-12}	1.33 10^{-9}	2.10 10^{-11}	2.00 10^{-11}	4.09 10^{-12}	2.78 10^{-10}	**2.51 10^{-10}**
	Y 3 10^{-4}	1.97 10^{-11}	7.58 10^{-12}	1.42 10^{-9}	9.86 10^{-12}	6.07 10^{-12}	4.13 10^{-12}	3.33 10^{-10}	**2.78 10^{-10}**
Nd-139	W 3 10^{-4}	3.63 10^{-13}	4.10 10^{-13}	3.44 10^{-11}	7.35 10^{-13}	2.01 10^{-12}	2.69 10^{-13}	2.50 10^{-12}	**5.19 10^{-12}**
	Y 3 10^{-4}	4.22 10^{-13}	4.44 10^{-13}	3.85 10^{-11}	5.30 10^{-13}	4.77 10^{-13}	2.88 10^{-13}	2.85 10^{-12}	**5.73 10^{-12}**
Nd-139m	W 3 10^{-4}	3.73 10^{-11}	1.60 10^{-11}	3.31 10^{-10}	2.49 10^{-11}	4.09 10^{-11}	9.33 10^{-12}	1.14 10^{-10}	**9.01 10^{-11}**
	Y 3 10^{-4}	4.48 10^{-11}	1.70 10^{-11}	3.67 10^{-10}	2.16 10^{-11}	1.39 10^{-11}	9.58 10^{-12}	1.32 10^{-10}	**1.01 10^{-10}**
Nd-141	W 3 10^{-4}	4.48 10^{-13}	3.41 10^{-13}	1.38 10^{-11}	5.64 10^{-13}	7.59 10^{-13}	1.37 10^{-13}	1.98 10^{-12}	**2.51 10^{-12}**
	Y 3 10^{-4}	5.51 10^{-13}	3.67 10^{-13}	1.49 10^{-11}	5.20 10^{-13}	3.61 10^{-13}	1.43 10^{-13}	2.39 10^{-12}	**2.78 10^{-12}**
Nd-147	W 3 10^{-4}	7.94 10^{-11}	3.76 10^{-11}	8.42 10^{-9}	4.98 10^{-10}	2.33 10^{-9}	1.94 10^{-11}	1.86 10^{-9}	**1.72 10^{-9}**
	Y 3 10^{-4}	8.41 10^{-11}	3.45 10^{-11}	1.06 10^{-8}	9.19 10^{-11}	3.26 10^{-10}	1.82 10^{-11}	1.76 10^{-9}	**1.85 10^{-9}**
Nd-149	W 3 10^{-4}	1.04 10^{-12}	9.61 10^{-13}	3.10 10^{-10}	4.75 10^{-12}	5.75 10^{-12}	5.96 10^{-13}	5.81 10^{-11}	**5.58 10^{-11}**
	Y 3 10^{-4}	1.27 10^{-12}	1.03 10^{-12}	3.32 10^{-10}	1.47 10^{-12}	1.12 10^{-12}	6.24 10^{-13}	6.66 10^{-11}	**6.05 10^{-11}**
Nd-151	W 3 10^{-4}	4.92 10^{-13}	3.41 10^{-13}	4.85 10^{-11}	6.86 10^{-13}	9.66 10^{-13}	2.42 10^{-13}	5.95 10^{-12}	**7.90 10^{-12}**
	Y 3 10^{-4}	5.70 10^{-13}	3.53 10^{-13}	5.09 10^{-11}	4.43 10^{-13}	3.29 10^{-13}	2.48 10^{-13}	6.85 10^{-12}	**8.43 10^{-12}**

Table 2.1, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Promethium									
Pm-141	W 3 10^{-4}	$1.41\ 10^{-13}$	$3.64\ 10^{-13}$	$6.08\ 10^{-11}$	$4.59\ 10^{-13}$	$4.71\ 10^{-13}$	$2.80\ 10^{-13}$	$1.64\ 10^{-12}$	**$7.96\ 10^{-12}$**
	Y 3 10^{-4}	$1.66\ 10^{-13}$	$3.88\ 10^{-13}$	$6.50\ 10^{-11}$	$4.03\ 10^{-13}$	$3.09\ 10^{-13}$	$2.96\ 10^{-13}$	$1.97\ 10^{-12}$	**$8.56\ 10^{-12}$**
Pm-143	W 3 10^{-4}	$5.92\ 10^{-10}$	$8.19\ 10^{-10}$	$4.74\ 10^{-9}$	$2.01\ 10^{-9}$	$5.37\ 10^{-9}$	$4.35\ 10^{-10}$	$3.19\ 10^{-9}$	**$2.21\ 10^{-9}$**
	Y 3 10^{-4}	$3.26\ 10^{-10}$	$9.63\ 10^{-10}$	$1.61\ 10^{-8}$	$1.12\ 10^{-9}$	$1.25\ 10^{-9}$	$7.74\ 10^{-10}$	$1.96\ 10^{-9}$	**$2.94\ 10^{-9}$**
Pm-144	W 3 10^{-4}	$3.47\ 10^{-9}$	$5.09\ 10^{-9}$	$2.01\ 10^{-8}$	$9.91\ 10^{-9}$	$1.44\ 10^{-8}$	$2.95\ 10^{-9}$	$1.90\ 10^{-8}$	**$1.14\ 10^{-8}$**
	Y 3 10^{-4}	$1.80\ 10^{-9}$	$5.74\ 10^{-9}$	$7.09\ 10^{-8}$	$6.17\ 10^{-9}$	$5.58\ 10^{-9}$	$4.98\ 10^{-9}$	$1.21\ 10^{-8}$	**$1.45\ 10^{-8}$**
Pm-145	W 3 10^{-4}	$3.60\ 10^{-10}$	$6.94\ 10^{-10}$	$4.64\ 10^{-9}$	$1.02\ 10^{-8}$	**$7.58\ 10^{-8}$**	$1.87\ 10^{-10}$	$8.67\ 10^{-9}$	$6.85\ 10^{-9}$
	Y 3 10^{-4}	$1.67\ 10^{-10}$	$8.43\ 10^{-10}$	$4.61\ 10^{-8}$	$4.54\ 10^{-9}$	$2.77\ 10^{-8}$	$1.72\ 10^{-10}$	$3.83\ 10^{-9}$	**$8.23\ 10^{-9}$**
Pm-146	W 3 10^{-4}	$5.38\ 10^{-9}$	$8.42\ 10^{-9}$	$3.39\ 10^{-8}$	$3.84\ 10^{-8}$	$5.29\ 10^{-8}$	$4.39\ 10^{-9}$	$4.87\ 10^{-8}$	**$2.76\ 10^{-8}$**
	Y 3 10^{-4}	$2.47\ 10^{-9}$	$8.04\ 10^{-9}$	$2.33\ 10^{-7}$	$1.60\ 10^{-8}$	$1.88\ 10^{-8}$	$6.33\ 10^{-9}$	$2.38\ 10^{-8}$	**$3.96\ 10^{-8}$**
Pm-147	W 3 10^{-4}	$1.88\ 10^{-14}$	$3.15\ 10^{-14}$	$9.69\ 10^{-9}$	$8.16\ 10^{-9}$	**$1.02.10^{-7}$**	$1.32\ 10^{-14}$	$5.89\ 10^{-9}$	$6.97\ 10^{-9}$
	Y 3 10^{-4}	$8.25\ 10^{-15}$	$3.60\ 10^{-14}$	$7.74\ 10^{-8}$	$1.61\ 10^{-9}$	$2.01\ 10^{-8}$	$1.98\ 10^{-14}$	$1.56\ 10^{-9}$	**$1.06\ 10^{-8}$**
Pm-148	W 3 10^{-4}	$1.96\ 10^{-10}$	$7.85\ 10^{-11}$	$1.26\ 10^{-8}$	$5.11\ 10^{-10}$	$4.80\ 10^{-10}$	$4.27\ 10^{-11}$	$3.88\ 10^{-9}$	**$2.81\ 10^{-9}$**
	Y 3 10^{-4}	$2.12\ 10^{-10}$	$7.19\ 10^{-11}$	$1.37\ 10^{-8}$	$1.07\ 10^{-10}$	$7.08\ 10^{-11}$	$3.82\ 10^{-11}$	$4.10\ 10^{-9}$	**$2.95\ 10^{-9}$**
Pm-148m	W 3 10^{-4}	$1.38\ 10^{-9}$	$1.28\ 10^{-9}$	$2.25\ 10^{-8}$	$2.88\ 10^{-9}$	$9.05\ 10^{-9}$	$8.79\ 10^{-10}$	$5.27\ 10^{-9}$	**$5.46\ 10^{-9}$**
	Y 3 10^{-4}	$1.19\ 10^{-9}$	$1.24\ 10^{-9}$	$3.59\ 10^{-8}$	$1.36\ 10^{-9}$	$1.36\ 10^{-9}$	$1.05\ 10^{-9}$	$3.58\ 10^{-9}$	**$6.10\ 10^{-9}$**
Pm-149	W 3 10^{-4}	$3.16\ 10^{-12}$	$8.44\ 10^{-13}$	$2.99\ 10^{-9}$	$7.94\ 10^{-11}$	$8.04\ 10^{-11}$	$3.69\ 10^{-13}$	$1.24\ 10^{-9}$	**$7.44\ 10^{-10}$**
	Y 3 10^{-4}	$3.61\ 10^{-12}$	$8.20\ 10^{-13}$	$3.12\ 10^{-9}$	$5.53\ 10^{-12}$	$5.01\ 10^{-12}$	$3.31\ 10^{-13}$	$1.39\ 10^{-9}$	**$7.93\ 10^{-10}$**
Pm-150	W 3 10^{-4}	$6.82\ 10^{-12}$	$5.15\ 10^{-12}$	$5.36\ 10^{-10}$	$8.76\ 10^{-12}$	$7.61\ 10^{-12}$	$3.38\ 10^{-12}$	$6.78\ 10^{-11}$	**$8.85\ 10^{-11}$**
	Y 3 10^{-4}	$8.26\ 10^{-12}$	$5.52\ 10^{-12}$	$5.78\ 10^{-10}$	$6.11\ 10^{-12}$	$4.00\ 10^{-12}$	$3.54\ 10^{-12}$	$8.22\ 10^{-11}$	**$9.79\ 10^{-11}$**
Pm-151	W 3 10^{-4}	$6.16\ 10^{-11}$	$1.59\ 10^{-11}$	$1.58\ 10^{-9}$	$5.79\ 10^{-11}$	$9.73\ 10^{-11}$	$6.69\ 10^{-12}$	$7.36\ 10^{-10}$	**$4.38\ 10^{-10}$**
	Y 3 10^{-4}	$7.17\ 10^{-11}$	$1.59\ 10^{-11}$	$1.64\ 10^{-9}$	$2.72\ 10^{-11}$	$1.86\ 10^{-11}$	$6.18\ 10^{-12}$	$8.39\ 10^{-10}$	**$4.73\ 10^{-10}$**
Samarium									
Sm-141	W 3 10^{-4}	$1.26\ 10^{-13}$	$4.63\ 10^{-13}$	$6.31\ 10^{-11}$	$5.37\ 10^{-13}$	$5.09\ 10^{-13}$	$3.69\ 10^{-13}$	$1.74\ 10^{-12}$	**$8.29\ 10^{-12}$**
Sm-141m	W 3 10^{-4}	$4.40\ 10^{-13}$	$1.29\ 10^{-12}$	$1.14\ 10^{-10}$	$1.52\ 10^{-12}$	$1.47\ 10^{-12}$	$1.03\ 10^{-12}$	$5.04\ 10^{-12}$	**$1.58\ 10^{-11}$**
Sm-142	W 3 10^{-4}	$1.05\ 10^{-12}$	$1.55\ 10^{-12}$	$4.19\ 10^{-10}$	$3.03\ 10^{-12}$	$3.11\ 10^{-12}$	$1.15\ 10^{-12}$	$2.32\ 10^{-11}$	**$5.82\ 10^{-11}$**
Sm-145	W 3 10^{-4}	$1.84\ 10^{-10}$	$2.90\ 10^{-10}$	$6.58\ 10^{-9}$	$3.46\ 10^{-9}$	$2.58\ 10^{-8}$	$7.46\ 10^{-11}$	$3.04\ 10^{-9}$	**$2.98\ 10^{-9}$**
Sm-146	W 3 10^{-4}	$0.00\ 10^{-0}$	$0.00\ 10^{-0}$	$8.40\ 10^{-6}$	$3.03\ 10^{-5}$	**$3.79\ 10^{-4}$**	$0.00\ 10^{-0}$	$2.08\ 10^{-5}$	$2.23\ 10^{-5}$
Sm-147	W 3 10^{-4}	$0.00\ 10^{-0}$	$0.00\ 10^{-0}$	$7.62\ 10^{-6}$	$2.75\ 10^{-5}$	**$3.44\ 10^{-4}$**	$0.00\ 10^{-0}$	$1.89\ 10^{-5}$	$2.02\ 10^{-5}$
Sm-151	W 3 10^{-4}	$4.03\ 10^{-14}$	$1.49\ 10^{-13}$	$3.26\ 10^{-9}$	$1.10\ 10^{-8}$	**$1.38\ 10^{-7}$**	$1.32\ 10^{-14}$	$7.51\ 10^{-9}$	$8.10\ 10^{-9}$
Sm-153	W 3 10^{-4}	$2.36\ 10^{-11}$	$5.67\ 10^{-12}$	$2.05\ 10^{-9}$	$6.66\ 10^{-11}$	$1.57\ 10^{-10}$	$1.51\ 10^{-12}$	$8.84\ 10^{-10}$	**$5.31\ 10^{-10}$**
Sm-155	W 3 10^{-4}	$1.35\ 10^{-14}$	$5.72\ 10^{-14}$	$5.32\ 10^{-11}$	$2.85\ 10^{-13}$	$1.65\ 10^{-12}$	$3.70\ 10^{-14}$	$1.03\ 10^{-12}$	**$6.79\ 10^{-12}$**
Sm-156	W 3 10^{-4}	$2.21\ 10^{-11}$	$1.15\ 10^{-11}$	$8.74\ 10^{-10}$	$4.10\ 10^{-11}$	$1.18\ 10^{-10}$	$6.33\ 10^{-12}$	$2.26\ 10^{-10}$	**$1.89\ 10^{-10}$**
Europium									
Eu-145	W 1 10^{-3}	$5.42\ 10^{-10}$	$2.18\ 10^{-10}$	$1.96\ 10^{-9}$	$3.58\ 10^{-10}$	$6.73\ 10^{-10}$	$1.19\ 10^{-10}$	$9.03\ 10^{-10}$	**$7.41\ 10^{-10}$**
Eu-146	W 1 10^{-3}	$8.75\ 10^{-10}$	$3.15\ 10^{-10}$	$2.62\ 10^{-9}$	$4.41\ 10^{-10}$	$3.31\ 10^{-10}$	$1.76\ 10^{-10}$	$1.35\ 10^{-9}$	**$1.05\ 10^{-9}$**
Eu-147	W 1 10^{-3}	$3.05\ 10^{-10}$	$2.13\ 10^{-10}$	$3.90\ 10^{-9}$	$4.56\ 10^{-10}$	$1.62\ 10^{-9}$	$1.28\ 10^{-10}$	$9.07\ 10^{-10}$	**$9.55\ 10^{-10}$**
Eu-148	W 1 10^{-3}	$1.61\ 10^{-9}$	$1.61\ 10^{-9}$	$1.20\ 10^{-8}$	$2.43\ 10^{-9}$	$2.76\ 10^{-9}$	$1.07\ 10^{-9}$	$4.60\ 10^{-9}$	**$3.87\ 10^{-9}$**
Eu-149	W 1 10^{-3}	$7.78\ 10^{-11}$	$8.56\ 10^{-11}$	$2.02\ 10^{-9}$	$3.86\ 10^{-10}$	$1.70\ 10^{-9}$	$3.23\ 10^{-11}$	$4.58\ 10^{-10}$	**$5.10\ 10^{-10}$**
Eu-150 12.62 h	W 1 10^{-3}	$3.69\ 10^{-12}$	$1.08\ 10^{-12}$	$7.79\ 10^{-10}$	$1.22\ 10^{-11}$	$1.23\ 10^{-11}$	$4.67\ 10^{-13}$	$2.85\ 10^{-10}$	**$1.82\ 10^{-10}$**
Eu-150 34.2 y	W 1 10^{-3}	$1.95\ 10^{-8}$	$3.06\ 10^{-8}$	$6.55\ 10^{-8}$	$7.95\ 10^{-8}$	$1.20\ 10^{-7}$	$1.63\ 10^{-8}$	$1.38\ 10^{-7}$	**$7.25\ 10^{-8}$**
Eu-152	W 1 10^{-3}	$1.31\ 10^{-8}$	$1.74\ 10^{-8}$	$5.76\ 10^{-8}$	$7.91\ 10^{-8}$	$2.40\ 10^{-7}$	$8.25\ 10^{-9}$	$9.99\ 10^{-8}$	**$5.97\ 10^{-8}$**
Eu-152m	W 1 10^{-3}	$1.33\ 10^{-11}$	$4.69\ 10^{-12}$	$9.94\ 10^{-10}$	$1.77\ 10^{-11}$	$1.94\ 10^{-11}$	$2.60\ 10^{-12}$	$3.17\ 10^{-10}$	**$2.21\ 10^{-10}$**
Eu-154	W 1 10^{-3}	$1.17\ 10^{-8}$	$1.55\ 10^{-8}$	$7.92\ 10^{-8}$	$1.06\ 10^{-7}$	$5.23\ 10^{-7}$	$7.14\ 10^{-9}$	$1.13\ 10^{-7}$	**$7.73\ 10^{-8}$**

Table 2.1, Cont'd.

Nuclide	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Eu-155	W 1 10^{-3}	3.56 10^{-10}	6.14 10^{-10}	1.19 10^{-8}	1.43 10^{-8}	**1.52 10^{-7}**	2.40 10^{-10}	1.11 10^{-8}	1.12 10^{-8}
Eu-156	W 1 10^{-3}	6.12 10^{-10}	3.64 10^{-10}	1.84 10^{-8}	1.14 10^{-9}	2.76 10^{-9}	2.16 10^{-10}	3.91 10^{-9}	**3.82 10^{-9}**
Eu-157	W 1 10^{-3}	2.84 10^{-11}	7.69 10^{-12}	1.19 10^{-9}	3.06 10^{-11}	3.90 10^{-11}	3.04 10^{-12}	4.82 10^{-10}	**3.01 10^{-10}**
Eu-158	W 1 10^{-3}	4.47 10^{-13}	9.57 10^{-13}	1.89 10^{-10}	1.35 10^{-12}	1.59 10^{-12}	8.40 10^{-13}	7.54 10^{-12}	**2.54 10^{-11}**
Gadolinium									
Gd-145	D 3 10^{-4}	1.88 10^{-12}	1.87 10^{-12}	5.88 10^{-11}	3.71 10^{-12}	8.96 10^{-12}	1.00 10^{-12}	1.22 10^{-11}	**1.22 10^{-11}**
	W 3 10^{-4}	1.69 10^{-12}	1.52 10^{-12}	6.74 10^{-11}	1.97 10^{-12}	2.80 10^{-12}	1.05 10^{-12}	4.40 10^{-12}	**1.04 10^{-11}**
Gd-146	D 3 10^{-4}	2.65 10^{-9}	3.51 10^{-9}	5.48 10^{-9}	1.42 10^{-8}	6.73 10^{-8}	1.76 10^{-9}	1.57 10^{-8}	**1.03 10^{-8}**
	W 3 10^{-4}	1.19 10^{-9}	1.65 10^{-9}	2.50 10^{-8}	3.84 10^{-9}	1.38 10^{-8}	1.13 10^{-9}	5.22 10^{-9}	**6.02 10^{-9}**
Gd-147	D 3 10^{-4}	1.90 10^{-10}	9.61 10^{-11}	3.84 10^{-10}	2.99 10^{-10}	1.07 10^{-9}	4.42 10^{-11}	5.01 10^{-10}	**3.28 10^{-10}**
	W 3 10^{-4}	3.04 10^{-10}	9.20 10^{-11}	1.06 10^{-9}	1.55 10^{-10}	2.43 10^{-10}	4.59 10^{-11}	5.43 10^{-10}	**4.07 10^{-10}**
Gd-148	D 3 10^{-4}	0.00 10^{-0}	0.00 10^{-0}	1.98 10^{-7}	1.41 10^{-4}	**1.76 10^{-3}**	0.00 10^{-0}	6.45 10^{-5}	8.91 10^{-5}
	W 3 10^{-4}	0.00 10^{-0}	0.00 10^{-0}	1.08 10^{-5}	3.56 10^{-5}	**4.45 10^{-4}**	0.00 10^{-0}	1.63 10^{-5}	2.38 10^{-5}
Gd-149	D 3 10^{-4}	1.56 10^{-10}	1.35 10^{-10}	4.26 10^{-10}	8.58 10^{-10}	4.34 10^{-9}	6.78 10^{-11}	8.96 10^{-10}	**6.14 10^{-10}**
	W 3 10^{-4}	2.24 10^{-10}	1.01 10^{-10}	2.44 10^{-9}	2.66 10^{-10}	8.33 10^{-10}	5.28 10^{-11}	6.52 10^{-10}	**6.18 10^{-10}**
Gd-151	D 3 10^{-4}	1.41 10^{-10}	2.12 10^{-10}	4.96 10^{-10}	3.97 10^{-9}	**3.57 10^{-8}**	9.54 10^{-11}	2.40 10^{-9}	2.40 10^{-9}
	W 3 10^{-4}	8.68 10^{-11}	9.81 10^{-11}	4.84 10^{-9}	9.49 10^{-10}	7.79 10^{-9}	3.77 10^{-11}	7.99 10^{-10}	**1.21 10^{-9}**
Gd-152	D 3 10^{-4}	0.00 10^{-0}	0.00 10^{-0}	1.33 10^{-7}	1.04 10^{-4}	**1.30 10^{-3}**	0.00 10^{-0}	4.77 10^{-5}	6.58 10^{-5}
	W 3 10^{-4}	0.00 10^{-0}	0.00 10^{-0}	7.28 10^{-6}	2.63 10^{-5}	**3.29 10^{-4}**	0.00 10^{-0}	1.20 10^{-5}	1.75 10^{-5}
Gd-153	D 3 10^{-4}	4.35 10^{-10}	6.88 10^{-10}	1.40 10^{-9}	1.09 10^{-8}	**9.23 10^{-8}**	2.84 10^{-10}	6.56 10^{-9}	6.43 10^{-9}
	W 3 10^{-4}	1.93 10^{-10}	2.59 10^{-10}	7.75 10^{-9}	2.71 10^{-9}	2.15 10^{-8}	1.04 10^{-10}	1.90 10^{-9}	**2.56 10^{-9}**
Gd-159	D 3 10^{-4}	4.77 10^{-12}	1.60 10^{-12}	5.31 10^{-10}	1.02 10^{-10}	2.01 10^{-10}	6.70 10^{-13}	3.26 10^{-10}	**1.81 10^{-10}**
	W 3 10^{-4}	7.17 10^{-12}	1.80 10^{-12}	1.05 10^{-9}	2.23 10^{-11}	4.00 10^{-11}	6.46 10^{-13}	4.40 10^{-10}	**2.64 10^{-10}**
Terbium									
Tb-147	W 3 10^{-4}	1.67 10^{-11}	7.44 10^{-12}	2.94 10^{-10}	1.17 10^{-11}	1.57 10^{-11}	4.61 10^{-12}	4.57 10^{-11}	**5.63 10^{-11}**
Tb-149	W 3 10^{-4}	2.45 10^{-11}	1.24 10^{-11}	1.53 10^{-8}	1.53 10^{-10}	1.89 10^{-9}	7.13 10^{-12}	1.89 10^{-10}	**1.98 10^{-9}**
Tb-150	W 3 10^{-4}	1.26 10^{-11}	7.84 10^{-12}	4.63 10^{-10}	1.21 10^{-11}	9.85 10^{-12}	5.07 10^{-12}	7.49 10^{-11}	**8.43 10^{-11}**
Tb-151	W 3 10^{-4}	1.04 10^{-10}	2.89 10^{-11}	4.79 10^{-10}	5.65 10^{-11}	1.29 10^{-10}	1.28 10^{-11}	2.36 10^{-10}	**1.69 10^{-10}**
Tb-153	W 3 10^{-4}	8.26 10^{-11}	2.30 10^{-11}	6.34 10^{-10}	8.57 10^{-11}	4.03 10^{-10}	8.54 10^{-12}	2.72 10^{-10}	**2.04 10^{-10}**
Tb-154	W 3 10^{-4}	2.67 10^{-10}	7.72 10^{-11}	7.21 10^{-10}	1.12 10^{-10}	1.09 10^{-10}	3.36 10^{-11}	4.58 10^{-10}	**3.20 10^{-10}**
Tb-155	W 3 10^{-4}	7.73 10^{-11}	2.40 10^{-11}	7.67 10^{-10}	8.34 10^{-11}	2.90 10^{-10}	8.45 10^{-12}	2.55 10^{-10}	**2.10 10^{-10}**
Tb-156	W 3 10^{-4}	6.72 10^{-10}	2.51 10^{-10}	3.30 10^{-9}	4.28 10^{-10}	8.48 10^{-10}	1.38 10^{-10}	1.33 10^{-9}	**1.08 10^{-9}**
Tb-156m 24.4 h	W 3 10^{-4}	1.04 10^{-10}	4.32 10^{-11}	6.93 10^{-10}	8.10 10^{-11}	1.96 10^{-10}	2.48 10^{-11}	2.48 10^{-10}	**2.06 10^{-10}**
Tb-156m 5.0 h	W 3 10^{-4}	2.62 10^{-11}	9.66 10^{-12}	2.18 10^{-10}	1.77 10^{-11}	4.65 10^{-11}	5.29 10^{-12}	6.91 10^{-11}	**5.86 10^{-11}**
Tb-157	W 3 10^{-4}	4.14 10^{-11}	6.60 10^{-11}	1.18 10^{-9}	4.18 10^{-9}	**4.42 10^{-8}**	2.67 10^{-11}	1.66 10^{-9}	2.49 10^{-9}
Tb-158	W 3 10^{-4}	1.38 10^{-8}	1.78 10^{-8}	4.91 10^{-8}	1.18 10^{-7}	6.23 10^{-7}	7.74 10^{-9}	8.01 10^{-8}	**6.91 10^{-8}**
Tb-160	W 3 10^{-4}	9.36 10^{-10}	9.63 10^{-10}	3.02 10^{-8}	4.43 10^{-9}	2.47 10^{-8}	6.54 10^{-10}	4.84 10^{-9}	**6.75 10^{-9}**
Tb-161	W 3 10^{-4}	2.58 10^{-11}	8.38 10^{-12}	4.19 10^{-9}	1.90 10^{-10}	2.07 10^{-9}	1.93 10^{-12}	1.08 10^{-9}	**9.20 10^{-10}**
Dysprosium									
Dy-155	W 3 10^{-4}	3.71 10^{-11}	1.19 10^{-11}	1.79 10^{-10}	2.35 10^{-11}	4.62 10^{-11}	5.32 10^{-12}	7.70 10^{-11}	**6.00 10^{-11}**
Dy-157	W 3 10^{-4}	1.64 10^{-11}	5.23 10^{-12}	5.93 10^{-11}	9.04 10^{-12}	9.10 10^{-12}	2.24 10^{-12}	2.73 10^{-11}	**2.16 10^{-11}**
Dy-159	W 3 10^{-4}	7.60 10^{-11}	7.99 10^{-11}	2.37 10^{-9}	8.21 10^{-10}	5.09 10^{-9}	3.12 10^{-11}	2.94 10^{-10}	**6.56 10^{-10}**
Dy-165	W 3 10^{-4}	1.24 10^{-13}	9.41 10^{-14}	2.42 10^{-10}	1.89 10^{-12}	2.47 10^{-12}	5.45 10^{-14}	2.27 10^{-11}	**3.62 10^{-11}**
Dy-166	W 3 10^{-4}	2.86 10^{-11}	8.09 10^{-12}	9.10 10^{-9}	4.37 10^{-10}	1.44 10^{-9}	2.68 10^{-12}	2.75 10^{-9}	**2.02 10^{-9}**

Table 2.1, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Holmium									
Ho-155	W $3\ 10^{-4}$	$3.34\ 10^{-12}$	$1.40\ 10^{-12}$	$6.56\ 10^{-11}$	$2.40\ 10^{-12}$	$3.61\ 10^{-12}$	$7.08\ 10^{-13}$	$9.26\ 10^{-12}$	**$1.21\ 10^{-11}$**
Ho-157	W $3\ 10^{-4}$	$4.54\ 10^{-13}$	$2.75\ 10^{-13}$	$7.54\ 10^{-12}$	$4.02\ 10^{-13}$	$3.78\ 10^{-13}$	$1.52\ 10^{-13}$	$9.41\ 10^{-13}$	**$1.41\ 10^{-12}$**
Ho-159	W $3\ 10^{-4}$	$9.82\ 10^{-14}$	$2.98\ 10^{-13}$	$1.08\ 10^{-11}$	$5.25\ 10^{-13}$	$1.08\ 10^{-12}$	$1.73\ 10^{-13}$	$9.64\ 10^{-13}$	**$1.76\ 10^{-12}$**
Ho-161	W $3\ 10^{-4}$	$4.69\ 10^{-13}$	$3.33\ 10^{-13}$	$2.45\ 10^{-11}$	$8.01\ 10^{-13}$	$2.02\ 10^{-12}$	$7.45\ 10^{-14}$	$3.13\ 10^{-12}$	**$4.20\ 10^{-12}$**
Ho-162	W $3\ 10^{-4}$	$9.03\ 10^{-15}$	$5.76\ 10^{-14}$	$4.69\ 10^{-12}$	$8.02\ 10^{-14}$	$1.16\ 10^{-13}$	$3.56\ 10^{-14}$	$1.60\ 10^{-13}$	**$6.36\ 10^{-13}$**
Ho-162m	W $3\ 10^{-4}$	$6.77\ 10^{-13}$	$1.02\ 10^{-12}$	$4.19\ 10^{-11}$	$1.36\ 10^{-12}$	$2.40\ 10^{-12}$	$6.92\ 10^{-13}$	$3.98\ 10^{-12}$	**$6.80\ 10^{-12}$**
Ho-164	W $3\ 10^{-4}$	$6.13\ 10^{-15}$	$2.72\ 10^{-14}$	$1.83\ 10^{-11}$	$7.88\ 10^{-14}$	$1.61\ 10^{-13}$	$7.88\ 10^{-15}$	$4.38\ 10^{-13}$	**$2.35\ 10^{-12}$**
Ho-164m	W $3\ 10^{-4}$	$3.90\ 10^{-14}$	$9.24\ 10^{-14}$	$3.79\ 10^{-11}$	$2.76\ 10^{-13}$	$9.23\ 10^{-13}$	$2.46\ 10^{-14}$	$1.68\ 10^{-12}$	**$5.14\ 10^{-12}$**
Ho-166	W $3\ 10^{-4}$	$5.02\ 10^{-12}$	$1.38\ 10^{-12}$	$3.25\ 10^{-9}$	$6.31\ 10^{-11}$	$9.35\ 10^{-11}$	$4.66\ 10^{-13}$	$1.49\ 10^{-9}$	**$8.48\ 10^{-10}$**
Ho-166m	W $3\ 10^{-4}$	$3.05\ 10^{-8}$	$4.84\ 10^{-8}$	$1.08\ 10^{-7}$	$1.61\ 10^{-7}$	$8.87\ 10^{-7}$	$2.14\ 10^{-8}$	$4.50\ 10^{-7}$	**$2.09\ 10^{-7}$**
Ho-167	W $3\ 10^{-4}$	$2.89\ 10^{-12}$	$1.72\ 10^{-12}$	$1.68\ 10^{-10}$	$3.21\ 10^{-12}$	$9.10\ 10^{-12}$	$9.54\ 10^{-13}$	$2.52\ 10^{-11}$	**$2.94\ 10^{-11}$**
Erbium									
Er-161	W $3\ 10^{-4}$	$8.98\ 10^{-12}$	$5.45\ 10^{-12}$	$1.02\ 10^{-10}$	$8.00\ 10^{-12}$	$1.12\ 10^{-11}$	$3.70\ 10^{-12}$	$2.59\ 10^{-11}$	**$2.45\ 10^{-11}$**
Er-165	W $3\ 10^{-4}$	$3.75\ 10^{-12}$	$1.08\ 10^{-12}$	$2.70\ 10^{-11}$	$3.51\ 10^{-12}$	$5.62\ 10^{-12}$	$2.94\ 10^{-13}$	$1.05\ 10^{-11}$	**$8.08\ 10^{-12}$**
Er-169	W $3\ 10^{-4}$	$2.81\ 10^{-12}$	$2.81\ 10^{-12}$	$2.72\ 10^{-9}$	$1.45\ 10^{-10}$	$1.76\ 10^{-9}$	$2.81\ 10^{-12}$	$5.53\ 10^{-10}$	**$5.64\ 10^{-10}$**
Er-171	W $3\ 10^{-4}$	$1.69\ 10^{-11}$	$6.70\ 10^{-12}$	$7.00\ 10^{-10}$	$2.16\ 10^{-11}$	$5.22\ 10^{-11}$	$3.96\ 10^{-12}$	$1.95\ 10^{-10}$	**$1.52\ 10^{-10}$**
Er-172	W $3\ 10^{-4}$	$2.01\ 10^{-10}$	$6.56\ 10^{-11}$	$4.60\ 10^{-9}$	$2.87\ 10^{-10}$	$8.10\ 10^{-10}$	$3.76\ 10^{-11}$	$1.45\ 10^{-9}$	**$1.11\ 10^{-9}$**
Thulium									
Tm-162	W $3\ 10^{-4}$	$3.62\ 10^{-13}$	$8.65\ 10^{-13}$	$4.11\ 10^{-11}$	$9.12\ 10^{-13}$	$7.88\ 10^{-13}$	$7.28\ 10^{-13}$	$2.08\ 10^{-12}$	**$5.93\ 10^{-12}$**
Tm-166	W $3\ 10^{-4}$	$6.19\ 10^{-11}$	$2.45\ 10^{-11}$	$3.10\ 10^{-10}$	$3.47\ 10^{-11}$	$4.48\ 10^{-11}$	$1.39\ 10^{-11}$	$1.31\ 10^{-10}$	**$1.02\ 10^{-10}$**
Tm-167	W $3\ 10^{-4}$	$9.39\ 10^{-11}$	$3.88\ 10^{-11}$	$3.64\ 10^{-9}$	$2.80\ 10^{-10}$	$2.09\ 10^{-9}$	$1.96\ 10^{-11}$	$7.80\ 10^{-10}$	**$7.97\ 10^{-10}$**
Tm-170	W $3\ 10^{-4}$	$1.45\ 10^{-10}$	$1.45\ 10^{-10}$	$3.90\ 10^{-8}$	$9.32\ 10^{-9}$	$1.39\ 10^{-8}$	$1.42\ 10^{-10}$	$2.78\ 10^{-9}$	**$7.11\ 10^{-9}$**
Tm-171	W $3\ 10^{-4}$	$5.81\ 10^{-11}$	$5.85\ 10^{-11}$	$3.99\ 10^{-9}$	$3.81\ 10^{-9}$	**$4.63\ 10^{-8}$**	$5.75\ 10^{-11}$	$3.88\ 10^{-10}$	$2.47\ 10^{-9}$
Tm-172	W $3\ 10^{-4}$	$1.24\ 10^{-10}$	$4.45\ 10^{-11}$	$5.23\ 10^{-9}$	$2.58\ 10^{-10}$	$5.06\ 10^{-10}$	$2.53\ 10^{-11}$	$2.04\ 10^{-9}$	**$1.32\ 10^{-9}$**
Tm-173	W $3\ 10^{-4}$	$1.83\ 10^{-11}$	$6.95\ 10^{-12}$	$5.80\ 10^{-10}$	$1.85\ 10^{-11}$	$1.68\ 10^{-11}$	$4.25\ 10^{-12}$	$1.74\ 10^{-10}$	**$1.30\ 10^{-10}$**
Tm-175	W $3\ 10^{-4}$	$2.03\ 10^{-13}$	$4.28\ 10^{-13}$	$4.39\ 10^{-11}$	$6.53\ 10^{-13}$	$2.89\ 10^{-12}$	$3.94\ 10^{-13}$	$2.33\ 10^{-12}$	**$6.26\ 10^{-12}$**
Ytterbium									
Yb-162	W $3\ 10^{-4}$	$2.52\ 10^{-13}$	$6.90\ 10^{-13}$	$3.76\ 10^{-11}$	$8.27\ 10^{-13}$	$8.98\ 10^{-13}$	$5.15\ 10^{-13}$	$2.23\ 10^{-12}$	**$5.49\ 10^{-12}$**
	Y $3\ 10^{-4}$	$2.95\ 10^{-13}$	$7.48\ 10^{-13}$	$4.11\ 10^{-11}$	$8.04\ 10^{-13}$	$6.23\ 10^{-13}$	$5.55\ 10^{-13}$	$2.63\ 10^{-12}$	**$6.04\ 10^{-12}$**
Yb-166	W $3\ 10^{-4}$	$5.09\ 10^{-10}$	$1.40\ 10^{-10}$	$2.00\ 10^{-9}$	$2.64\ 10^{-10}$	$5.24\ 10^{-10}$	$6.39\ 10^{-11}$	$1.05\ 10^{-9}$	**$7.52\ 10^{-10}$**
	Y $3\ 10^{-4}$	$5.76\ 10^{-10}$	$1.40\ 10^{-10}$	$2.07\ 10^{-9}$	$2.12\ 10^{-10}$	$1.28\ 10^{-10}$	$6.04\ 10^{-11}$	$1.20\ 10^{-9}$	**$8.04\ 10^{-10}$**
Yb-167	W $3\ 10^{-4}$	$1.33\ 10^{-13}$	$1.58\ 10^{-13}$	$1.32\ 10^{-11}$	$5.06\ 10^{-13}$	$2.48\ 10^{-12}$	$8.01\ 10^{-14}$	$1.24\ 10^{-12}$	**$2.15\ 10^{-12}$**
	Y $3\ 10^{-4}$	$1.46\ 10^{-13}$	$1.65\ 10^{-13}$	$1.44\ 10^{-11}$	$3.08\ 10^{-13}$	$3.39\ 10^{-13}$	$8.14\ 10^{-14}$	$1.41\ 10^{-12}$	**$2.26\ 10^{-12}$**
Yb-169	W $3\ 10^{-4}$	$2.42\ 10^{-10}$	$1.63\ 10^{-10}$	$9.33\ 10^{-9}$	$1.01\ 10^{-9}$	$7.35\ 10^{-9}$	$8.25\ 10^{-11}$	$1.13\ 10^{-9}$	**$1.89\ 10^{-9}$**
	Y $3\ 10^{-4}$	$2.37\ 10^{-10}$	$1.85\ 10^{-10}$	$1.39\ 10^{-8}$	$3.82\ 10^{-10}$	$6.29\ 10^{-10}$	$8.57\ 10^{-11}$	$1.18\ 10^{-9}$	**$2.18\ 10^{-9}$**
Yb-175	W $3\ 10^{-4}$	$1.59\ 10^{-11}$	$4.74\ 10^{-12}$	$1.82\ 10^{-9}$	$7.05\ 10^{-11}$	$7.82\ 10^{-10}$	$2.38\ 10^{-12}$	$5.79\ 10^{-10}$	**$4.29\ 10^{-10}$**
	Y $3\ 10^{-4}$	$1.78\ 10^{-11}$	$4.71\ 10^{-12}$	$1.94\ 10^{-9}$	$1.08\ 10^{-11}$	$4.68\ 10^{-11}$	$2.12\ 10^{-12}$	$6.57\ 10^{-10}$	**$4.38\ 10^{-10}$**
Yb-177	W $3\ 10^{-4}$	$6.94\ 10^{-13}$	$5.36\ 10^{-13}$	$2.30\ 10^{-10}$	$3.12\ 10^{-12}$	$1.99\ 10^{-11}$	$3.76\ 10^{-13}$	$2.44\ 10^{-11}$	**$3.61\ 10^{-11}$**
	Y $3\ 10^{-4}$	$8.24\ 10^{-13}$	$5.76\ 10^{-13}$	$2.50\ 10^{-10}$	$8.57\ 10^{-13}$	$1.53\ 10^{-12}$	$3.94\ 10^{-13}$	$2.94\ 10^{-11}$	**$3.93\ 10^{-11}$**
Yb-178	W $3\ 10^{-4}$	$2.25\ 10^{-13}$	$2.71\ 10^{-13}$	$2.80\ 10^{-10}$	$1.65\ 10^{-12}$	$5.58\ 10^{-12}$	$1.79\ 10^{-13}$	$1.87\ 10^{-11}$	**$3.97\ 10^{-11}$**
	Y $3\ 10^{-4}$	$2.74\ 10^{-13}$	$2.96\ 10^{-13}$	$3.06\ 10^{-10}$	$3.99\ 10^{-13}$	$5.14\ 10^{-13}$	$1.89\ 10^{-13}$	$2.35\ 10^{-11}$	**$4.39\ 10^{-11}$**
Lutetium									
Lu-169	W $3\ 10^{-4}$	$1.99\ 10^{-10}$	$6.09\ 10^{-11}$	$1.00\ 10^{-9}$	$1.45\ 10^{-10}$	$5.34\ 10^{-10}$	$2.87\ 10^{-11}$	$3.90\ 10^{-10}$	**$3.30\ 10^{-10}$**
	Y $3\ 10^{-4}$	$2.28\ 10^{-10}$	$6.30\ 10^{-11}$	$1.23\ 10^{-9}$	$9.86\ 10^{-11}$	$7.70\ 10^{-11}$	$2.69\ 10^{-11}$	$4.48\ 10^{-10}$	**$3.64\ 10^{-10}$**
Lu-170	W $3\ 10^{-4}$	$5.17\ 10^{-10}$	$1.52\ 10^{-10}$	$1.53\ 10^{-9}$	$2.40\ 10^{-10}$	$3.07\ 10^{-10}$	$7.00\ 10^{-11}$	$8.87\ 10^{-10}$	**$6.42\ 10^{-10}$**
	Y $3\ 10^{-4}$	$5.90\ 10^{-10}$	$1.53\ 10^{-10}$	$1.58\ 10^{-9}$	$2.04\ 10^{-10}$	$1.15\ 10^{-10}$	$6.67\ 10^{-11}$	$1.02\ 10^{-9}$	**$6.96\ 10^{-10}$**

Table 2.1, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Lu-171	W 3 10^{-4}	$3.18\ 10^{-10}$	$1.32\ 10^{-10}$	$2.99\ 10^{-9}$	$3.30\ 10^{-10}$	$1.41\ 10^{-9}$	$8.30\ 10^{-11}$	$8.12\ 10^{-10}$	**$7.86\ 10^{-10}$**
	Y 3 10^{-4}	$3.41\ 10^{-10}$	$1.28\ 10^{-10}$	$3.35\ 10^{-9}$	$1.88\ 10^{-10}$	$1.76\ 10^{-10}$	$7.85\ 10^{-11}$	$9.02\ 10^{-10}$	**$8.07\ 10^{-10}$**
Lu-172	W 3 10^{-4}	$7.31\ 10^{-10}$	$2.92\ 10^{-10}$	$4.30\ 10^{-9}$	$5.53\ 10^{-10}$	$1.56\ 10^{-9}$	$1.84\ 10^{-10}$	$1.46\ 10^{-9}$	**$1.30\ 10^{-9}$**
	Y 3 10^{-4}	$7.93\ 10^{-10}$	$2.81\ 10^{-10}$	$4.70\ 10^{-9}$	$3.67\ 10^{-10}$	$2.78\ 10^{-10}$	$1.76\ 10^{-10}$	$1.62\ 10^{-9}$	**$1.35\ 10^{-9}$**
Lu-173	W 3 10^{-4}	$3.49\ 10^{-10}$	$4.24\ 10^{-10}$	$7.42\ 10^{-9}$	$5.94\ 10^{-9}$	**$4.70\ 10^{-8}$**	$2.92\ 10^{-10}$	$8.98\ 10^{-10}$	$3.44\ 10^{-9}$
	Y 3 10^{-4}	$1.82\ 10^{-10}$	$7.19\ 10^{-10}$	$4.20\ 10^{-8}$	$1.97\ 10^{-9}$	$7.41\ 10^{-9}$	$3.56\ 10^{-10}$	$1.44\ 10^{-9}$	**$6.09\ 10^{-9}$**
Lu-174	W 3 10^{-4}	$5.82\ 10^{-10}$	$7.10\ 10^{-10}$	$8.73\ 10^{-9}$	$1.23\ 10^{-8}$	**$1.14\ 10^{-7}$**	$4.98\ 10^{-10}$	$1.44\ 10^{-9}$	$6.64\ 10^{-9}$
	Y 3 10^{-4}	$2.75\ 10^{-10}$	$1.04\ 10^{-9}$	$7.13\ 10^{-8}$	$4.03\ 10^{-9}$	$2.62\ 10^{-8}$	$6.51\ 10^{-10}$	$1.98\ 10^{-9}$	**$1.07\ 10^{-8}$**
Lu-174m	W 3 10^{-4}	$1.45\ 10^{-10}$	$1.65\ 10^{-10}$	$1.53\ 10^{-8}$	$5.18\ 10^{-9}$	**$5.47\ 10^{-8}$**	$9.92\ 10^{-11}$	$1.11\ 10^{-9}$	$4.49\ 10^{-9}$
	Y 3 10^{-4}	$8.56\ 10^{-11}$	$2.54\ 10^{-10}$	$5.11\ 10^{-8}$	$1.02\ 10^{-9}$	$6.52\ 10^{-9}$	$1.26\ 10^{-10}$	$1.16\ 10^{-9}$	**$6.86\ 10^{-9}$**
Lu-176	W 3 10^{-4}	$7.15\ 10^{-9}$	$9.74\ 10^{-9}$	$6.24\ 10^{-8}$	$2.73\ 10^{-7}$	**$2.88\ 10^{-6}$**	$8.47\ 10^{-9}$	$1.97\ 10^{-8}$	$1.36\ 10^{-7}$
	Y 3 10^{-4}	$3.86\ 10^{-9}$	$1.10\ 10^{-8}$	$9.99\ 10^{-7}$	$1.21\ 10^{-7}$	$1.19\ 10^{-6}$	$8.24\ 10^{-9}$	$2.10\ 10^{-8}$	**$1.79\ 10^{-7}$**
Lu-176m	W 3 10^{-4}	$1.98\ 10^{-13}$	$9.81\ 10^{-14}$	$3.94\ 10^{-10}$	$4.17\ 10^{-12}$	$8.48\ 10^{-12}$	$3.65\ 10^{-14}$	$5.68\ 10^{-11}$	**$6.51\ 10^{-11}$**
	Y 3 10^{-4}	$2.43\ 10^{-13}$	$1.07\ 10^{-13}$	$4.23\ 10^{-10}$	$4.61\ 10^{-13}$	$5.99\ 10^{-13}$	$3.71\ 10^{-14}$	$7.06\ 10^{-11}$	**$7.21\ 10^{-11}$**
Lu-177	W 3 10^{-4}	$1.75\ 10^{-11}$	$5.94\ 10^{-12}$	$3.02\ 10^{-9}$	$1.54\ 10^{-10}$	$1.79\ 10^{-9}$	$2.85\ 10^{-12}$	$7.44\ 10^{-10}$	**$6.63\ 10^{-10}$**
	Y 3 10^{-4}	$1.93\ 10^{-11}$	$5.79\ 10^{-12}$	$3.33\ 10^{-9}$	$1.82\ 10^{-11}$	$1.03\ 10^{-10}$	$2.47\ 10^{-12}$	$8.42\ 10^{-10}$	**$6.63\ 10^{-10}$**
Lu-177m	W 3 10^{-4}	$1.29\ 10^{-9}$	$1.43\ 10^{-9}$	$4.49\ 10^{-8}$	$1.35\ 10^{-8}$	**$1.16\ 10^{-7}$**	$1.09\ 10^{-9}$	$4.12\ 10^{-9}$	$1.23\ 10^{-8}$
	Y 3 10^{-4}	$8.89\ 10^{-10}$	$2.03\ 10^{-9}$	$1.41\ 10^{-7}$	$3.46\ 10^{-9}$	$1.07\ 10^{-8}$	$1.37\ 10^{-9}$	$5.15\ 10^{-9}$	**$1.98\ 10^{-8}$**
Lu-178	W 3 10^{-4}	$2.23\ 10^{-14}$	$7.56\ 10^{-14}$	$9.19\ 10^{-11}$	$2.45\ 10^{-13}$	$4.08\ 10^{-13}$	$5.58\ 10^{-14}$	$1.93\ 10^{-12}$	**$1.17\ 10^{-11}$**
	Y 3 10^{-4}	$2.55\ 10^{-14}$	$8.08\ 10^{-14}$	$9.88\ 10^{-11}$	$9.21\ 10^{-14}$	$8.20\ 10^{-14}$	$5.92\ 10^{-14}$	$2.42\ 10^{-12}$	**$1.26\ 10^{-11}$**
Lu-178m	W 3 10^{-4}	$1.19\ 10^{-13}$	$5.30\ 10^{-13}$	$6.19\ 10^{-11}$	$7.06\ 10^{-13}$	$8.87\ 10^{-13}$	$3.75\ 10^{-13}$	$1.90\ 10^{-12}$	**$8.23\ 10^{-12}$**
	Y 3 10^{-4}	$1.36\ 10^{-13}$	$5.65\ 10^{-13}$	$6.62\ 10^{-11}$	$6.56\ 10^{-13}$	$5.22\ 10^{-13}$	$3.96\ 10^{-13}$	$2.23\ 10^{-12}$	**$8.84\ 10^{-12}$**
Lu-179	W 3 10^{-4}	$5.22\ 10^{-13}$	$2.25\ 10^{-13}$	$4.69\ 10^{-10}$	$5.76\ 10^{-12}$	$6.30\ 10^{-12}$	$1.08\ 10^{-13}$	$8.30\ 10^{-11}$	**$8.22\ 10^{-11}$**
	Y 3 10^{-4}	$6.37\ 10^{-13}$	$2.43\ 10^{-13}$	$5.02\ 10^{-10}$	$6.46\ 10^{-13}$	$5.31\ 10^{-13}$	$1.08\ 10^{-13}$	$1.03\ 10^{-10}$	**$9.13\ 10^{-11}$**
Hafnium									
Hf-170	D 2 10^{-3}	$1.70\ 10^{-10}$	$8.83\ 10^{-11}$	$3.41\ 10^{-10}$	$2.27\ 10^{-10}$	$7.36\ 10^{-10}$	$6.51\ 10^{-11}$	$2.75\ 10^{-10}$	**$2.31\ 10^{-10}$**
	W 2 10^{-3}	$2.28\ 10^{-10}$	$6.79\ 10^{-11}$	$8.41\ 10^{-10}$	$1.14\ 10^{-10}$	$1.70\ 10^{-10}$	$3.51\ 10^{-11}$	$4.49\ 10^{-10}$	**$3.23\ 10^{-10}$**
Hf-172	D 2 10^{-3}	$1.91\ 10^{-8}$	$2.22\ 10^{-8}$	$2.07\ 10^{-8}$	$1.93\ 10^{-7}$	**$1.45\ 10^{-6}$**	$1.44\ 10^{-8}$	$2.76\ 10^{-8}$	$8.60\ 10^{-8}$
	W 2 10^{-3}	$5.28\ 10^{-9}$	$6.75\ 10^{-9}$	$5.36\ 10^{-8}$	$4.88\ 10^{-8}$	**$3.58\ 10^{-7}$**	$4.65\ 10^{-9}$	$9.12\ 10^{-9}$	$2.82\ 10^{-8}$
Hf-173	D 2 10^{-3}	$6.05\ 10^{-11}$	$2.74\ 10^{-11}$	$1.68\ 10^{-10}$	$1.24\ 10^{-10}$	$6.79\ 10^{-10}$	$1.97\ 10^{-11}$	$1.18\ 10^{-10}$	**$1.11\ 10^{-10}$**
	W 2 10^{-3}	$7.55\ 10^{-11}$	$2.06\ 10^{-11}$	$3.46\ 10^{-10}$	$5.61\ 10^{-11}$	$1.61\ 10^{-10}$	$9.36\ 10^{-12}$	$1.78\ 10^{-10}$	**$1.29\ 10^{-10}$**
Hf-175	D 2 10^{-3}	$5.51\ 10^{-10}$	$5.53\ 10^{-10}$	$7.23\ 10^{-10}$	$4.41\ 10^{-9}$	**$1.42\ 10^{-8}$**	$5.06\ 10^{-10}$	$7.71\ 10^{-10}$	$1.51\ 10^{-9}$
	W 2 10^{-3}	$3.42\ 10^{-10}$	$3.05\ 10^{-10}$	$6.48\ 10^{-9}$	$1.16\ 10^{-9}$	$3.09\ 10^{-9}$	$2.21\ 10^{-10}$	$7.87\ 10^{-10}$	**$1.38\ 10^{-9}$**
Hf-177m	D 2 10^{-3}	$7.10\ 10^{-12}$	$5.35\ 10^{-12}$	$1.17\ 10^{-10}$	$7.64\ 10^{-12}$	$9.71\ 10^{-12}$	$3.76\ 10^{-12}$	$2.91\ 10^{-11}$	**$2.67\ 10^{-11}$**
	W 2 10^{-3}	$2.02\ 10^{-12}$	$3.15\ 10^{-12}$	$1.30\ 10^{-10}$	$4.04\ 10^{-12}$	$4.28\ 10^{-12}$	$2.27\ 10^{-12}$	$9.52\ 10^{-12}$	**$2.01\ 10^{-11}$**
Hf-178m	D 2 10^{-3}	$1.63\ 10^{-7}$	$1.86\ 10^{-7}$	$1.70\ 10^{-7}$	$1.61\ 10^{-6}$	**$1.04\ 10^{-5}$**	$1.75\ 10^{-7}$	$2.17\ 10^{-7}$	$6.65\ 10^{-7}$
	W 2 10^{-3}	$4.29\ 10^{-8}$	$4.90\ 10^{-8}$	$1.12\ 10^{-7}$	$4.10\ 10^{-7}$	**$2.63\ 10^{-6}$**	$4.57\ 10^{-8}$	$5.89\ 10^{-8}$	$1.79\ 10^{-7}$
Hf-179m	D 2 10^{-3}	$7.48\ 10^{-10}$	$6.33\ 10^{-10}$	$1.29\ 10^{-9}$	$5.32\ 10^{-9}$	**$4.03\ 10^{-8}$**	$5.77\ 10^{-10}$	$1.22\ 10^{-9}$	$2.67\ 10^{-9}$
	W 2 10^{-3}	$6.14\ 10^{-10}$	$3.94\ 10^{-10}$	$1.30\ 10^{-8}$	$1.34\ 10^{-9}$	$7.51\ 10^{-9}$	$2.75\ 10^{-10}$	$1.89\ 10^{-9}$	**$2.73\ 10^{-9}$**
Hf-180m	D 2 10^{-3}	$3.47\ 10^{-11}$	$1.57\ 10^{-11}$	$1.75\ 10^{-10}$	$3.06\ 10^{-11}$	$7.72\ 10^{-11}$	$1.10\ 10^{-11}$	$8.21\ 10^{-11}$	**$6.30\ 10^{-11}$**
	W 2 10^{-3}	$2.50\ 10^{-11}$	$1.07\ 10^{-11}$	$2.32\ 10^{-10}$	$1.68\ 10^{-11}$	$2.39\ 10^{-11}$	$6.20\ 10^{-12}$	$6.83\ 10^{-11}$	**$5.91\ 10^{-11}$**
Hf-181	D 2 10^{-3}	$6.85\ 10^{-10}$	$6.16\ 10^{-10}$	$1.26\ 10^{-9}$	$8.21\ 10^{-9}$	**$7.99\ 10^{-8}$**	$5.85\ 10^{-10}$	$1.19\ 10^{-9}$	$4.17\ 10^{-9}$
	W 2 10^{-3}	$4.29\ 10^{-10}$	$3.41\ 10^{-10}$	$1.73\ 10^{-8}$	$1.85\ 10^{-9}$	$1.55\ 10^{-8}$	$2.72\ 10^{-10}$	$1.84\ 10^{-9}$	**$3.48\ 10^{-9}$**
Hf-182	D 2 10^{-3}	$1.35\ 10^{-7}$	$1.66\ 10^{-7}$	$1.50\ 10^{-7}$	$2.00\ 10^{-6}$	**$1.72\ 10^{-5}$**	$1.19\ 10^{-7}$	$2.06\ 10^{-7}$	$8.98\ 10^{-7}$
	W 2 10^{-3}	$3.47\ 10^{-8}$	$4.29\ 10^{-8}$	$6.84\ 10^{-8}$	$5.09\ 10^{-7}$	**$4.37\ 10^{-6}$**	$3.07\ 10^{-8}$	$5.35\ 10^{-8}$	$2.32\ 10^{-7}$

Table 2.1, Cont'd.

Nuclide	Class/f_1	Committed Dose Equivalent per Unit Intake (Sv/Bq)							
		Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Hf-182m	D $2\ 10^{-3}$	$4.24\ 10^{-12}$	$3.32\ 10^{-12}$	$6.32\ 10^{-11}$	$9.36\ 10^{-12}$	$5.42\ 10^{-11}$	$2.51\ 10^{-12}$	$1.62\ 10^{-11}$	**$1.68\ 10^{-11}$**
	W $2\ 10^{-3}$	$1.37\ 10^{-12}$	$1.85\ 10^{-12}$	$7.70\ 10^{-11}$	$3.33\ 10^{-12}$	$1.30\ 10^{-11}$	$1.48\ 10^{-12}$	$5.83\ 10^{-12}$	**$1.24\ 10^{-11}$**
Hf-183	D $2\ 10^{-3}$	$5.21\ 10^{-12}$	$4.06\ 10^{-12}$	$1.20\ 10^{-10}$	$1.72\ 10^{-11}$	$1.30\ 10^{-10}$	$3.51\ 10^{-12}$	$3.06\ 10^{-11}$	**$3.16\ 10^{-11}$**
	W $2\ 10^{-3}$	$2.47\ 10^{-12}$	$1.99\ 10^{-12}$	$1.77\ 10^{-10}$	$4.61\ 10^{-12}$	$2.28\ 10^{-11}$	$1.60\ 10^{-12}$	$2.24\ 10^{-11}$	**$3.02\ 10^{-11}$**
Hf-184	D $2\ 10^{-3}$	$5.60\ 10^{-11}$	$2.91\ 10^{-11}$	$6.29\ 10^{-10}$	$9.30\ 10^{-11}$	$2.27\ 10^{-10}$	$2.37\ 10^{-11}$	$2.80\ 10^{-10}$	**$1.97\ 10^{-10}$**
	W $2\ 10^{-3}$	$5.22\ 10^{-11}$	$1.74\ 10^{-11}$	$9.52\ 10^{-10}$	$3.56\ 10^{-11}$	$5.84\ 10^{-11}$	$1.03\ 10^{-11}$	$3.15\ 10^{-10}$	**$2.31\ 10^{-10}$**
Tantalum									
Ta-172	W $1\ 10^{-3}$	$8.73\ 10^{-13}$	$1.58\ 10^{-12}$	$9.02\ 10^{-11}$	$1.85\ 10^{-12}$	$2.48\ 10^{-12}$	$1.34\ 10^{-12}$	$4.59\ 10^{-12}$	**$1.30\ 10^{-11}$**
	Y $1\ 10^{-3}$	$5.75\ 10^{-13}$	$1.60\ 10^{-12}$	$1.08\ 10^{-10}$	$1.70\ 10^{-12}$	$1.45\ 10^{-12}$	$1.30\ 10^{-12}$	$5.44\ 10^{-12}$	**$1.53\ 10^{-11}$**
Ta-173	W $1\ 10^{-3}$	$2.00\ 10^{-11}$	$7.77\ 10^{-12}$	$3.72\ 10^{-10}$	$1.43\ 10^{-11}$	$1.81\ 10^{-11}$	$4.65\ 10^{-12}$	$8.33\ 10^{-11}$	**$7.82\ 10^{-11}$**
	Y $1\ 10^{-3}$	$2.16\ 10^{-11}$	$6.71\ 10^{-12}$	$4.07\ 10^{-10}$	$1.15\ 10^{-11}$	$6.76\ 10^{-12}$	$3.08\ 10^{-12}$	$9.83\ 10^{-11}$	**$8.64\ 10^{-11}$**
Ta-174	W $1\ 10^{-3}$	$1.17\ 10^{-12}$	$1.44\ 10^{-12}$	$1.16\ 10^{-10}$	$1.86\ 10^{-12}$	$1.95\ 10^{-12}$	$1.13\ 10^{-12}$	$7.56\ 10^{-12}$	**$1.70\ 10^{-11}$**
	Y $1\ 10^{-3}$	$8.63\ 10^{-13}$	$1.10\ 10^{-12}$	$1.25\ 10^{-10}$	$1.32\ 10^{-12}$	$9.67\ 10^{-13}$	$7.52\ 10^{-13}$	$8.79\ 10^{-12}$	**$1.82\ 10^{-11}$**
Ta-175	W $1\ 10^{-3}$	$5.41\ 10^{-11}$	$2.02\ 10^{-11}$	$2.78\ 10^{-10}$	$3.20\ 10^{-11}$	$3.31\ 10^{-11}$	$1.09\ 10^{-11}$	$1.17\ 10^{-10}$	**$9.02\ 10^{-11}$**
	Y $1\ 10^{-3}$	$6.04\ 10^{-11}$	$1.98\ 10^{-11}$	$3.29\ 10^{-10}$	$2.88\ 10^{-11}$	$1.65\ 10^{-11}$	$8.91\ 10^{-12}$	$1.36\ 10^{-10}$	**$1.03\ 10^{-10}$**
Ta-176	W $1\ 10^{-3}$	$7.24\ 10^{-11}$	$2.97\ 10^{-11}$	$3.44\ 10^{-10}$	$3.79\ 10^{-11}$	$3.23\ 10^{-11}$	$1.69\ 10^{-11}$	$1.52\ 10^{-10}$	**$1.16\ 10^{-10}$**
	Y $1\ 10^{-3}$	$8.13\ 10^{-11}$	$2.83\ 10^{-11}$	$3.59\ 10^{-10}$	$3.50\ 10^{-11}$	$1.96\ 10^{-11}$	$1.34\ 10^{-11}$	$1.77\ 10^{-10}$	**$1.26\ 10^{-10}$**
Ta-177	W $1\ 10^{-3}$	$2.87\ 10^{-11}$	$7.99\ 10^{-12}$	$2.64\ 10^{-10}$	$2.53\ 10^{-11}$	$5.09\ 10^{-11}$	$3.35\ 10^{-12}$	$1.13\ 10^{-10}$	**$7.88\ 10^{-11}$**
	Y $1\ 10^{-3}$	$3.13\ 10^{-11}$	$6.92\ 10^{-12}$	$2.74\ 10^{-10}$	$2.00\ 10^{-11}$	$1.17\ 10^{-11}$	$1.81\ 10^{-12}$	$1.28\ 10^{-10}$	**$8.29\ 10^{-11}$**
Ta-178	W $1\ 10^{-3}$	$5.09\ 10^{-12}$	$4.00\ 10^{-12}$	$1.09\ 10^{-10}$	$5.69\ 10^{-12}$	$5.70\ 10^{-12}$	$2.60\ 10^{-12}$	$1.61\ 10^{-11}$	**$2.07\ 10^{-11}$**
	Y $1\ 10^{-3}$	$5.22\ 10^{-12}$	$3.61\ 10^{-12}$	$1.18\ 10^{-10}$	$4.94\ 10^{-12}$	$3.30\ 10^{-12}$	$2.01\ 10^{-12}$	$1.87\ 10^{-11}$	**$2.24\ 10^{-11}$**
Ta-179	W $1\ 10^{-3}$	$6.61\ 10^{-11}$	$6.77\ 10^{-11}$	$1.89\ 10^{-9}$	$2.20\ 10^{-10}$	$2.38\ 10^{-10}$	$4.30\ 10^{-11}$	$2.03\ 10^{-10}$	**$3.49\ 10^{-10}$**
	Y $1\ 10^{-3}$	$4.55\ 10^{-11}$	$2.29\ 10^{-10}$	$1.26\ 10^{-8}$	$4.74\ 10^{-10}$	$3.91\ 10^{-10}$	$8.57\ 10^{-11}$	$4.38\ 10^{-10}$	**$1.76\ 10^{-9}$**
Ta-180	W $1\ 10^{-3}$	$1.03\ 10^{-9}$	$1.04\ 10^{-9}$	$2.62\ 10^{-8}$	$2.10\ 10^{-9}$	$2.68\ 10^{-9}$	$8.13\ 10^{-10}$	$3.06\ 10^{-9}$	**$4.83\ 10^{-9}$**
	Y $1\ 10^{-3}$	$1.45\ 10^{-9}$	$8.59\ 10^{-9}$	$4.80\ 10^{-7}$	$1.08\ 10^{-8}$	$8.97\ 10^{-9}$	$5.80\ 10^{-9}$	$1.75\ 10^{-8}$	**$6.62\ 10^{-8}$**
Ta-180m	W $1\ 10^{-3}$	$3.34\ 10^{-12}$	$1.29\ 10^{-12}$	$1.02\ 10^{-10}$	$3.74\ 10^{-12}$	$6.77\ 10^{-12}$	$6.36\ 10^{-13}$	$3.04\ 10^{-11}$	**$2.31\ 10^{-11}$**
	Y $1\ 10^{-3}$	$3.55\ 10^{-12}$	$9.87\ 10^{-13}$	$1.08\ 10^{-10}$	$2.75\ 10^{-12}$	$1.66\ 10^{-12}$	$2.44\ 10^{-13}$	$3.60\ 10^{-11}$	**$2.52\ 10^{-11}$**
Ta-182	W $1\ 10^{-3}$	$1.25\ 10^{-9}$	$1.25\ 10^{-9}$	$3.21\ 10^{-8}$	$1.98\ 10^{-9}$	$2.35\ 10^{-9}$	$1.05\ 10^{-9}$	$3.96\ 10^{-9}$	**$5.88\ 10^{-9}$**
	Y $1\ 10^{-3}$	$8.99\ 10^{-10}$	$1.79\ 10^{-9}$	$8.28\ 10^{-8}$	$1.92\ 10^{-9}$	$1.51\ 10^{-9}$	$1.53\ 10^{-9}$	$4.37\ 10^{-9}$	**$1.21\ 10^{-8}$**
Ta-182m	W $1\ 10^{-3}$	$1.76\ 10^{-13}$	$2.48\ 10^{-13}$	$2.12\ 10^{-11}$	$4.55\ 10^{-13}$	$1.55\ 10^{-12}$	$1.91\ 10^{-13}$	$6.91\ 10^{-13}$	**$2.94\ 10^{-12}$**
	Y $1\ 10^{-3}$	$1.04\ 10^{-13}$	$2.68\ 10^{-13}$	$2.71\ 10^{-11}$	$3.34\ 10^{-13}$	$3.40\ 10^{-13}$	$2.03\ 10^{-13}$	$7.91\ 10^{-13}$	**$3.61\ 10^{-12}$**
Ta-183	W $1\ 10^{-3}$	$1.62\ 10^{-10}$	$6.44\ 10^{-11}$	$5.92\ 10^{-9}$	$2.21\ 10^{-10}$	$1.29\ 10^{-9}$	$4.09\ 10^{-11}$	$1.80\ 10^{-9}$	**$1.37\ 10^{-9}$**
	Y $1\ 10^{-3}$	$1.54\ 10^{-10}$	$4.29\ 10^{-11}$	$6.36\ 10^{-9}$	$8.75\ 10^{-11}$	$1.16\ 10^{-10}$	$1.77\ 10^{-11}$	$1.96\ 10^{-9}$	**$1.41\ 10^{-9}$**
Ta-184	W $1\ 10^{-3}$	$7.56\ 10^{-11}$	$2.91\ 10^{-11}$	$1.13\ 10^{-9}$	$4.48\ 10^{-11}$	$4.62\ 10^{-11}$	$1.85\ 10^{-11}$	$3.84\ 10^{-10}$	**$2.81\ 10^{-10}$**
	Y $1\ 10^{-3}$	$8.37\ 10^{-11}$	$2.54\ 10^{-11}$	$1.19\ 10^{-9}$	$3.39\ 10^{-11}$	$1.91\ 10^{-11}$	$1.30\ 10^{-11}$	[illegible]$.54\ 10^{-10}$	**$3.09\ 10^{-10}$**
Ta-185	W $1\ 10^{-3}$	$5.40\ 10^{-13}$	$6.44\ 10^{-13}$	$1.53\ 10^{-10}$	$1.15\ 10^{-12}$	$3.73\ 10^{-12}$	$5.55\ 10^{-13}$	$6.00\ 10^{-12}$	**$2.07\ 10^{-11}$**
	Y $1\ 10^{-3}$	$1.51\ 10^{-13}$	$2.59\ 10^{-13}$	$1.71\ 10^{-10}$	$3.94\ 10^{-13}$	$4.71\ 10^{-13}$	$1.61\ 10^{-13}$	$6.89\ 10^{-12}$	**$2.27\ 10^{-11}$**
Ta-186	W $1\ 10^{-3}$	$1.47\ 10^{-13}$	$4.23\ 10^{-13}$	$4.87\ 10^{-11}$	$4.41\ 10^{-13}$	$3.68\ 10^{-13}$	$3.73\ 10^{-13}$	$1.09\ 10^{-12}$	**$6.35\ 10^{-12}$**
	Y $1\ 10^{-3}$	$5.94\ 10^{-14}$	$3.53\ 10^{-13}$	$5.09\ 10^{-11}$	$3.58\ 10^{-13}$	$2.82\ 10^{-13}$	$2.99\ 10^{-13}$	$1.13\ 10^{-12}$	**$6.57\ 10^{-12}$**
Tungsten									
W-176	D $3\ 10^{-1}$	$1.56\ 10^{-11}$	$5.40\ 10^{-12}$	$9.32\ 10^{-11}$	$8.48\ 10^{-12}$	$1.32\ 10^{-11}$	$2.41\ 10^{-12}$	$3.82\ 10^{-11}$	**$2.88\ 10^{-11}$**
W-177	D $3\ 10^{-1}$	$6.35\ 10^{-12}$	$3.09\ 10^{-12}$	$6.85\ 10^{-11}$	$4.96\ 10^{-12}$	$8.77\ 10^{-12}$	$1.64\ 10^{-12}$	$2.16\ 10^{-11}$	**$1.76\ 10^{-11}$**
W-178	D $3\ 10^{-1}$	$2.08\ 10^{-11}$	$7.27\ 10^{-12}$	$1.56\ 10^{-10}$	$3.57\ 10^{-11}$	$4.80\ 10^{-11}$	$2.75\ 10^{-12}$	$1.41\ 10^{-10}$	**$7.32\ 10^{-11}$**
W-179	D $3\ 10^{-1}$	$9.44\ 10^{-14}$	$8.34\ 10^{-14}$	$4.99\ 10^{-12}$	$1.90\ 10^{-13}$	$5.27\ 10^{-13}$	$1.90\ 10^{-14}$	$9.09\ 10^{-13}$	**$9.47\ 10^{-13}$**
W-181	D $3\ 10^{-1}$	$1.11\ 10^{-11}$	$5.93\ 10^{-12}$	$5.25\ 10^{-11}$	$5.04\ 10^{-11}$	$7.08\ 10^{-11}$	$2.71\ 10^{-12}$	$7.56\ 10^{-11}$	**$4.09\ 10^{-11}$**
W-185	D $3\ 10^{-1}$	$1.24\ 10^{-14}$	$6.15\ 10^{-15}$	$3.80\ 10^{-10}$	$8.39\ 10^{-11}$	$2.55\ 10^{-10}$	$2.85\ 10^{-15}$	$4.65\ 10^{-10}$	**$2.03\ 10^{-10}$**

Table 2.1, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
W-187	D 3 10^{-1}	2.99 10^{-11}	8.79 10^{-12}	6.05 10^{-10}	2.32 10^{-11}	9.85 10^{-11}	4.37 10^{-12}	2.66 10^{-10}	**1.67 10^{-10}**
W-188	D 3 10^{-1}	7.97 10^{-12}	4.88 10^{-12}	1.36 10^{-9}	5.54 10^{-10}	1.65 10^{-9}	2.72 10^{-12}	2.75 10^{-9}	**1.11 10^{-9}**
Rhenium									
Re-177	D 8 10^{-1}	9.99 10^{-13}	1.02 10^{-12}	2.90 10^{-11}	1.28 10^{-12}	1.04 10^{-12}	1.95 10^{-11}	6.00 10^{-12}	**6.45 10^{-12}**
	W 8 10^{-1}	4.13 10^{-13}	6.43 10^{-13}	3.24 10^{-11}	8.04 10^{-13}	6.39 10^{-13}	6.60 10^{-12}	2.18 10^{-12}	**5.06 10^{-12}**
Re-178	D 8 10^{-1}	4.90 10^{-13}	6.43 10^{-13}	3.41 10^{-11}	6.86 10^{-13}	5.74 10^{-13}	8.77 10^{-12}	4.72 10^{-12}	**6.09 10^{-12}**
	W 8 10^{-1}	1.60 10^{-13}	4.08 10^{-13}	3.71 10^{-11}	4.41 10^{-13}	3.63 10^{-13}	2.86 10^{-12}	1.23 10^{-12}	**5.07 10^{-12}**
Re-181	D 8 10^{-1}	4.65 10^{-11}	3.96 10^{-11}	3.53 10^{-10}	4.81 10^{-11}	4.08 10^{-11}	9.95 10^{-10}	2.19 10^{-10}	**1.62 10^{-10}**
	W 8 10^{-1}	4.10 10^{-11}	3.34 10^{-11}	6.86 10^{-10}	4.11 10^{-11}	3.23 10^{-11}	5.45 10^{-10}	1.80 10^{-10}	**1.74 10^{-10}**
Re-182	D 8 10^{-1}	3.93 10^{-11}	3.46 10^{-11}	2.38 10^{-10}	4.07 10^{-11}	3.37 10^{-11}	5.89 10^{-10}	1.38 10^{-10}	**1.09 10^{-10}**
	W 8 10^{-1}	3.20 10^{-11}	2.82 10^{-11}	3.79 10^{-10}	3.31 10^{-11}	2.55 10^{-11}	2.99 10^{-10}	1.06 10^{-10}	**1.03 10^{-10}**
Re-182	D 8 10^{-1}	2.12 10^{-10}	1.77 10^{-10}	9.25 10^{-10}	2.13 10^{-10}	1.82 10^{-10}	2.65 10^{-9}	8.42 10^{-10}	**5.54 10^{-10}**
	W 8 10^{-1}	2.18 10^{-10}	1.88 10^{-10}	3.04 10^{-9}	2.26 10^{-10}	1.78 10^{-10}	1.71 10^{-9}	8.02 10^{-10}	**7.72 10^{-10}**
Re-184	D 8 10^{-1}	1.72 10^{-10}	1.65 10^{-10}	4.62 10^{-10}	1.93 10^{-10}	1.67 10^{-10}	1.15 10^{-9}	6.56 10^{-10}	**3.83 10^{-10}**
	W 8 10^{-1}	2.25 10^{-10}	4.05 10^{-10}	7.24 10^{-9}	4.44 10^{-10}	3.56 10^{-10}	1.12 10^{-9}	1.01 10^{-9}	**1.39 10^{-9}**
Re-184m	D 8 10^{-1}	1.66 10^{-10}	1.55 10^{-10}	6.54 10^{-10}	1.88 10^{-10}	1.69 10^{-10}	1.96 10^{-9}	1.06 10^{-9}	**5.47 10^{-10}**
	W 8 10^{-1}	2.39 10^{-10}	5.88 10^{-10}	2.62 10^{-8}	6.79 10^{-10}	5.52 10^{-10}	2.10 10^{-9}	1.77 10^{-9}	**3.98 10^{-9}**
Re-186	D 8 10^{-1}	6.87 10^{-11}	6.79 10^{-11}	9.77 10^{-10}	6.99 10^{-11}	6.91 10^{-11}	3.41 10^{-9}	9.03 10^{-10}	**5.28 10^{-10}**
	W 8 10^{-1}	4.53 10^{-11}	4.48 10^{-11}	4.42 10^{-9}	4.72 10^{-11}	4.59 10^{-11}	2.19 10^{-9}	8.10 10^{-10}	**8.64 10^{-10}**
Re-186m	D 8 10^{-1}	1.55 10^{-10}	1.52 10^{-10}	6.85 10^{-10}	1.60 10^{-10}	1.58 10^{-10}	2.28 10^{-9}	1.82 10^{-9} **8.01 10^{-9}**	7.83 10^{-10} ST wall
	W 8 10^{-1}	1.58 10^{-10}	1.86 10^{-10}	7.44 10^{-8}	2.16 10^{-10}	2.02 10^{-10}	2.85 10^{-9}	2.16 10^{-9}	**9.76 10^{-9}**
Re-187	D 8 10^{-1}	2.95 10^{-13}	2.95 10^{-13}	2.29 10^{-12}	2.95 10^{-13}	2.95 10^{-13}	7.90 10^{-12}	3.77 10^{-12} **1.61 10^{-11}**	1.80 10^{-12} ST wall
	W 8 10^{-1}	2.60 10^{-13}	2.60 10^{-13}	1.09 10^{-10}	2.60 10^{-13}	2.60 10^{-13}	6.96 10^{-12}	4.09 10^{-12}	**1.47 10^{-11}**
Re-188	D 8 10^{-1}	4.97 10^{-11}	4.92 10^{-11}	1.35 10^{-9}	4.99 10^{-11}	4.93 10^{-11}	4.18 10^{-9}	7.01 10^{-10}	**5.25 10^{-10}**
	W 8 10^{-1}	2.70 10^{-11}	2.65 10^{-11}	2.52 10^{-9}	2.71 10^{-11}	2.65 10^{-11}	2.19 10^{-9}	5.39 10^{-10}	**5.44 10^{-10}**
Re-188m	D 8 10^{-1}	1.01 10^{-12}	1.02 10^{-12}	3.19 10^{-11}	1.09 10^{-12}	1.05 10^{-12}	8.02 10^{-11}	1.40 10^{-11}	**1.10 10^{-11}**
	W 8 10^{-1}	5.25 10^{-13}	5.48 10^{-13}	5.41 10^{-11}	6.01 10^{-13}	5.73 10^{-13}	4.15 10^{-11}	1.02 10^{-11}	**1.11 10^{-11}**
Re-189	D 8 10^{-1}	3.30 10^{-11}	3.18 10^{-11}	7.03 10^{-10}	3.32 10^{-11}	3.23 10^{-11}	2.27 10^{-9}	4.22 10^{-10}	**2.97 10^{-10}**
	W 8 10^{-1}	2.03 10^{-11}	1.90 10^{-11}	1.53 10^{-9}	2.04 10^{-11}	1.92 10^{-11}	1.27 10^{-9}	3.45 10^{-10}	**3.36 10^{-10}**
Osmium									
Os-180	D 1 10^{-2}	1.02 10^{-12}	1.08 10^{-12}	2.17 10^{-11}	1.22 10^{-12}	9.55 10^{-13}	8.89 10^{-13}	4.97 10^{-12}	**4.71 10^{-12}**
	W 1 10^{-2}	2.62 10^{-13}	6.74 10^{-13}	2.33 10^{-11}	7.39 10^{-13}	5.95 10^{-13}	6.21 10^{-13}	1.58 10^{-12}	**3.56 10^{-12}**
	Y 1 10^{-2}	1.74 10^{-13}	6.06 10^{-13}	2.50 10^{-11}	6.52 10^{-13}	5.06 10^{-13}	5.39 10^{-13}	1.63 10^{-12}	**3.73 10^{-12}**
Os-181	D 1 10^{-2}	1.64 10^{-11}	8.95 10^{-12}	8.91 10^{-11}	1.15 10^{-11}	8.34 10^{-12}	6.53 10^{-12}	4.46 10^{-11}	**3.13 10^{-11}**
	W 1 10^{-2}	1.31 10^{-11}	6.08 10^{-12}	1.28 10^{-10}	8.02 10^{-12}	5.11 10^{-12}	3.92 10^{-12}	4.08 10^{-11}	**3.30 10^{-11}**
	Y 1 10^{-2}	1.44 10^{-11}	5.66 10^{-12}	1.37 10^{-10}	7.68 10^{-12}	4.44 10^{-12}	3.18 10^{-12}	4.71 10^{-11}	**3.62 10^{-11}**
Os-182	D 1 10^{-2}	1.61 10^{-10}	7.60 10^{-11}	3.61 10^{-10}	1.03 10^{-10}	7.47 10^{-11}	5.43 10^{-11}	4.01 10^{-10}	**2.32 10^{-10}**
	W 1 10^{-2}	2.34 10^{-10}	6.33 10^{-11}	8.52 10^{-10}	9.55 10^{-11}	5.12 10^{-11}	3.09 10^{-11}	5.27 10^{-10}	**3.42 10^{-10}**
	Y 1 10^{-2}	2.63 10^{-10}	6.01 10^{-11}	8.70 10^{-10}	9.50 10^{-11}	4.55 10^{-11}	2.43 10^{-11}	6.01 10^{-10}	**3.73 10^{-10}**
Os-185	D 1 10^{-2}	1.47 10^{-9}	1.47 10^{-9}	1.97 10^{-9}	1.78 10^{-9}	1.48 10^{-9}	1.18 10^{-9}	5.62 10^{-9}	**2.80 10^{-9}**
	W 1 10^{-2}	7.16 10^{-10}	7.13 10^{-10}	6.45 10^{-9}	8.31 10^{-10}	6.37 10^{-10}	5.78 10^{-10}	1.88 10^{-9}	**1.76 10^{-9}**
	Y 1 10^{-2}	5.20 10^{-10}	9.11 10^{-10}	1.43 10^{-8}	9.85 10^{-10}	7.45 10^{-10}	7.86 10^{-10}	1.79 10^{-9}	**2.68 10^{-9}**
Os-189m	D 1 10^{-2}	5.22 10^{-13}	5.01 10^{-13}	2.82 10^{-11}	4.97 10^{-13}	4.96 10^{-13}	5.04 10^{-13}	9.85 10^{-12}	**6.63 10^{-12}**
	W 1 10^{-2}	1.39 10^{-13}	1.25 10^{-13}	3.92 10^{-11}	1.18 10^{-13}	1.17 10^{-13}	1.18 10^{-13}	8.53 10^{-12}	**7.34 10^{-12}**
	Y 1 10^{-2}	3.50 10^{-14}	1.76 10^{-14}	4.16 10^{-11}	9.07 10^{-15}	8.38 10^{-15}	8.15 10^{-15}	1.02 10^{-11}	**8.07 10^{-12}**

Table 2.1, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Os-191	D 1 10^{-2}	$1.92\ 10^{-10}$	$1.73\ 10^{-10}$	$6.04\ 10^{-10}$	$2.26\ 10^{-10}$	$2.04\ 10^{-10}$	$1.59\ 10^{-10}$	$1.59\ 10^{-9}$	**$6.60\ 10^{-10}$**
	W 1 10^{-2}	$7.97\ 10^{-11}$	$5.22\ 10^{-11}$	$5.55\ 10^{-9}$	$8.68\ 10^{-11}$	$6.50\ 10^{-11}$	$3.75\ 10^{-11}$	$1.00\ 10^{-9}$	**$1.01\ 10^{-9}$**
	Y 1 10^{-2}	$5.71\ 10^{-11}$	$2.96\ 10^{-11}$	$6.85\ 10^{-9}$	$6.10\ 10^{-11}$	$3.93\ 10^{-11}$	$1.43\ 10^{-11}$	$9.19\ 10^{-10}$	**$1.13\ 10^{-9}$**
Os-191m	D 1 10^{-2}	$9.75\ 10^{-12}$	$8.77\ 10^{-12}$	$1.16\ 10^{-10}$	$1.10\ 10^{-11}$	$1.00\ 10^{-11}$	$8.21\ 10^{-12}$	$1.04\ 10^{-10}$	**$5.09\ 10^{-11}$**
	W 1 10^{-2}	$3.90\ 10^{-12}$	$2.52\ 10^{-12}$	$3.64\ 10^{-10}$	$4.01\ 10^{-12}$	$3.05\ 10^{-12}$	$1.88\ 10^{-12}$	$9.14\ 10^{-11}$	**$7.31\ 10^{-11}$**
	Y 1 10^{-2}	$2.73\ 10^{-12}$	$1.26\ 10^{-12}$	$4.18\ 10^{-10}$	$2.64\ 10^{-12}$	$1.65\ 10^{-12}$	$5.84\ 10^{-13}$	$1.02\ 10^{-10}$	**$8.20\ 10^{-11}$**
Os-193	D 1 10^{-2}	$4.32\ 10^{-11}$	$3.68\ 10^{-11}$	$8.15\ 10^{-10}$	$3.97\ 10^{-11}$	$3.73\ 10^{-11}$	$3.51\ 10^{-11}$	$6.29\ 10^{-10}$	**$3.10\ 10^{-10}$**
	W 1 10^{-2}	$2.14\ 10^{-11}$	$1.00\ 10^{-11}$	$1.94\ 10^{-9}$	$1.31\ 10^{-11}$	$9.73\ 10^{-12}$	$7.78\ 10^{-12}$	$8.49\ 10^{-10}$	**$4.96\ 10^{-10}$**
	Y 1 10^{-2}	$1.81\ 10^{-11}$	$4.51\ 10^{-12}$	$2.00\ 10^{-9}$	$7.70\ 10^{-12}$	$4.00\ 10^{-12}$	$2.04\ 10^{-12}$	$9.82\ 10^{-10}$	**$5.41\ 10^{-10}$**
Os-194	D 1 10^{-2}	$1.00\ 10^{-8}$	$9.99\ 10^{-9}$	$1.13\ 10^{-8}$	$1.01\ 10^{-8}$	$9.99\ 10^{-9}$	$9.88\ 10^{-9}$	$9.02\ 10^{-8}$	**$3.42\ 10^{-8}$**
	W 1 10^{-2}	$2.65\ 10^{-9}$	$2.66\ 10^{-9}$	$1.37\ 10^{-7}$	$2.69\ 10^{-9}$	$2.65\ 10^{-9}$	$2.61\ 10^{-9}$	$2.79\ 10^{-8}$	**$2.64\ 10^{-8}$**
	Y 1 10^{-2}	$9.36\ 10^{-10}$	$1.53\ 10^{-9}$	$1.47\ 10^{-6}$	$1.56\ 10^{-9}$	$1.39\ 10^{-9}$	$1.37\ 10^{-9}$	$1.30\ 10^{-8}$	**$1.81\ 10^{-7}$**
Iridium									
Ir-182	D 1 10^{-2}	$2.62\ 10^{-12}$	$1.83\ 10^{-12}$	$6.53\ 10^{-11}$	$2.19\ 10^{-12}$	$1.71\ 10^{-12}$	$1.43\ 10^{-12}$	$1.13\ 10^{-11}$	**$1.25\ 10^{-11}$**
	W 1 10^{-2}	$2.89\ 10^{-12}$	$1.27\ 10^{-12}$	$7.49\ 10^{-11}$	$1.66\ 10^{-12}$	$1.06\ 10^{-12}$	$8.37\ 10^{-13}$	$7.22\ 10^{-12}$	**$1.23\ 10^{-11}$**
	Y 1 10^{-2}	$3.10\ 10^{-12}$	$1.12\ 10^{-12}$	$7.87\ 10^{-11}$	$1.53\ 10^{-12}$	$8.71\ 10^{-13}$	$6.43\ 10^{-13}$	$8.16\ 10^{-12}$	**$1.31\ 10^{-11}$**
Ir-184	D 1 10^{-2}	$2.75\ 10^{-11}$	$1.53\ 10^{-11}$	$2.13\ 10^{-10}$	$1.83\ 10^{-11}$	$1.33\ 10^{-11}$	$1.12\ 10^{-11}$	$8.15\ 10^{-11}$	**$6.21\ 10^{-11}$**
	W 1 10^{-2}	$1.41\ 10^{-11}$	$9.66\ 10^{-12}$	$2.61\ 10^{-10}$	$1.12\ 10^{-11}$	$7.74\ 10^{-12}$	$6.84\ 10^{-12}$	$4.78\ 10^{-11}$	**$5.24\ 10^{-11}$**
	Y 1 10^{-2}	$1.50\ 10^{-11}$	$8.80\ 10^{-12}$	$2.80\ 10^{-10}$	$1.03\ 10^{-11}$	$6.48\ 10^{-12}$	$5.51\ 10^{-12}$	$5.61\ 10^{-11}$	**$5.71\ 10^{-11}$**
Ir-185	D 1 10^{-2}	$5.65\ 10^{-11}$	$3.10\ 10^{-11}$	$2.53\ 10^{-10}$	$4.12\ 10^{-11}$	$3.09\ 10^{-11}$	$2.24\ 10^{-11}$	$1.78\ 10^{-10}$	**$1.09\ 10^{-10}$**
	W 1 10^{-2}	$5.30\ 10^{-11}$	$2.02\ 10^{-11}$	$4.45\ 10^{-10}$	$2.88\ 10^{-11}$	$1.75\ 10^{-11}$	$1.11\ 10^{-11}$	$1.87\ 10^{-10}$	**$1.30\ 10^{-10}$**
	Y 1 10^{-2}	$5.77\ 10^{-11}$	$2.04\ 10^{-11}$	$5.10\ 10^{-10}$	$2.93\ 10^{-11}$	$1.63\ 10^{-11}$	$1.03\ 10^{-11}$	$2.15\ 10^{-10}$	**$1.48\ 10^{-10}$**
Ir-186	D 1 10^{-2}	$1.34\ 10^{-10}$	$5.86\ 10^{-11}$	$3.54\ 10^{-10}$	$7.54\ 10^{-11}$	$5.27\ 10^{-11}$	$4.02\ 10^{-11}$	$2.77\ 10^{-10}$	**$1.80\ 10^{-10}$**
	W 1 10^{-2}	$1.55\ 10^{-10}$	$4.76\ 10^{-11}$	$5.94\ 10^{-10}$	$6.45\ 10^{-11}$	$3.62\ 10^{-11}$	$2.47\ 10^{-11}$	$3.22\ 10^{-10}$	**$2.23\ 10^{-10}$**
	Y 1 10^{-2}	$1.77\ 10^{-10}$	$4.59\ 10^{-11}$	$6.13\ 10^{-10}$	$6.45\ 10^{-11}$	$3.26\ 10^{-11}$	$2.00\ 10^{-11}$	$3.73\ 10^{-10}$	**$2.46\ 10^{-10}$**
Ir-187	D 1 10^{-2}	$2.33\ 10^{-11}$	$1.07\ 10^{-11}$	$1.16\ 10^{-10}$	$1.56\ 10^{-11}$	$1.09\ 10^{-11}$	$7.74\ 10^{-12}$	$6.67\ 10^{-11}$	**$4.38\ 10^{-11}$**
	W 1 10^{-2}	$2.29\ 10^{-11}$	$7.82\ 10^{-12}$	$1.78\ 10^{-10}$	$1.21\ 10^{-11}$	$6.97\ 10^{-12}$	$4.35\ 10^{-12}$	$7.16\ 10^{-11}$	**$5.15\ 10^{-11}$**
	Y 1 10^{-2}	$2.62\ 10^{-11}$	$7.36\ 10^{-12}$	$1.85\ 10^{-10}$	$1.19\ 10^{-11}$	$6.10\ 10^{-12}$	$3.37\ 10^{-12}$	$8.37\ 10^{-11}$	**$5.67\ 10^{-11}$**
Ir-188	D 1 10^{-2}	$2.50\ 10^{-10}$	$1.18\ 10^{-10}$	$3.95\ 10^{-10}$	$1.47\ 10^{-10}$	$1.07\ 10^{-10}$	$8.23\ 10^{-11}$	$4.70\ 10^{-10}$	**$2.92\ 10^{-10}$**
	W 1 10^{-2}	$3.32\ 10^{-10}$	$9.78\ 10^{-11}$	$8.92\ 10^{-10}$	$1.30\ 10^{-10}$	$7.34\ 10^{-11}$	$4.92\ 10^{-11}$	$5.46\ 10^{-10}$	**$3.88\ 10^{-10}$**
	Y 1 10^{-2}	$3.70\ 10^{-10}$	$9.26\ 10^{-11}$	$9.13\ 10^{-10}$	$1.28\ 10^{-10}$	$6.52\ 10^{-11}$	$3.95\ 10^{-11}$	$6.10\ 10^{-10}$	**$4.17\ 10^{-10}$**
Ir-189	D 1 10^{-2}	$1.03\ 10^{-10}$	$8.48\ 10^{-11}$	$2.70\ 10^{-10}$	$1.34\ 10^{-10}$	$1.14\ 10^{-10}$	$7.42\ 10^{-11}$	$6.48\ 10^{-10}$	**$2.87\ 10^{-10}$**
	W 1 10^{-2}	$6.64\ 10^{-11}$	$3.56\ 10^{-11}$	$2.10\ 10^{-9}$	$6.87\ 10^{-11}$	$4.74\ 10^{-11}$	$2.07\ 10^{-11}$	$4.14\ 10^{-10}$	**$4.08\ 10^{-10}$**
	Y 1 10^{-2}	$5.89\ 10^{-11}$	$2.66\ 10^{-11}$	$2.52\ 10^{-9}$	$5.68\ 10^{-11}$	$3.53\ 10^{-11}$	$1.06\ 10^{-11}$	$3.91\ 10^{-10}$	**$4.46\ 10^{-10}$**
Ir-190	D 1 10^{-2}	$8.73\ 10^{-10}$	$6.71\ 10^{-10}$	$1.34\ 10^{-9}$	$8.60\ 10^{-10}$	$6.94\ 10^{-10}$	$5.18\ 10^{-10}$	$2.91\ 10^{-9}$	**$1.49\ 10^{-9}$**
	W 1 10^{-2}	$8.07\ 10^{-10}$	$4.08\ 10^{-10}$	$6.46\ 10^{-9}$	$5.32\ 10^{-10}$	$3.57\ 10^{-10}$	$2.74\ 10^{-10}$	$1.76\ 10^{-9}$	**$1.65\ 10^{-9}$**
	Y 1 10^{-2}	$7.92\ 10^{-10}$	$3.61\ 10^{-10}$	$7.53\ 10^{-9}$	$4.72\ 10^{-10}$	$2.95\ 10^{-10}$	$2.30\ 10^{-10}$	$1.69\ 10^{-9}$	**$1.73\ 10^{-9}$**
Ir-190m	D 1 10^{-2}	$3.67\ 10^{-12}$	$2.84\ 10^{-12}$	$1.18\ 10^{-11}$	$3.62\ 10^{-12}$	$2.94\ 10^{-12}$	$2.21\ 10^{-12}$	$1.25\ 10^{-11}$	**$7.09\ 10^{-12}$**
	W 1 10^{-2}	$3.36\ 10^{-12}$	$1.70\ 10^{-12}$	$3.40\ 10^{-11}$	$2.21\ 10^{-12}$	$1.49\ 10^{-12}$	$1.15\ 10^{-12}$	$7.50\ 10^{-12}$	**$7.77\ 10^{-12}$**
	Y 1 10^{-2}	$3.28\ 10^{-12}$	$1.49\ 10^{-12}$	$3.90\ 10^{-11}$	$1.95\ 10^{-12}$	$1.22\ 10^{-12}$	$9.46\ 10^{-13}$	$7.40\ 10^{-12}$	**$8.24\ 10^{-12}$**
Ir-192	D 1 10^{-2}	$2.22\ 10^{-9}$	$2.07\ 10^{-9}$	$3.17\ 10^{-9}$	$2.39\ 10^{-9}$	$2.07\ 10^{-9}$	$1.72\ 10^{-9}$	$1.15\ 10^{-8}$	**$5.10\ 10^{-9}$**
	W 1 10^{-2}	$9.42\ 10^{-10}$	$8.51\ 10^{-10}$	$2.55\ 10^{-8}$	$9.72\ 10^{-10}$	$7.66\ 10^{-10}$	$6.59\ 10^{-10}$	$4.33\ 10^{-9}$	**$4.88\ 10^{-9}$**
	Y 1 10^{-2}	$6.08\ 10^{-10}$	$8.63\ 10^{-10}$	$5.24\ 10^{-8}$	$9.38\ 10^{-10}$	$7.00\ 10^{-10}$	$6.51\ 10^{-10}$	$2.94\ 10^{-9}$	**$7.61\ 10^{-9}$**
Ir-192m	D 1 10^{-2}	$6.51\ 10^{-9}$	$6.27\ 10^{-9}$	$7.50\ 10^{-9}$	$7.66\ 10^{-9}$	$6.56\ 10^{-9}$	$5.05\ 10^{-9}$	$3.34\ 10^{-8}$	**$1.48\ 10^{-8}$**
	W 1 10^{-2}	$1.99\ 10^{-9}$	$2.14\ 10^{-9}$	$2.11\ 10^{-8}$	$2.60\ 10^{-9}$	$2.17\ 10^{-9}$	$1.70\ 10^{-9}$	$9.95\ 10^{-9}$	**$6.76\ 10^{-9}$**
	Y 1 10^{-2}	$2.48\ 10^{-9}$	$1.38\ 10^{-8}$	$7.49\ 10^{-7}$	$1.51\ 10^{-8}$	$1.20\ 10^{-8}$	$1.08\ 10^{-8}$	$3.04\ 10^{-8}$	**$1.04\ 10^{-7}$**

Table 2.1, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Ir-194	D 1 10^{-2}	$5.30\ 10^{-11}$	$4.78\ 10^{-11}$	$1.47\ 10^{-9}$	$4.88\ 10^{-11}$	$4.74\ 10^{-11}$	$4.66\ 10^{-11}$	$9.07\ 10^{-10}$	**$4.78\ 10^{-10}$**
	W 1 10^{-2}	$1.98\ 10^{-11}$	$1.18\ 10^{-11}$	$2.88\ 10^{-9}$	$1.29\ 10^{-11}$	$1.10\ 10^{-11}$	$1.02\ 10^{-11}$	$1.20\ 10^{-9}$	**$7.14\ 10^{-10}$**
	Y 1 10^{-2}	$1.35\ 10^{-11}$	$3.84\ 10^{-12}$	$2.99\ 10^{-9}$	$5.04\ 10^{-12}$	$2.89\ 10^{-12}$	$2.04\ 10^{-12}$	$1.40\ 10^{-9}$	**$7.84\ 10^{-10}$**
Ir-194m	D 1 10^{-2}	$7.40\ 10^{-9}$	$7.25\ 10^{-9}$	$9.63\ 10^{-9}$	$8.34\ 10^{-9}$	$6.99\ 10^{-9}$	$5.76\ 10^{-9}$	$3.07\ 10^{-8}$	**$1.47\ 10^{-8}$**
	W 1 10^{-2}	$3.09\ 10^{-9}$	$3.17\ 10^{-9}$	$3.66\ 10^{-8}$	$3.51\ 10^{-9}$	$2.75\ 10^{-9}$	$2.53\ 10^{-9}$	$9.89\ 10^{-9}$	**$9.19\ 10^{-9}$**
	Y 1 10^{-2}	$2.04\ 10^{-9}$	$4.77\ 10^{-9}$	$1.13\ 10^{-7}$	$4.82\ 10^{-9}$	$3.70\ 10^{-9}$	$4.04\ 10^{-9}$	$9.68\ 10^{-9}$	**$1.85\ 10^{-8}$**
Ir-195	D 1 10^{-2}	$3.28\ 10^{-12}$	$2.81\ 10^{-12}$	$1.82\ 10^{-10}$	$3.34\ 10^{-12}$	$3.02\ 10^{-12}$	$2.62\ 10^{-12}$	$4.59\ 10^{-11}$	**$3.74\ 10^{-11}$**
	W 1 10^{-2}	$1.05\ 10^{-12}$	$9.22\ 10^{-13}$	$2.23\ 10^{-10}$	$1.24\ 10^{-12}$	$1.04\ 10^{-12}$	$7.69\ 10^{-13}$	$2.32\ 10^{-11}$	**$3.43\ 10^{-11}$**
	Y 1 10^{-2}	$5.02\ 10^{-13}$	$3.17\ 10^{-13}$	$2.40\ 10^{-10}$	$6.18\ 10^{-13}$	$4.05\ 10^{-13}$	$1.45\ 10^{-13}$	$2.80\ 10^{-11}$	**$3.75\ 10^{-11}$**
Ir-195m	D 1 10^{-2}	$1.25\ 10^{-11}$	$7.70\ 10^{-12}$	$2.66\ 10^{-10}$	$9.69\ 10^{-12}$	$7.70\ 10^{-12}$	$6.24\ 10^{-12}$	$8.63\ 10^{-11}$	**$6.37\ 10^{-11}$**
	W 1 10^{-2}	$6.31\ 10^{-12}$	$3.78\ 10^{-12}$	$3.43\ 10^{-10}$	$4.99\ 10^{-12}$	$3.55\ 10^{-12}$	$2.62\ 10^{-12}$	$5.81\ 10^{-11}$	**$6.15\ 10^{-11}$**
	Y 1 10^{-2}	$6.16\ 10^{-12}$	$2.82\ 10^{-12}$	$3.66\ 10^{-10}$	$4.05\ 10^{-12}$	$2.42\ 10^{-12}$	$1.50\ 10^{-12}$	$6.98\ 10^{-11}$	**$6.74\ 10^{-11}$**
Platinum									
Pt-186	D 1 10^{-2}	$1.75\ 10^{-11}$	$9.35\ 10^{-12}$	$1.10\ 10^{-10}$	$1.17\ 10^{-11}$	$8.29\ 10^{-12}$	$6.95\ 10^{-12}$	$4.99\ 10^{-11}$	**$3.58\ 10^{-11}$**
Pt-188	D 1 10^{-2}	$4.95\ 10^{-10}$	$3.36\ 10^{-10}$	$6.97\ 10^{-10}$	$4.46\ 10^{-10}$	$3.50\ 10^{-10}$	$2.69\ 10^{-10}$	$1.73\ 10^{-9}$	**$8.48\ 10^{-10}$**
Pt-189	D 1 10^{-2}	$2.50\ 10^{-11}$	$1.17\ 10^{-11}$	$1.13\ 10^{-10}$	$1.91\ 10^{-11}$	$1.34\ 10^{-11}$	$8.42\ 10^{-12}$	$7.95\ 10^{-11}$	**$4.84\ 10^{-11}$**
Pt-191	D 1 10^{-2}	$8.62\ 10^{-11}$	$4.51\ 10^{-11}$	$2.56\ 10^{-10}$	$7.65\ 10^{-11}$	$5.58\ 10^{-11}$	$3.41\ 10^{-11}$	$3.19\ 10^{-10}$	**$1.66\ 10^{-10}$**
Pt-193	D 1 10^{-2}	$1.43\ 10^{-11}$	$1.33\ 10^{-11}$	$3.86\ 10^{-11}$	$1.36\ 10^{-11}$	$1.35\ 10^{-11}$	$1.42\ 10^{-11}$	$1.62\ 10^{-10}$	**$6.14\ 10^{-11}$**
Pt-193m	D 1 10^{-2}	$3.78\ 10^{-11}$	$3.55\ 10^{-11}$	$4.09\ 10^{-10}$	$3.86\ 10^{-11}$	$3.70\ 10^{-11}$	$3.50\ 10^{-11}$	$5.55\ 10^{-10}$	**$2.37\ 10^{-10}$**
Pt-195m	D 1 10^{-2}	$6.80\ 10^{-11}$	$5.42\ 10^{-11}$	$5.65\ 10^{-10}$	$7.24\ 10^{-11}$	$6.29\ 10^{-11}$	$5.04\ 10^{-11}$	$7.48\ 10^{-10}$	**$3.29\ 10^{-10}$**
Pt-197	D 1 10^{-2}	$1.64\ 10^{-11}$	$1.45\ 10^{-11}$	$4.55\ 10^{-10}$	$1.59\ 10^{-11}$	$1.50\ 10^{-11}$	$1.41\ 10^{-11}$	$2.97\ 10^{-10}$	**$1.53\ 10^{-10}$**
Pt-197m	D 1 10^{-2}	$3.24\ 10^{-12}$	$2.80\ 10^{-12}$	$1.40\ 10^{-10}$	$3.18\ 10^{-12}$	$2.92\ 10^{-12}$	$2.62\ 10^{-12}$	$4.83\ 10^{-11}$	**$3.31\ 10^{-11}$**
Pt-199	D 1 10^{-2}	$1.09\ 10^{-12}$	$9.87\ 10^{-13}$	$6.61\ 10^{-11}$	$1.07\ 10^{-12}$	$9.66\ 10^{-13}$	$9.03\ 10^{-13}$	$1.26\ 10^{-11}$	**$1.23\ 10^{-11}$**
Pt-200	D 1 10^{-2}	$5.75\ 10^{-11}$	$4.45\ 10^{-11}$	$1.41\ 10^{-9}$	$4.82\ 10^{-11}$	$4.39\ 10^{-11}$	$4.14\ 10^{-11}$	$8.38\ 10^{-10}$	**$4.50\ 10^{-10}$**
Gold									
Au-193	D 1 10^{-1}	$2.32\ 10^{-11}$	$1.12\ 10^{-11}$	$1.39\ 10^{-10}$	$1.94\ 10^{-11}$	$1.45\ 10^{-11}$	$8.81\ 10^{-12}$	$7.86\ 10^{-11}$	**$5.08\ 10^{-11}$**
	W 1 10^{-1}	$2.36\ 10^{-11}$	$7.30\ 10^{-12}$	$2.56\ 10^{-10}$	$1.50\ 10^{-11}$	$8.66\ 10^{-12}$	$3.61\ 10^{-12}$	$1.05\ 10^{-10}$	**$7.13\ 10^{-11}$**
	Y 1 10^{-1}	$2.61\ 10^{-11}$	$6.52\ 10^{-12}$	$2.66\ 10^{-10}$	$1.46\ 10^{-11}$	$7.41\ 10^{-12}$	$2.37\ 10^{-12}$	$1.23\ 10^{-10}$	**$7.82\ 10^{-11}$**
Au-194	D 1 10^{-1}	$1.66\ 10^{-10}$	$7.36\ 10^{-11}$	$2.62\ 10^{-10}$	$9.38\ 10^{-11}$	$7.10\ 10^{-11}$	$5.70\ 10^{-11}$	$2.43\ 10^{-10}$	**$1.72\ 10^{-10}$**
	W 1 10^{-1}	$2.14\ 10^{-10}$	$6.58\ 10^{-11}$	$6.19\ 10^{-10}$	$8.90\ 10^{-11}$	$5.19\ 10^{-11}$	$3.50\ 10^{-11}$	$3.48\ 10^{-10}$	**$2.55\ 10^{-10}$**
	Y 1 10^{-1}	$2.37\ 10^{-10}$	$6.36\ 10^{-11}$	$6.37\ 10^{-10}$	$8.88\ 10^{-11}$	$4.73\ 10^{-11}$	$2.88\ 10^{-11}$	$3.94\ 10^{-10}$	**$2.76\ 10^{-10}$**
Au-195	D 1 10^{-1}	$6.27\ 10^{-11}$	$4.04\ 10^{-11}$	$2.23\ 10^{-10}$	$6.89\ 10^{-11}$	$5.73\ 10^{-11}$	$3.71\ 10^{-11}$	$1.92\ 10^{-10}$	**$1.17\ 10^{-10}$**
	W 1 10^{-1}	$7.71\ 10^{-11}$	$8.21\ 10^{-11}$	$7.81\ 10^{-9}$	$1.62\ 10^{-10}$	$1.20\ 10^{-10}$	$4.20\ 10^{-11}$	$4.54\ 10^{-10}$	**$1.13\ 10^{-9}$**
	Y 1 10^{-1}	$7.67\ 10^{-11}$	$2.29\ 10^{-10}$	$2.65\ 10^{-8}$	$4.35\ 10^{-10}$	$3.39\ 10^{-10}$	$1.08\ 10^{-10}$	$6.63\ 10^{-10}$	**$3.50\ 10^{-9}$**
Au-198	D 1 10^{-1}	$1.43\ 10^{-10}$	$9.52\ 10^{-11}$	$9.52\ 10^{-10}$	$1.05\ 10^{-10}$	$9.36\ 10^{-11}$	$8.71\ 10^{-11}$	$6.83\ 10^{-10}$	**$3.87\ 10^{-10}$**
	W 1 10^{-1}	$1.35\ 10^{-10}$	$5.07\ 10^{-11}$	$3.36\ 10^{-9}$	$6.20\ 10^{-11}$	$4.22\ 10^{-11}$	$3.46\ 10^{-11}$	$1.22\ 10^{-9}$	**$8.20\ 10^{-10}$**
	Y 1 10^{-1}	$1.40\ 10^{-10}$	$4.16\ 10^{-11}$	$3.51\ 10^{-9}$	$5.40\ 10^{-11}$	$3.19\ 10^{-11}$	$2.37\ 10^{-11}$	$1.39\ 10^{-9}$	**$8.87\ 10^{-10}$**
Au-198m	D 1 10^{-1}	$2.42\ 10^{-10}$	$1.48\ 10^{-10}$	$1.09\ 10^{-9}$	$1.88\ 10^{-10}$	$1.60\ 10^{-10}$	$1.30\ 10^{-10}$	$8.74\ 10^{-10}$	**$5.07\ 10^{-10}$**
	W 1 10^{-1}	$2.55\ 10^{-10}$	$9.01\ 10^{-11}$	$5.19\ 10^{-9}$	$1.36\ 10^{-10}$	$8.66\ 10^{-11}$	$5.53\ 10^{-11}$	$1.64\ 10^{-9}$	**$1.21\ 10^{-9}$**
	Y 1 10^{-1}	$2.68\ 10^{-10}$	$7.79\ 10^{-11}$	$5.49\ 10^{-9}$	$1.26\ 10^{-10}$	$7.14\ 10^{-11}$	$3.99\ 10^{-11}$	$1.84\ 10^{-9}$	**$1.31\ 10^{-9}$**
Au-199	D 1 10^{-1}	$5.06\ 10^{-11}$	$3.71\ 10^{-11}$	$4.15\ 10^{-10}$	$4.45\ 10^{-11}$	$3.99\ 10^{-11}$	$3.42\ 10^{-11}$	$2.96\ 10^{-10}$	**$1.64\ 10^{-10}$**
	W 1 10^{-1}	$3.90\ 10^{-11}$	$1.60\ 10^{-11}$	$1.63\ 10^{-9}$	$2.45\ 10^{-11}$	$1.68\ 10^{-11}$	$1.10\ 10^{-11}$	$5.45\ 10^{-10}$	**$3.75\ 10^{-10}$**
	Y 1 10^{-1}	$3.84\ 10^{-11}$	$1.19\ 10^{-11}$	$1.71\ 10^{-9}$	$2.07\ 10^{-11}$	$1.22\ 10^{-11}$	$6.47\ 10^{-12}$	$6.18\ 10^{-10}$	**$4.05\ 10^{-10}$**
Au-200	D 1 10^{-1}	$1.92\ 10^{-12}$	$1.79\ 10^{-12}$	$1.32\ 10^{-10}$	$1.82\ 10^{-12}$	$1.69\ 10^{-12}$	$1.66\ 10^{-12}$	$2.36\ 10^{-11}$	**$2.40\ 10^{-11}$**
	W 1 10^{-1}	$5.56\ 10^{-13}$	$6.81\ 10^{-13}$	$1.48\ 10^{-10}$	$6.81\ 10^{-13}$	$6.12\ 10^{-13}$	$6.24\ 10^{-13}$	$5.78\ 10^{-12}$	**$1.99\ 10^{-11}$**
	Y 1 10^{-1}	$1.68\ 10^{-13}$	$3.06\ 10^{-13}$	$1.60\ 10^{-10}$	$3.01\ 10^{-13}$	$2.28\ 10^{-13}$	$2.42\ 10^{-13}$	$6.46\ 10^{-12}$	**$2.13\ 10^{-11}$**

Table 2.1, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Au-200m	D 1 10^{-1}	2.28 10^{-10}	1.11 10^{-10}	9.34 10^{-10}	1.32 10^{-10}	1.02 10^{-10}	9.04 10^{-11}	6.04 10^{-10}	**3.89 10^{-10}**
	W 1 10^{-1}	2.49 10^{-10}	8.03 10^{-11}	1.75 10^{-9}	1.02 10^{-10}	6.17 10^{-11}	4.86 10^{-11}	8.06 10^{-10}	**5.42 10^{-10}**
	Y 1 10^{-1}	2.78 10^{-10}	7.46 10^{-11}	1.80 10^{-9}	9.91 10^{-11}	5.29 10^{-11}	3.76 10^{-11}	9.39 10^{-10}	**5.93 10^{-10}**
Au-201	D 1 10^{-1}	3.97 10^{-13}	3.98 10^{-13}	4.30 10^{-11}	4.04 10^{-13}	3.88 10^{-13}	3.83 10^{-13}	6.12 10^{-12}	**7.23 10^{-12}**
	W 1 10^{-1}	1.15 10^{-13}	1.40 10^{-13}	4.70 10^{-11}	1.41 10^{-13}	1.33 10^{-13}	1.34 10^{-13}	1.08 10^{-12}	**6.04 10^{-12}**
	Y 1 10^{-1}	1.64 10^{-14}	4.35 10^{-14}	5.03 10^{-11}	4.40 10^{-14}	3.51 10^{-14}	3.69 10^{-14}	1.15 10^{-12}	**6.40 10^{-12}**
Mercury									
Hg-193	D 2 10^{-2}	1.09 10^{-11}	5.82 10^{-12}	1.12 10^{-10}	9.63 10^{-12}	7.20 10^{-12}	4.53 10^{-12}	4.88 10^{-11}	**3.32 10^{-11}**
	W 2 10^{-2}	8.50 10^{-12}	3.21 10^{-12}	1.61 10^{-10}	6.11 10^{-12}	3.74 10^{-12}	1.72 10^{-12}	4.36 10^{-11}	**3.59 10^{-11}**
	D 1.0	6.02 10^{-12}	6.28 10^{-12}	1.13 10^{-10}	9.94 10^{-12}	8.72 10^{-12}	5.86 10^{-12}	2.46 10^{-11}	**2.50 10^{-11}**
	Vapor	2.19 10^{-12}	4.93 10^{-12}	3.70 10^{-10}	7.52 10^{-12}	6.26 10^{-12}	3.50 10^{-12}	1.06 10^{-11}	**5.01 10^{-11}**
Hg-193m	D 2 10^{-2}	8.76 10^{-11}	4.27 10^{-11}	3.51 10^{-10}	5.92 10^{-11}	4.38 10^{-11}	3.31 10^{-11}	2.49 10^{-10}	**1.54 10^{-10}**
	W 2 10^{-2}	8.60 10^{-11}	2.83 10^{-11}	6.07 10^{-10}	4.25 10^{-11}	2.46 10^{-11}	1.54 10^{-11}	2.84 10^{-10}	**1.90 10^{-10}**
	D 1.0	4.12 10^{-11}	4.30 10^{-11}	3.57 10^{-10}	6.05 10^{-11}	5.25 10^{-11}	4.32 10^{-11}	1.46 10^{-10}	**1.14 10^{-10}**
	Vapor	2.03 10^{-11}	4.26 10^{-11}	1.34 10^{-9}	5.12 10^{-11}	4.25 10^{-11}	3.57 10^{-11}	8.96 10^{-11}	**2.08 10^{-10}**
Hg-194	D 2 10^{-2}	2.55 10^{-8}	2.05 10^{-8}	1.99 10^{-8}	2.56 10^{-8}	2.19 10^{-8}	1.88 10^{-8}	5.30 10^{-8}	**3.20 10^{-8}**
	W 2 10^{-2}	7.37 10^{-9}	6.33 10^{-9}	2.18 10^{-8}	7.78 10^{-9}	6.58 10^{-9}	5.67 10^{-9}	1.55 10^{-8}	**1.14 10^{-8}**
	D 1.0	2.98 10^{-8}	2.49 10^{-8}	2.39 10^{-8}	3.81 10^{-8}	3.25 10^{-8}	2.85 10^{-8}	9.51 10^{-8}	**4.90 10^{-8}**
	Vapor	3.72 10^{-8}	3.00 10^{-8}	3.03 10^{-8}	3.75 10^{-8}	3.21 10^{-8}	2.75 10^{-8}	7.75 10^{-8}	**4.70 10^{-8}**
Hg-195	D 2 10^{-2}	1.60 10^{-11}	8.74 10^{-12}	1.08 10^{-10}	1.33 10^{-11}	1.01 10^{-11}	7.19 10^{-12}	6.19 10^{-11}	**3.89 10^{-11}**
	W 2 10^{-2}	1.30 10^{-11}	5.04 10^{-12}	1.81 10^{-10}	8.38 10^{-12}	5.19 10^{-12}	3.02 10^{-12}	6.01 10^{-11}	**4.50 10^{-11}**
	D 1.0	9.19 10^{-12}	9.74 10^{-12}	1.10 10^{-10}	1.51 10^{-11}	1.33 10^{-11}	9.75 10^{-12}	3.93 10^{-11}	**3.12 10^{-11}**
	Vapor	4.51 10^{-12}	8.43 10^{-12}	3.80 10^{-10}	1.16 10^{-11}	9.79 10^{-12}	7.20 10^{-12}	1.97 10^{-11}	**5.58 10^{-11}**
Hg-195m	D 2 10^{-2}	1.05 10^{-10}	7.03 10^{-11}	5.03 10^{-10}	9.36 10^{-11}	7.90 10^{-11}	6.40 10^{-11}	4.95 10^{-10}	**2.61 10^{-10}**
	W 2 10^{-2}	9.46 10^{-11}	3.16 10^{-11}	1.47 10^{-9}	5.05 10^{-11}	3.15 10^{-11}	1.94 10^{-11}	6.45 10^{-10}	**4.06 10^{-10}**
	D 1.0	8.08 10^{-11}	7.83 10^{-11}	5.14 10^{-10}	1.13 10^{-10}	1.01 10^{-10}	8.09 10^{-11}	4.27 10^{-10}	**2.41 10^{-10}**
	Vapor	6.49 10^{-11}	7.62 10^{-11}	2.50 10^{-9}	9.69 10^{-11}	8.56 10^{-11}	6.97 10^{-11}	2.34 10^{-10}	**4.14 10^{-10}**
Hg-197	D 2 10^{-2}	4.40 10^{-11}	3.12 10^{-11}	2.17 10^{-10}	4.98 10^{-11}	4.15 10^{-11}	2.88 10^{-11}	2.25 10^{-10}	**1.17 10^{-10}**
	W 2 10^{-2}	3.38 10^{-11}	1.20 10^{-11}	7.21 10^{-10}	2.65 10^{-11}	1.62 10^{-11}	6.98 10^{-12}	2.84 10^{-10}	**1.86 10^{-10}**
	D 1.0	3.58 10^{-11}	3.41 10^{-11}	2.21 10^{-10}	5.80 10^{-11}	5.15 10^{-11}	3.39 10^{-11}	2.06 10^{-10}	**1.12 10^{-10}**
	Vapor	3.15 10^{-11}	3.47 10^{-11}	1.12 10^{-9}	5.34 10^{-11}	4.70 10^{-11}	3.09 10^{-11}	1.18 10^{-10}	**1.92 10^{-10}**
Hg-197m	D 2 10^{-2}	4.97 10^{-11}	3.80 10^{-11}	4.86 10^{-10}	5.04 10^{-11}	4.41 10^{-11}	3.55 10^{-11}	3.80 10^{-10}	**1.99 10^{-10}**
	W 2 10^{-2}	3.15 10^{-11}	1.26 10^{-11}	1.17 10^{-9}	2.25 10^{-11}	1.48 10^{-11}	8.43 10^{-12}	4.94 10^{-10}	**3.02 10^{-10}**
	D 1.0	4.39 10^{-11}	4.26 10^{-11}	4.92 10^{-10}	5.81 10^{-11}	5.35 10^{-11}	4.21 10^{-11}	2.58 10^{-10}	**1.64 10^{-10}**
	Vapor	3.14 10^{-11}	3.47 10^{-11}	2.22 10^{-9}	4.65 10^{-11}	4.19 10^{-11}	3.17 10^{-11}	1.19 10^{-10}	**3.23 10^{-10}**
Hg-199m	D 2 10^{-2}	9.54 10^{-13}	8.49 10^{-13}	5.71 10^{-11}	1.05 10^{-12}	9.03 10^{-13}	7.22 10^{-13}	9.69 10^{-12}	**1.03 10^{-11}**
	W 2 10^{-2}	2.65 10^{-13}	3.62 10^{-13}	6.37 10^{-11}	4.68 10^{-13}	3.95 10^{-13}	2.88 10^{-13}	2.28 10^{-12}	**8.52 10^{-12}**
	D 1.0	8.86 10^{-13}	9.97 10^{-13}	5.73 10^{-11}	1.17 10^{-12}	1.08 10^{-12}	9.05 10^{-13}	6.47 10^{-12}	**9.39 10^{-12}**
	Vapor	7.29 10^{-14}	4.22 10^{-13}	1.48 10^{-10}	5.89 10^{-13}	4.76 10^{-13}	2.89 10^{-13}	8.43 10^{-13}	**1.82 10^{-11}**
Hg-203	D 2 10^{-2}	6.55 10^{-10}	5.47 10^{-10}	8.76 10^{-10}	6.59 10^{-10}	5.89 10^{-10}	5.06 10^{-10}	2.13 10^{-9}	**1.10 10^{-9}**
	W 2 10^{-2}	2.74 10^{-10}	2.14 10^{-10}	8.78 10^{-9}	2.63 10^{-10}	2.09 10^{-10}	1.66 10^{-10}	1.19 10^{-9}	**1.55 10^{-9}**
	D 1.0	8.57 10^{-10}	7.76 10^{-10}	1.11 10^{-9}	1.06 10^{-9}	9.47 10^{-10}	8.09 10^{-10}	4.45 10^{-9}	**1.98 10^{-9}**
	Vapor	8.65 10^{-10}	7.90 10^{-10}	3.32 10^{-9}	9.45 10^{-10}	8.49 10^{-10}	7.32 10^{-10}	2.77 10^{-9}	**1.73 10^{-9}**
Thallium									
Tl-194	D 1.0	5.75 10^{-13}	9.66 10^{-13}	9.40 10^{-12}	1.09 10^{-12}	8.95 10^{-13}	7.98 10^{-13}	2.97 10^{-12}	**2.49 10^{-12}**
Tl-194m	D 1.0	2.00 10^{-12}	3.16 10^{-12}	5.81 10^{-11}	3.33 10^{-12}	2.81 10^{-12}	2.75 10^{-12}	1.20 10^{-11}	**1.21 10^{-11}**

Table 2.1, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Tl-195	D 1.0	3.77 10^{-12}	4.61 10^{-12}	5.26 10^{-11}	5.26 10^{-12}	4.54 10^{-12}	4.09 10^{-12}	1.23 10^{-11}	**1.25 10^{-11}**
Tl-197	D 1.0	4.66 10^{-12}	5.11 10^{-12}	5.51 10^{-11}	6.77 10^{-12}	5.96 10^{-12}	4.64 10^{-12}	1.23 10^{-11}	**1.34 10^{-11}**
Tl-198	D 1.0	2.35 10^{-11}	2.50 10^{-11}	1.30 10^{-10}	2.77 10^{-11}	2.38 10^{-11}	2.24 10^{-11}	4.83 10^{-11}	**4.44 10^{-11}**
Tl-198m	D 1.0	9.52 10^{-12}	1.10 10^{-11}	1.22 10^{-10}	1.23 10^{-11}	1.07 10^{-11}	1.00 10^{-11}	2.70 10^{-11}	**2.89 10^{-11}**
Tl-199	D 1.0	6.45 10^{-12}	6.90 10^{-12}	8.27 10^{-11}	9.57 10^{-12}	8.37 10^{-12}	6.24 10^{-12}	1.54 10^{-11}	**1.88 10^{-11}**
Tl-200	D 1.0	8.53 10^{-11}	8.32 10^{-11}	2.78 10^{-10}	9.78 10^{-11}	8.57 10^{-11}	7.90 10^{-11}	1.42 10^{-10}	**1.27 10^{-10}**
Tl-201	D 1.0	3.66 10^{-11}	3.32 10^{-11}	1.69 10^{-10}	5.37 10^{-11}	4.77 10^{-11}	3.14 10^{-11}	6.71 10^{-11}	**6.34 10^{-11}**
Tl-202	D 1.0	2.19 10^{-10}	1.90 10^{-10}	3.40 10^{-10}	2.55 10^{-10}	2.24 10^{-10}	1.81 10^{-10}	3.29 10^{-10}	**2.66 10^{-10}**
Tl-204	D 1.0	4.14 10^{-10}	4.14 10^{-10}	1.13 10^{-9}	4.15 10^{-10}	4.15 10^{-10}	4.14 10^{-10}	9.14 10^{-10}	**6.50 10^{-10}**
Lead									
Pb-195m	D 2 10^{-1}	2.26 10^{-12}	1.90 10^{-12}	3.61 10^{-11}	2.95 10^{-12}	8.31 10^{-12}	1.45 10^{-12}	8.47 10^{-12}	**8.37 10^{-12}**
Pb-198	D 2 10^{-1}	9.99 10^{-12}	7.36 10^{-12}	5.57 10^{-11}	1.66 10^{-11}	2.79 10^{-11}	4.81 10^{-12}	2.52 10^{-11}	**2.08 10^{-11}**
Pb-199	D 2 10^{-1}	9.89 10^{-12}	6.21 10^{-12}	5.79 10^{-11}	9.99 10^{-12}	1.97 10^{-11}	4.35 10^{-12}	2.47 10^{-11}	**1.97 10^{-11}**
Pb-200	D 2 10^{-1}	1.08 10^{-10}	6.39 10^{-11}	3.40 10^{-10}	2.02 10^{-10}	7.66 10^{-10}	4.28 10^{-11}	2.95 10^{-10}	**2.14 10^{-10}**
Pb-201	D 2 10^{-1}	3.85 10^{-11}	1.96 10^{-11}	1.46 10^{-10}	5.63 10^{-11}	2.10 10^{-10}	1.33 10^{-11}	9.11 10^{-11}	**7.09 10^{-11}**
Pb-202	D 2 10^{-1}	1.45 10^{-8}	1.63 10^{-8}	1.62 10^{-8}	6.66 10^{-8}	9.46 10^{-8}	1.49 10^{-8}	2.42 10^{-8}	**2.65 10^{-8}**
Pb-202m	D 2 10^{-1}	3.17 10^{-11}	1.80 10^{-11}	1.20 10^{-10}	2.51 10^{-11}	3.52 10^{-11}	1.35 10^{-11}	6.26 10^{-11}	**4.83 10^{-11}**
Pb-203	D 2 10^{-1}	6.01 10^{-11}	3.44 10^{-11}	2.06 10^{-10}	1.54 10^{-10}	7.54 10^{-10}	2.34 10^{-11}	1.86 10^{-10}	**1.43 10^{-10}**
Pb-205	D 2 10^{-1}	5.25 10^{-11}	5.87 10^{-11}	7.76 10^{-11}	4.37 10^{-9}	9.58 10^{-9}	5.51 10^{-11}	7.30 10^{-10}	**1.06 10^{-9}**
Pb-209	D 2 10^{-1}	1.48 10^{-12}	1.48 10^{-12}	1.15 10^{-10}	6.03 10^{-12}	5.75 10^{-11}	1.48 10^{-12}	2.92 10^{-11}	**2.56 10^{-11}**
Pb-210	D 2 10^{-1}	3.18 10^{-7}	3.18 10^{-7}	3.18 10^{-7}	3.75 10^{-6}	**5.47 10^{-5}**	3.18 10^{-7}	4.69 10^{-6}	3.67 10^{-6}
Pb-211	D 2 10^{-1}	1.63 10^{-10}	1.63 10^{-10}	1.78 10^{-8}	2.64 10^{-10}	1.39 10^{-9}	1.63 10^{-10}	2.51 10^{-10}	**2.35 10^{-9}**
Pb-212	D 2 10^{-1}	3.47 10^{-9}	3.43 10^{-9}	1.97 10^{-7}	3.34 10^{-8}	3.71 10^{-7}	3.42 10^{-9}	1.78 10^{-8}	**4.56 10^{-8}**
Pb-214	D 2 10^{-1}	1.63 10^{-10}	1.62 10^{-10}	1.49 10^{-8}	4.63 10^{-10}	3.88 10^{-9}	1.62 10^{-10}	2.62 10^{-10}	**2.11 10^{-9}**
Bismuth									
Bi-200	D 5 10^{-2}	5.94 10^{-12}	3.91 10^{-12}	5.11 10^{-11}	5.02 10^{-12}	3.14 10^{-12}	2.44 10^{-12}	2.96 10^{-11}	**1.78 10^{-11}**
	W 5 10^{-2}	6.04 10^{-12}	3.32 10^{-12}	6.90 10^{-11}	4.18 10^{-12}	2.63 10^{-12}	2.27 10^{-12}	1.77 10^{-11}	**1.62 10^{-11}**
Bi-201	D 5 10^{-2}	1.64 10^{-11}	8.12 10^{-12}	1.45 10^{-10}	1.11 10^{-11}	6.56 10^{-12}	4.68 10^{-12}	9.11 10^{-11}	**5.17 10^{-11}**
	W 5 10^{-2}	1.28 10^{-11}	6.38 10^{-12}	1.92 10^{-10}	8.39 10^{-12}	5.06 10^{-12}	4.04 10^{-12}	4.76 10^{-11}	**4.28 10^{-11}**
Bi-202	D 5 10^{-2}	1.55 10^{-11}	9.39 10^{-12}	8.40 10^{-11}	1.15 10^{-11}	6.97 10^{-12}	5.69 10^{-12}	5.70 10^{-11}	**3.42 10^{-11}**
	W 5 10^{-2}	6.13 10^{-12}	6.50 10^{-12}	9.67 10^{-11}	7.11 10^{-12}	4.88 10^{-12}	4.99 10^{-12}	2.24 10^{-11}	**2.20 10^{-11}**
Bi-203	D 5 10^{-2}	1.24 10^{-10}	4.94 10^{-11}	3.07 10^{-10}	6.84 10^{-11}	3.74 10^{-11}	2.35 10^{-11}	3.94 10^{-10}	**2.03 10^{-10}**
	W 5 10^{-2}	1.53 10^{-10}	5.07 10^{-11}	5.75 10^{-10}	6.67 10^{-11}	3.60 10^{-11}	2.46 10^{-11}	3.30 10^{-10}	**2.24 10^{-10}**
Bi-205	D 5 10^{-2}	3.40 10^{-10}	1.48 10^{-10}	4.11 10^{-10}	2.14 10^{-10}	1.17 10^{-10}	6.69 10^{-11}	1.19 10^{-9}	**5.44 10^{-10}**
	W 5 10^{-2}	6.91 10^{-10}	3.70 10^{-10}	4.31 10^{-9}	4.31 10^{-10}	2.74 10^{-10}	2.41 10^{-10}	1.20 10^{-9}	**1.17 10^{-9}**
Bi-206	D 5 10^{-2}	5.99 10^{-10}	2.46 10^{-10}	9.47 10^{-10}	3.55 10^{-10}	1.93 10^{-10}	1.17 10^{-10}	2.28 10^{-9}	**1.04 10^{-9}**
	W 5 10^{-2}	1.16 10^{-9}	4.38 10^{-10}	5.62 10^{-9}	5.41 10^{-10}	3.14 10^{-10}	2.68 10^{-10}	2.20 10^{-9}	**1.77 10^{-9}**
Bi-207	D 5 10^{-2}	3.74 10^{-10}	1.79 10^{-10}	6.95 10^{-10}	2.61 10^{-10}	1.46 10^{-10}	9.02 10^{-11}	2.10 10^{-9}	**8.73 10^{-10}**
	W 5 10^{-2}	9.71 10^{-10}	1.25 10^{-9}	3.17 10^{-8}	1.32 10^{-9}	9.58 10^{-10}	1.08 10^{-9}	3.19 10^{-9}	**5.41 10^{-9}**
Bi-210	D 5 10^{-2}	1.96 10^{-10}	1.96 10^{-10}	2.47 10^{-9}	1.96 10^{-10}	1.96 10^{-10}	1.96 10^{-10}	1.26 10^{-8} **5.85 10^{-8}**	4.18 10^{-9} Kidneys
	W 5 10^{-2}	6.47 10^{-11}	6.47 10^{-11}	4.26 10^{-7}	6.47 10^{-11}	6.47 10^{-11}	6.47 10^{-11}	5.66 10^{-9}	**5.29 10^{-8}**
Bi-210m	D 5 10^{-2}	1.01 10^{-8}	1.00 10^{-8}	3.15 10^{-7}	1.01 10^{-8}	1.00 10^{-8}	1.00 10^{-8}	6.03 10^{-7} **2.96 10^{-6}**	2.25 10^{-7} Kidneys
	W 5 10^{-2}	3.20 10^{-9}	3.23 10^{-9}	1.66 10^{-5}	3.28 10^{-9}	3.20 10^{-9}	3.16 10^{-9}	1.92 10^{-7}	**2.05 10^{-6}**
Bi-212	D 5 10^{-2}	1.66 10^{-10}	1.65 10^{-10}	3.39 10^{-8}	1.65 10^{-10}	1.64 10^{-10}	1.64 10^{-10}	5.56 10^{-9}	**5.83 10^{-9}**
	W 5 10^{-2}	4.74 10^{-11}	4.80 10^{-11}	3.89 10^{-8}	4.80 10^{-11}	4.75 10^{-11}	4.75 10^{-11}	1.59 10^{-9}	**5.17 10^{-9}**

Table 2.1, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Bi-213	D $5\ 10^{-2}$	$1.31\ 10^{-10}$	$1.31\ 10^{-10}$	$2.81\ 10^{-8}$	$1.31\ 10^{-10}$	$1.31\ 10^{-10}$	$1.31\ 10^{-10}$	$3.95\ 10^{-9}$	**$4.63\ 10^{-9}$**
	W $5\ 10^{-2}$	$3.80\ 10^{-11}$	$3.80\ 10^{-11}$	$3.16\ 10^{-8}$	$3.81\ 10^{-11}$	$3.80\ 10^{-11}$	$3.80\ 10^{-11}$	$1.14\ 10^{-9}$	**$4.16\ 10^{-9}$**
Bi-214	D $5\ 10^{-2}$	$5.08\ 10^{-11}$	$5.10\ 10^{-11}$	$1.22\ 10^{-8}$	$5.10\ 10^{-11}$	$5.08\ 10^{-11}$	$5.07\ 10^{-11}$	$9.43\ 10^{-10}$	**$1.78\ 10^{-9}$**
	W $5\ 10^{-2}$	$1.51\ 10^{-11}$	$1.55\ 10^{-11}$	$1.32\ 10^{-8}$	$1.55\ 10^{-11}$	$1.54\ 10^{-11}$	$1.54\ 10^{-11}$	$2.77\ 10^{-10}$	**$1.68\ 10^{-9}$**
Polonium									
Po-203	D $1\ 10^{-1}$	$1.08\ 10^{-11}$	$6.43\ 10^{-12}$	$6.78\ 10^{-11}$	$7.57\ 10^{-12}$	$5.59\ 10^{-12}$	$4.77\ 10^{-12}$	$2.81\ 10^{-11}$	**$2.14\ 10^{-11}$**
	W $1\ 10^{-1}$	$9.12\ 10^{-12}$	$4.46\ 10^{-12}$	$8.56\ 10^{-11}$	$5.33\ 10^{-12}$	$3.47\ 10^{-12}$	$2.97\ 10^{-12}$	$1.96\ 10^{-11}$	**$1.99\ 10^{-11}$**
Po-205	D $1\ 10^{-1}$	$1.72\ 10^{-11}$	$1.21\ 10^{-11}$	$1.11\ 10^{-10}$	$1.39\ 10^{-11}$	$1.06\ 10^{-11}$	$9.39\ 10^{-12}$	$4.94\ 10^{-11}$	**$3.65\ 10^{-11}$**
	W $1\ 10^{-1}$	$8.74\ 10^{-12}$	$7.30\ 10^{-12}$	$1.44\ 10^{-10}$	$8.05\ 10^{-12}$	$5.88\ 10^{-12}$	$5.71\ 10^{-12}$	$2.03\ 10^{-11}$	**$2.80\ 10^{-11}$**
Po-207	D $1\ 10^{-1}$	$3.72\ 10^{-11}$	$1.96\ 10^{-11}$	$1.17\ 10^{-10}$	$2.37\ 10^{-11}$	$1.67\ 10^{-11}$	$1.48\ 10^{-11}$	$8.14\ 10^{-11}$	**$5.45\ 10^{-11}$**
	W $1\ 10^{-1}$	$2.81\ 10^{-11}$	$1.39\ 10^{-11}$	$1.52\ 10^{-10}$	$1.65\ 10^{-11}$	$1.06\ 10^{-11}$	$9.82\ 10^{-12}$	$5.91\ 10^{-11}$	**$4.77\ 10^{-11}$**
Po-210	D $1\ 10^{-1}$	$4.04\ 10^{-7}$	$4.04\ 10^{-7}$	$7.29\ 10^{-7}$	$4.04\ 10^{-7}$	$4.04\ 10^{-7}$	$4.04\ 10^{-7}$	$7.40\ 10^{-6}$	**$2.54\ 10^{-6}$**
	W $1\ 10^{-1}$	$1.26\ 10^{-7}$	$1.26\ 10^{-7}$	$1.30\ 10^{-5}$	$1.26\ 10^{-7}$	$1.26\ 10^{-7}$	$1.26\ 10^{-7}$	$2.30\ 10^{-6}$	**$2.32\ 10^{-6}$**
Astatine									
At-207	D 1.0	$9.87\ 10^{-11}$	$1.00\ 10^{-10}$	$4.32\ 10^{-9}$	$1.03\ 10^{-10}$	$1.00\ 10^{-10}$	$1.00\ 10^{-10}$	$1.16\ 10^{-10}$	**$6.11\ 10^{-10}$**
	W 1.0	$3.56\ 10^{-11}$	$4.07\ 10^{-11}$	$5.14\ 10^{-9}$	$4.18\ 10^{-11}$	$3.96\ 10^{-11}$	$4.02\ 10^{-11}$	$5.38\ 10^{-11}$	**$6.55\ 10^{-10}$**
At-211	D 1.0	$5.08\ 10^{-9}$	$5.08\ 10^{-9}$	$1.48\ 10^{-7}$	$5.08\ 10^{-9}$	$5.08\ 10^{-9}$	$5.08\ 10^{-9}$	$5.12\ 10^{-9}$	**$2.22\ 10^{-8}$**
	W 1.0	$2.43\ 10^{-9}$	$2.43\ 10^{-9}$	$2.12\ 10^{-7}$	$2.43\ 10^{-9}$	$2.43\ 10^{-9}$	$2.43\ 10^{-9}$	$2.47\ 10^{-9}$	**$2.76\ 10^{-8}$**
Francium									
Fr-222	D 1.0	$3.29\ 10^{-10}$	$3.29\ 10^{-10}$	$2.52\ 10^{-8}$	$3.29\ 10^{-10}$	$3.29\ 10^{-10}$	$3.29\ 10^{-10}$	$3.52\ 10^{-10}$	**$3.32\ 10^{-9}$**
Fr-223	D 1.0	$1.44\ 10^{-9}$	$1.44\ 10^{-9}$	$3.44\ 10^{-9}$	$1.44\ 10^{-9}$	$1.44\ 10^{-9}$	$1.44\ 10^{-9}$	$1.44\ 10^{-9}$	**$1.68\ 10^{-9}$**
Radium									
Ra-223	W $2\ 10^{-1}$	$3.38\ 10^{-8}$	$3.38\ 10^{-8}$	$1.66\ 10^{-5}$	$2.24\ 10^{-7}$	$2.34\ 10^{-6}$	$3.38\ 10^{-8}$	$6.14\ 10^{-8}$	**$2.12\ 10^{-6}$**
Ra-224	W $2\ 10^{-1}$	$1.56\ 10^{-8}$	$1.54\ 10^{-8}$	$6.56\ 10^{-6}$	$1.13\ 10^{-7}$	$1.17\ 10^{-6}$	$1.53\ 10^{-8}$	$3.55\ 10^{-8}$	**$8.53\ 10^{-7}$**
Ra-225	W $2\ 10^{-1}$	$3.07\ 10^{-8}$	$3.07\ 10^{-8}$	$1.67\ 10^{-5}$	$1.58\ 10^{-7}$	$1.68\ 10^{-6}$	$3.07\ 10^{-8}$	$3.63\ 10^{-8}$	**$2.10\ 10^{-6}$**
Ra-226	W $2\ 10^{-1}$	$1.02\ 10^{-7}$	$1.02\ 10^{-7}$	$1.61\ 10^{-5}$	$6.64\ 10^{-7}$	$7.59\ 10^{-6}$	$1.02\ 10^{-7}$	$1.07\ 10^{-7}$	**$2.32\ 10^{-6}$**
Ra-227	W $2\ 10^{-1}$	$2.27\ 10^{-12}$	$2.36\ 10^{-12}$	$3.32\ 10^{-10}$	$4.81\ 10^{-11}$	**$9.59\ 10^{-10}$**	$2.30\ 10^{-12}$	$4.60\ 10^{-12}$	$7.68\ 10^{-11}$
Ra-228	W $2\ 10^{-1}$	$1.83\ 10^{-7}$	$1.84\ 10^{-7}$	$7.22\ 10^{-6}$	$7.38\ 10^{-7}$	$6.51\ 10^{-6}$	$1.83\ 10^{-7}$	$1.87\ 10^{-7}$	**$1.29\ 10^{-6}$**
Actinium									
Ac-224	D $1\ 10^{-3}$	$5.87\ 10^{-9}$	$6.95\ 10^{-12}$	$5.95\ 10^{-8}$	$3.84\ 10^{-8}$	**$4.83\ 10^{-7}$**	$2.49\ 10^{-12}$	$2.64\ 10^{-8}$	$3.56\ 10^{-8}$
	W $1\ 10^{-3}$	$1.01\ 10^{-9}$	$5.66\ 10^{-12}$	$2.28\ 10^{-7}$	$6.38\ 10^{-9}$	$8.04\ 10^{-8}$	$2.78\ 10^{-12}$	$5.12\ 10^{-9}$	**$3.23\ 10^{-8}$**
	Y $1\ 10^{-3}$	$7.48\ 10^{-11}$	$5.38\ 10^{-12}$	$2.43\ 10^{-7}$	$3.82\ 10^{-10}$	$4.73\ 10^{-9}$	$2.68\ 10^{-12}$	$1.18\ 10^{-9}$	**$2.97\ 10^{-8}$**
Ac-225	D $1\ 10^{-3}$	$5.22\ 10^{-7}$	$7.63\ 10^{-11}$	$1.57\ 10^{-6}$	$3.72\ 10^{-6}$	**$4.65\ 10^{-5}$**	$4.03\ 10^{-11}$	$2.53\ 10^{-6}$	$2.92\ 10^{-6}$
	W $1\ 10^{-3}$	$8.70\ 10^{-8}$	$5.16\ 10^{-11}$	$1.55\ 10^{-5}$	$6.19\ 10^{-7}$	$7.75\ 10^{-6}$	$2.89\ 10^{-11}$	$4.53\ 10^{-7}$	**$2.32\ 10^{-6}$**
	Y $1\ 10^{-3}$	$5.20\ 10^{-9}$	$4.66\ 10^{-11}$	$1.79\ 10^{-5}$	$3.63\ 10^{-8}$	$4.53\ 10^{-7}$	$2.64\ 10^{-11}$	$6.14\ 10^{-8}$	**$2.19\ 10^{-6}$**
Ac-226	D $1\ 10^{-3}$	$5.60\ 10^{-8}$	$7.29\ 10^{-12}$	$9.15\ 10^{-7}$	$3.30\ 10^{-7}$	**$4.19\ 10^{-6}$**	$3.07\ 10^{-12}$	$2.24\ 10^{-7}$	$3.56\ 10^{-7}$
	W $1\ 10^{-3}$	$1.07\ 10^{-8}$	$7.43\ 10^{-12}$	$2.30\ 10^{-6}$	$6.35\ 10^{-8}$	$8.04\ 10^{-7}$	$2.71\ 10^{-12}$	$5.22\ 10^{-8}$	**$3.26\ 10^{-7}$**
	Y $1\ 10^{-3}$	$1.30\ 10^{-9}$	$7.45\ 10^{-12}$	$2.42\ 10^{-6}$	$7.89\ 10^{-9}$	$9.89\ 10^{-8}$	$2.45\ 10^{-12}$	$1.73\ 10^{-8}$	**$3.00\ 10^{-7}$**
Ac-227	D $1\ 10^{-3}$	$3.96\ 10^{-4}$	$6.66\ 10^{-8}$	$1.23\ 10^{-7}$	$2.57\ 10^{-3}$	**$3.21\ 10^{-2}$**	$3.59\ 10^{-8}$	$1.47\ 10^{-3}$	$1.81\ 10^{-3}$
	W $1\ 10^{-3}$	$9.98\ 10^{-5}$	$1.70\ 10^{-8}$	$6.80\ 10^{-5}$	$6.49\ 10^{-4}$	**$8.10\ 10^{-3}$**	$9.22\ 10^{-9}$	$3.70\ 10^{-4}$	$4.65\ 10^{-4}$
	Y $1\ 10^{-3}$	$3.56\ 10^{-5}$	$1.06\ 10^{-8}$	$1.54\ 10^{-3}$	$2.33\ 10^{-4}$	$2.91\ 10^{-3}$	$6.47\ 10^{-9}$	$1.34\ 10^{-4}$	**$3.49\ 10^{-4}$**
Ac-228	D $1\ 10^{-3}$	$1.58\ 10^{-8}$	$2.11\ 10^{-11}$	$6.41\ 10^{-10}$	$1.14\ 10^{-7}$	**$1.43\ 10^{-6}$**	$8.81\ 10^{-12}$	$7.56\ 10^{-8}$	$8.33\ 10^{-8}$
	W $1\ 10^{-3}$	$3.90\ 10^{-9}$	$1.24\ 10^{-11}$	$3.47\ 10^{-8}$	$2.80\ 10^{-8}$	**$3.49\ 10^{-7}$**	$6.77\ 10^{-12}$	$1.87\ 10^{-8}$	$2.46\ 10^{-8}$
	Y $1\ 10^{-3}$	$6.84\ 10^{-10}$	$1.28\ 10^{-11}$	$2.53\ 10^{-7}$	$4.76\ 10^{-9}$	$5.93\ 10^{-8}$	$7.79\ 10^{-12}$	$3.36\ 10^{-9}$	**$3.39\ 10^{-8}$**
Thorium									
Th-226	W $2\ 10^{-4}$	$1.62\ 10^{-10}$	$1.62\ 10^{-10}$	$7.21\ 10^{-8}$	$5.14\ 10^{-10}$	$4.53\ 10^{-9}$	$1.62\ 10^{-10}$	$1.81\ 10^{-10}$	**$8.97\ 10^{-9}$**
	Y $2\ 10^{-4}$	$9.17\ 10^{-12}$	$9.18\ 10^{-12}$	$7.82\ 10^{-8}$	$1.22\ 10^{-10}$	$1.42\ 10^{-9}$	$9.18\ 10^{-12}$	$2.94\ 10^{-11}$	**$9.45\ 10^{-9}$**

Table 2.1, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Th-227	W 2 10^{-4}	5.36 10^{-8}	5.36 10^{-8}	2.40 10^{-5}	2.43 10^{-6}	2.94 10^{-5}	5.35 10^{-8}	1.47 10^{-7}	**4.12 10^{-6}**
	Y 2 10^{-4}	2.96 10^{-9}	2.98 10^{-9}	3.58 10^{-5}	1.30 10^{-7}	1.58 10^{-6}	2.94 10^{-9}	2.06 10^{-8}	**4.37 10^{-6}**
Th-228	W 2 10^{-4}	1.35 10^{-6}	1.35 10^{-6}	9.48 10^{-5}	1.12 10^{-4}	**1.37 10^{-3}**	1.34 10^{-6}	3.44 10^{-6}	6.75 10^{-5}
	Y 2 10^{-4}	2.26 10^{-7}	2.32 10^{-7}	6.91 10^{-4}	1.87 10^{-5}	2.29 10^{-4}	2.30 10^{-7}	6.05 10^{-7}	**9.23 10^{-5}**
Th-229	W 2 10^{-4}	2.76 10^{-6}	2.76 10^{-6}	7.95 10^{-5}	1.15 10^{-3}	**1.43 10^{-2}**	2.76 10^{-6}	7.05 10^{-6}	5.80 10^{-4}
	Y 2 10^{-4}	1.18 10^{-6}	1.18 10^{-6}	1.99 10^{-3}	4.60 10^{-4}	**5.73 10^{-3}**	1.18 10^{-6}	3.02 10^{-6}	4.67 10^{-4}
Th-230	W 2 10^{-4}	4.08 10^{-7}	4.08 10^{-7}	1.61 10^{-5}	1.73 10^{-4}	**2.16 10^{-3}**	4.08 10^{-7}	1.05 10^{-6}	8.80 10^{-5}
	Y 2 10^{-4}	1.72 10^{-7}	1.72 10^{-7}	3.00 10^{-4}	6.99 10^{-5}	**8.71 10^{-4}**	1.72 10^{-7}	4.48 10^{-7}	7.07 10^{-5}
Th-231	W 2 10^{-4}	7.62 10^{-12}	3.00 10^{-12}	7.81 10^{-10}	7.88 10^{-11}	9.22 10^{-10}	1.97 10^{-12}	3.32 10^{-10}	**2.33 10^{-10}**
	Y 2 10^{-4}	6.95 10^{-12}	1.42 10^{-12}	8.75 10^{-10}	2.78 10^{-11}	3.15 10^{-10}	3.09 10^{-13}	3.91 10^{-10}	**2.37 10^{-10}**
Th-232	W 2 10^{-4}	7.62 10^{-7}	7.72 10^{-7}	1.44 10^{-5}	8.93 10^{-4}	**1.11 10^{-2}**	7.44 10^{-7}	1.87 10^{-6}	4.43 10^{-4}
	Y 2 10^{-4}	5.98 10^{-7}	6.14 10^{-7}	9.40 10^{-4}	4.01 10^{-4}	**4.99 10^{-3}**	5.99 10^{-7}	1.51 10^{-6}	3.11 10^{-4}
Th-234	W 2 10^{-4}	1.13 10^{-10}	1.08 10^{-10}	4.66 10^{-8}	4.18 10^{-9}	7.83 10^{-9}	1.03 10^{-10}	5.54 10^{-9}	**8.04 10^{-9}**
	Y 2 10^{-4}	2.11 10^{-11}	1.66 10^{-11}	6.39 10^{-8}	2.56 10^{-10}	6.29 10^{-10}	1.27 10^{-11}	5.80 10^{-9}	**9.47 10^{-9}**
Protactinium									
Pa-227	W 1 10^{-3}	4.60 10^{-14}	8.34 10^{-14}	9.95 10^{-8}	4.76 10^{-10}	7.30 10^{-9}	5.20 10^{-14}	2.26 10^{-10}	**1.23 10^{-8}**
	Y 1 10^{-3}	4.82 10^{-14}	9.11 10^{-14}	1.10 10^{-7}	2.70 10^{-11}	4.09 10^{-10}	5.63 10^{-14}	4.67 10^{-11}	**1.32 10^{-8}**
Pa-228	W 1 10^{-3}	1.55 10^{-10}	4.78 10^{-11}	1.59 10^{-7}	8.86 10^{-8}	**1.11 10^{-6}**	2.35 10^{-11}	2.81 10^{-9}	6.39 10^{-8}
	Y 1 10^{-3}	1.79 10^{-10}	5.34 10^{-11}	9.31 10^{-7}	1.50 10^{-8}	1.86 10^{-7}	2.74 10^{-11}	1.00 10^{-9}	**1.19 10^{-7}**
Pa-230	W 1 10^{-3}	3.27 10^{-10}	1.90 10^{-10}	1.87 10^{-6}	1.53 10^{-7}	1.91 10^{-6}	1.37 10^{-10}	2.40 10^{-8}	**3.07 10^{-7}**
	Y 1 10^{-3}	3.34 10^{-10}	1.96 10^{-10}	3.25 10^{-6}	1.51 10^{-8}	1.86 10^{-7}	1.53 10^{-10}	2.49 10^{-9}	**3.98 10^{-7}**
Pa-231	W 1 10^{-3}	6.90 10^{-9}	8.79 10^{-9}	1.72 10^{-5}	6.97 10^{-4}	**8.70 10^{-3}**	7.64 10^{-9}	2.87 10^{-7}	3.47 10^{-4}
	Y 1 10^{-3}	3.06 10^{-9}	5.65 10^{-9}	7.47 10^{-4}	2.88 10^{-4}	**3.60 10^{-3}**	4.45 10^{-9}	2.12 10^{-7}	2.32 10^{-4}
Pa-232	W 1 10^{-3}	1.66 10^{-10}	4.77 10^{-11}	2.40 10^{-9}	4.89 10^{-8}	**6.10 10^{-7}**	2.51 10^{-11}	6.13 10^{-10}	2.47 10^{-8}
	Y 1 10^{-3}	1.92 10^{-10}	4.86 10^{-11}	7.47 10^{-8}	1.94 10^{-8}	**2.41 10^{-7}**	2.44 10^{-11}	7.12 10^{-10}	1.88 10^{-8}
Pa-233	W 1 10^{-3}	1.29 10^{-10}	8.32 10^{-11}	1.19 10^{-8}	8.21 10^{-10}	7.37 10^{-9}	5.17 10^{-11}	1.47 10^{-9}	**2.24 10^{-9}**
	Y 1 10^{-3}	1.29 10^{-10}	9.20 10^{-11}	1.70 10^{-8}	1.86 10^{-10}	8.28 10^{-10}	5.62 10^{-11}	1.48 10^{-9}	**2.58 10^{-9}**
Pa-234	W 1 10^{-3}	5.08 10^{-11}	2.03 10^{-11}	8.46 10^{-10}	3.31 10^{-11}	8.24 10^{-11}	1.20 10^{-11}	2.46 10^{-10}	**1.98 10^{-10}**
	Y 1 10^{-3}	6.13 10^{-11}	2.19 10^{-11}	8.97 10^{-10}	2.74 10^{-11}	2.06 10^{-11}	1.23 10^{-11}	2.98 10^{-10}	**2.20 10^{-10}**
Uranium									
U-230	D 5 10^{-2}	7.90 10^{-8}	7.90 10^{-8}	2.02 10^{-6}	2.73 10^{-6}	**3.29 10^{-5}**	7.90 10^{-8}	2.44 10^{-6}	2.32 10^{-6}
	W 5 10^{-2}	1.71 10^{-8}	1.71 10^{-8}	3.25 10^{-5}	5.95 10^{-7}	7.17 10^{-6}	1.71 10^{-8}	5.63 10^{-7}	**4.36 10^{-6}**
	Y 2 10^{-3}	8.87 10^{-10}	8.82 10^{-10}	4.35 10^{-5}	3.28 10^{-8}	3.96 10^{-7}	8.78 10^{-10}	7.03 10^{-8}	**5.26 10^{-6}**
U-231	D 5 10^{-2}	2.50 10^{-11}	1.30 10^{-11}	2.36 10^{-10}	1.34 10^{-10}	1.23 10^{-9}	9.17 10^{-12}	2.98 10^{-10}	**1.79 10^{-10}**
	W 5 10^{-2}	3.65 10^{-11}	1.16 10^{-11}	1.18 10^{-9}	4.69 10^{-11}	2.80 10^{-10}	4.98 10^{-12}	3.72 10^{-10}	**2.78 10^{-10}**
	Y 2 10^{-3}	4.15 10^{-11}	1.07 10^{-11}	1.51 10^{-9}	2.56 10^{-11}	5.03 10^{-11}	3.58 10^{-12}	4.14 10^{-10}	**3.22 10^{-10}**
U-232	D 5 10^{-2}	8.00 10^{-8}	8.06 10^{-8}	4.07 10^{-7}	4.06 10^{-6}	**6.42 10^{-5}**	7.85 10^{-8}	3.11 10^{-6}	3.43 10^{-6}
	W 5 10^{-2}	2.51 10^{-8}	2.53 10^{-8}	2.49 10^{-5}	1.23 10^{-6}	1.94 10^{-5}	2.47 10^{-8}	9.76 10^{-7}	**4.02 10^{-6}**
	Y 2 10^{-3}	1.69 10^{-8}	2.66 10^{-8}	1.48 10^{-3}	4.68 10^{-7}	7.14 10^{-6}	2.43 10^{-8}	5.86 10^{-7}	**1.78 10^{-4}**
U-233	D 5 10^{-2}	2.54 10^{-8}	2.54 10^{-8}	3.22 10^{-7}	7.12 10^{-7}	**1.12 10^{-5}**	2.54 10^{-8}	9.40 10^{-7}	7.53 10^{-7}
	W 5 10^{-2}	7.63 10^{-9}	7.63 10^{-9}	1.62 10^{-5}	2.14 10^{-7}	3.36 10^{-6}	7.63 10^{-9}	2.89 10^{-7}	**2.16 10^{-6}**
	Y 2 10^{-3}	2.69 10^{-9}	2.73 10^{-9}	3.04 10^{-4}	7.39 10^{-8}	1.16 10^{-6}	2.70 10^{-9}	1.08 10^{-7}	**3.66 10^{-5}**
U-234	D 5 10^{-2}	2.50 10^{-8}	2.50 10^{-8}	3.18 10^{-7}	6.98 10^{-7}	**1.09 10^{-5}**	2.50 10^{-8}	9.26 10^{-7}	7.37 10^{-7}
	W 5 10^{-2}	7.52 10^{-9}	7.52 10^{-9}	1.60 10^{-5}	2.10 10^{-7}	3.29 10^{-6}	7.52 10^{-9}	2.85 10^{-7}	**2.13 10^{-6}**
	Y 2 10^{-3}	2.65 10^{-9}	2.68 10^{-9}	2.98 10^{-4}	7.22 10^{-8}	1.13 10^{-6}	2.65 10^{-9}	1.06 10^{-7}	**3.58 10^{-5}**

w = wk
y ~ years
long Ret. Time

Table 2.1, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
U-235	D 5 10^{-2}	$2.37\ 10^{-8}$	$2.38\ 10^{-8}$	$2.95\ 10^{-7}$	$6.58\ 10^{-7}$	**$1.01\ 10^{-5}$**	$2.37\ 10^{-8}$	$8.59\ 10^{-7}$	$6.85\ 10^{-7}$
	W 5 10^{-2}	$7.24\ 10^{-9}$	$7.33\ 10^{-9}$	$1.48\ 10^{-5}$	$1.98\ 10^{-7}$	$3.05\ 10^{-6}$	$7.22\ 10^{-9}$	$2.65\ 10^{-7}$	**$1.97\ 10^{-6}$**
	Y 2 10^{-3}	$2.84\ 10^{-9}$	$5.37\ 10^{-9}$	$2.76\ 10^{-4}$	$7.15\ 10^{-8}$	$1.05\ 10^{-6}$	$4.11\ 10^{-9}$	$1.02\ 10^{-7}$	**$3.32\ 10^{-5}$**
U-236	D 5 10^{-2}	$2.37\ 10^{-8}$	$2.37\ 10^{-8}$	$3.01\ 10^{-7}$	$6.60\ 10^{-7}$	**$1.04\ 10^{-5}$**	$2.37\ 10^{-8}$	$8.77\ 10^{-7}$	$7.01\ 10^{-7}$
	W 5 10^{-2}	$7.12\ 10^{-9}$	$7.12\ 10^{-9}$	$1.51\ 10^{-5}$	$1.99\ 10^{-7}$	$3.12\ 10^{-6}$	$7.12\ 10^{-9}$	$2.70\ 10^{-7}$	**$2.01\ 10^{-6}$**
	Y 2 10^{-3}	$2.51\ 10^{-9}$	$2.54\ 10^{-9}$	$2.82\ 10^{-4}$	$6.83\ 10^{-8}$	$1.07\ 10^{-6}$	$2.51\ 10^{-9}$	$1.00\ 10^{-7}$	**$3.39\ 10^{-5}$**
U-237	D 5 10^{-2}	$5.55\ 10^{-11}$	$3.39\ 10^{-11}$	$6.13\ 10^{-10}$	$4.12\ 10^{-10}$	$4.02\ 10^{-9}$	$2.62\ 10^{-11}$	$8.94\ 10^{-10}$	**$5.32\ 10^{-10}$**
	W 5 10^{-2}	$7.39\ 10^{-11}$	$2.78\ 10^{-11}$	$4.26\ 10^{-9}$	$1.23\ 10^{-10}$	$8.35\ 10^{-10}$	$1.39\ 10^{-11}$	$1.10\ 10^{-9}$	**$9.03\ 10^{-10}$**
	Y 2 10^{-3}	$8.15\ 10^{-11}$	$2.51\ 10^{-11}$	$4.70\ 10^{-9}$	$5.23\ 10^{-11}$	$6.82\ 10^{-11}$	$1.00\ 10^{-11}$	$1.19\ 10^{-9}$	**$9.54\ 10^{-10}$**
U-238	D 5 10^{-2}	$2.23\ 10^{-8}$	$2.23\ 10^{-8}$	$2.80\ 10^{-7}$	$6.58\ 10^{-7}$	**$9.78\ 10^{-6}$**	$2.22\ 10^{-8}$	$8.22\ 10^{-7}$	$6.62\ 10^{-7}$
	W 5 10^{-2}	$6.71\ 10^{-9}$	$6.74\ 10^{-9}$	$1.42\ 10^{-5}$	$1.98\ 10^{-7}$	$2.94\ 10^{-6}$	$6.71\ 10^{-9}$	$2.54\ 10^{-7}$	**$1.90\ 10^{-6}$**
	Y 2 10^{-3}	$2.42\ 10^{-9}$	$2.91\ 10^{-9}$	$2.66\ 10^{-4}$	$6.88\ 10^{-8}$	$1.01\ 10^{-6}$	$2.73\ 10^{-9}$	$9.61\ 10^{-8}$	**$3.20\ 10^{-5}$**
U-239	D 5 10^{-2}	$6.28\ 10^{-13}$	$4.92\ 10^{-13}$	$4.25\ 10^{-11}$	$1.84\ 10^{-12}$	$1.27\ 10^{-11}$	$4.32\ 10^{-13}$	$9.89\ 10^{-12}$	**$8.91\ 10^{-12}$**
	W 5 10^{-2}	$4.86\ 10^{-13}$	$2.33\ 10^{-13}$	$5.75\ 10^{-11}$	$6.00\ 10^{-13}$	$2.75\ 10^{-12}$	$1.59\ 10^{-13}$	$7.46\ 10^{-12}$	**$9.45\ 10^{-12}$**
	Y 2 10^{-3}	$4.60\ 10^{-13}$	$1.40\ 10^{-13}$	$6.16\ 10^{-11}$	$2.70\ 10^{-13}$	$3.11\ 10^{-13}$	$5.92\ 10^{-14}$	$8.50\ 10^{-12}$	**$1.01\ 10^{-11}$**
U-240	D 5 10^{-2}	$4.08\ 10^{-11}$	$2.69\ 10^{-11}$	$1.27\ 10^{-9}$	$1.19\ 10^{-10}$	$3.70\ 10^{-10}$	$2.37\ 10^{-11}$	$7.60\ 10^{-10}$	**$4.21\ 10^{-10}$**
	W 5 10^{-2}	$3.16\ 10^{-11}$	$1.26\ 10^{-11}$	$2.26\ 10^{-9}$	$3.47\ 10^{-11}$	$9.06\ 10^{-11}$	$8.52\ 10^{-12}$	$8.66\ 10^{-10}$	**$5.48\ 10^{-10}$**
	Y 2 10^{-3}	$3.35\ 10^{-11}$	$8.98\ 10^{-12}$	$2.43\ 10^{-9}$	$1.26\ 10^{-11}$	$1.49\ 10^{-11}$	$4.15\ 10^{-12}$	$1.03\ 10^{-9}$	**$6.13\ 10^{-10}$**
Neptunium									
Np-232	W 1 10^{-3}	$6.85\ 10^{-11}$	$4.32\ 10^{-13}$	$2.06\ 10^{-11}$	$6.12\ 10^{-10}$	**$7.63\ 10^{-9}$**	$3.81\ 10^{-13}$	$5.60\ 10^{-11}$	$3.39\ 10^{-10}$
Np-233	W 1 10^{-3}	$5.85\ 10^{-14}$	$9.08\ 10^{-14}$	$3.39\ 10^{-12}$	$2.61\ 10^{-13}$	$1.57\ 10^{-12}$	$6.10\ 10^{-14}$	$2.38\ 10^{-13}$	**$5.87\ 10^{-13}$**
Np-234	W 1 10^{-3}	$3.48\ 10^{-10}$	$1.30\ 10^{-10}$	$1.59\ 10^{-9}$	$2.44\ 10^{-10}$	$5.85\ 10^{-10}$	$6.85\ 10^{-11}$	$6.74\ 10^{-10}$	**$5.49\ 10^{-10}$**
Np-235	W 1 10^{-3}	$1.49\ 10^{-10}$	$1.71\ 10^{-11}$	$2.30\ 10^{-9}$	$1.68\ 10^{-9}$	**$1.67\ 10^{-8}$**	$3.13\ 10^{-12}$	$3.46\ 10^{-10}$	$1.12\ 10^{-9}$
Np-236 1.15 10^5 y	W 1 10^{-3}	$6.29\ 10^{-6}$	$9.83\ 10^{-9}$	$1.32\ 10^{-7}$	$5.12\ 10^{-5}$	**$6.39\ 10^{-4}$**	$6.29\ 10^{-9}$	$3.99\ 10^{-6}$	$2.81\ 10^{-5}$
Np-236 22.5 h	W 1 10^{-3}	$4.05\ 10^{-9}$	$3.93\ 10^{-12}$	$8.14\ 10^{-9}$	$3.87\ 10^{-8}$	**$4.83\ 10^{-7}$**	$2.00\ 10^{-12}$	$4.04\ 10^{-9}$	$2.23\ 10^{-8}$
Np-237	W 1 10^{-3}	$2.96\ 10^{-5}$	$1.69\ 10^{-8}$	$1.61\ 10^{-5}$	$2.62\ 10^{-4}$	**$3.27\ 10^{-3}$**	$1.34\ 10^{-8}$	$2.34\ 10^{-5}$	$1.46\ 10^{-4}$
Np-238	W 1 10^{-3}	$1.99\ 10^{-9}$	$4.18\ 10^{-11}$	$3.47\ 10^{-9}$	$1.69\ 10^{-8}$	**$2.10\ 10^{-7}$**	$2.45\ 10^{-11}$	$2.55\ 10^{-9}$	$1.00\ 10^{-8}$
Np-239	W 1 10^{-3}	$7.45\ 10^{-11}$	$1.63\ 10^{-11}$	$2.36\ 10^{-9}$	$2.08\ 10^{-10}$	$2.03\ 10^{-9}$	$7.62\ 10^{-12}$	$9.59\ 10^{-10}$	**$6.78\ 10^{-10}$**
Np-240	W 1 10^{-3}	$2.28\ 10^{-12}$	$2.26\ 10^{-12}$	$1.26\ 10^{-10}$	$8.15\ 10^{-12}$	$6.99\ 10^{-11}$	$1.98\ 10^{-12}$	$9.30\ 10^{-12}$	**$2.20\ 10^{-11}$**
Plutonium									
Pu-234	W 1 10^{-3}	$3.68\ 10^{-10}$	$3.49\ 10^{-11}$	$4.75\ 10^{-8}$	$2.28\ 10^{-9}$	$2.80\ 10^{-8}$	$2.92\ 10^{-11}$	$1.64\ 10^{-9}$	**$7.40\ 10^{-9}$**
	Y 1 10^{-5}	$6.37\ 10^{-11}$	$1.13\ 10^{-11}$	$6.00\ 10^{-8}$	$2.13\ 10^{-10}$	$2.48\ 10^{-9}$	$5.81\ 10^{-12}$	$2.75\ 10^{-10}$	**$7.40\ 10^{-9}$**
Pu-235	W 1 10^{-3}	$3.47\ 10^{-14}$	$6.83\ 10^{-14}$	$3.78\ 10^{-12}$	$1.47\ 10^{-13}$	$5.47\ 10^{-13}$	$4.63\ 10^{-14}$	$2.01\ 10^{-13}$	**$5.68\ 10^{-13}$**
	Y 1 10^{-5}	$1.58\ 10^{-14}$	$6.10\ 10^{-14}$	$4.46\ 10^{-12}$	$9.29\ 10^{-14}$	$1.21\ 10^{-13}$	$3.79\ 10^{-14}$	$1.77\ 10^{-13}$	**$6.17\ 10^{-13}$**
Pu-236	W 1 10^{-3}	$9.35\ 10^{-6}$	$3.31\ 10^{-9}$	$1.84\ 10^{-5}$	$5.36\ 10^{-5}$	**$6.70\ 10^{-4}$**	$1.86\ 10^{-9}$	$2.68\ 10^{-5}$	$3.91\ 10^{-5}$
	Y 1 10^{-5}	$3.16\ 10^{-6}$	$1.53\ 10^{-9}$	$1.88\ 10^{-4}$	$1.81\ 10^{-5}$	$2.26\ 10^{-4}$	$8.38\ 10^{-10}$	$8.91\ 10^{-6}$	**$3.50\ 10^{-5}$**
Pu-237	W 1 10^{-3}	$6.51\ 10^{-11}$	$3.89\ 10^{-11}$	$2.20\ 10^{-9}$	$2.46\ 10^{-10}$	$1.83\ 10^{-9}$	$1.82\ 10^{-11}$	$3.23\ 10^{-10}$	**$4.68\ 10^{-10}$**
	Y 1 10^{-5}	$3.86\ 10^{-11}$	$4.07\ 10^{-11}$	$3.70\ 10^{-9}$	$7.68\ 10^{-11}$	$1.80\ 10^{-10}$	$2.18\ 10^{-11}$	$1.95\ 10^{-10}$	**$5.33\ 10^{-10}$**
Pu-238	W 1 10^{-3}	$2.80\ 10^{-5}$	$1.00\ 10^{-9}$	$1.84\ 10^{-5}$	$1.52\ 10^{-4}$	**$1.90\ 10^{-3}$**	$9.62\ 10^{-10}$	$7.02\ 10^{-5}$	$1.06\ 10^{-4}$
	Y 1 10^{-5}	$1.04\ 10^{-5}$	$4.40\ 10^{-10}$	$3.20\ 10^{-4}$	$5.80\ 10^{-5}$	$7.25\ 10^{-4}$	$3.86\ 10^{-10}$	$2.74\ 10^{-5}$	**$7.79\ 10^{-5}$**
Pu-239	W 1 10^{-3}	$3.18\ 10^{-5}$	$9.22\ 10^{-10}$	$1.73\ 10^{-5}$	$1.69\ 10^{-4}$	**$2.11\ 10^{-3}$**	$9.03\ 10^{-10}$	$7.56\ 10^{-5}$	$1.16\ 10^{-4}$
	Y 1 10^{-5}	$1.20\ 10^{-5}$	$3.99\ 10^{-10}$	$3.23\ 10^{-4}$	$6.57\ 10^{-5}$	**$8.21\ 10^{-4}$**	$3.75\ 10^{-10}$	$3.02\ 10^{-5}$	$8.33\ 10^{-5}$
Pu-240	W 1 10^{-3}	$3.18\ 10^{-5}$	$9.51\ 10^{-10}$	$1.73\ 10^{-5}$	$1.69\ 10^{-4}$	**$2.11\ 10^{-3}$**	$9.05\ 10^{-10}$	$7.56\ 10^{-5}$	$1.16\ 10^{-4}$
	Y 1 10^{-5}	$1.20\ 10^{-5}$	$4.33\ 10^{-10}$	$3.23\ 10^{-4}$	$6.57\ 10^{-5}$	**$8.21\ 10^{-4}$**	$3.76\ 10^{-10}$	$3.02\ 10^{-5}$	$8.33\ 10^{-5}$

Table 2.1, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Pu-241	W 1 10^{-3}	$6.82\ 10^{-7}$	$3.06\ 10^{-11}$	$7.42\ 10^{-9}$	$3.36\ 10^{-6}$	**$4.20\ 10^{-5}$**	$1.24\ 10^{-11}$	$1.31\ 10^{-6}$	$2.23\ 10^{-6}$
	Y 1 10^{-5}	$2.76\ 10^{-7}$	$2.14\ 10^{-11}$	$3.18\ 10^{-6}$	$1.43\ 10^{-6}$	**$1.78\ 10^{-5}$**	$9.15\ 10^{-12}$	$6.02\ 10^{-7}$	$1.34\ 10^{-6}$
Pu-242	W 1 10^{-3}	$3.02\ 10^{-5}$	$9.45\ 10^{-10}$	$1.64\ 10^{-5}$	$1.61\ 10^{-4}$	**$2.01\ 10^{-3}$**	$8.79\ 10^{-10}$	$7.18\ 10^{-5}$	$1.11\ 10^{-4}$
	Y 1 10^{-5}	$1.14\ 10^{-5}$	$4.35\ 10^{-10}$	$3.07\ 10^{-4}$	$6.25\ 10^{-5}$	**$7.81\ 10^{-4}$**	$3.71\ 10^{-10}$	$2.86\ 10^{-5}$	$7.92\ 10^{-5}$
Pu-243	W 1 10^{-3}	$3.68\ 10^{-12}$	$6.32\ 10^{-13}$	$1.91\ 10^{-10}$	$1.58\ 10^{-11}$	$1.86\ 10^{-10}$	$4.82\ 10^{-13}$	$4.33\ 10^{-11}$	**$4.44\ 10^{-11}$**
	Y 1 10^{-5}	$1.67\ 10^{-12}$	$2.75\ 10^{-13}$	$2.27\ 10^{-10}$	$5.77\ 10^{-12}$	$6.53\ 10^{-11}$	$1.13\ 10^{-13}$	$4.69\ 10^{-11}$	**$4.44\ 10^{-11}$**
Pu-244	W 1 10^{-3}	$2.99\ 10^{-5}$	$3.33\ 10^{-8}$	$1.63\ 10^{-5}$	$1.59\ 10^{-4}$	**$1.98\ 10^{-3}$**	$1.82\ 10^{-8}$	$7.13\ 10^{-5}$	$1.09\ 10^{-4}$
	Y 1 10^{-5}	$1.13\ 10^{-5}$	$2.07\ 10^{-8}$	$3.03\ 10^{-4}$	$6.19\ 10^{-5}$	**$7.69\ 10^{-4}$**	$1.27\ 10^{-8}$	$2.84\ 10^{-5}$	$7.82\ 10^{-5}$
Pu-245	W 1 10^{-3}	$3.33\ 10^{-11}$	$9.77\ 10^{-12}$	$1.29\ 10^{-9}$	$5.60\ 10^{-11}$	$3.68\ 10^{-10}$	$6.05\ 10^{-12}$	$4.96\ 10^{-10}$	**$3.31\ 10^{-10}$**
	Y 1 10^{-5}	$3.06\ 10^{-11}$	$8.09\ 10^{-12}$	$1.40\ 10^{-9}$	$2.16\ 10^{-11}$	$1.28\ 10^{-10}$	$3.98\ 10^{-12}$	$5.71\ 10^{-10}$	**$3.55\ 10^{-10}$**
Pu-246	W 1 10^{-3}	$7.74\ 10^{-10}$	$2.11\ 10^{-10}$	$2.48\ 10^{-8}$	$2.40\ 10^{-9}$	$2.08\ 10^{-8}$	$1.23\ 10^{-10}$	$6.01\ 10^{-9}$	**$5.92\ 10^{-9}$**
	Y 1 10^{-5}	$5.34\ 10^{-10}$	$1.87\ 10^{-10}$	$3.09\ 10^{-8}$	$7.28\ 10^{-10}$	$5.92\ 10^{-9}$	$1.13\ 10^{-10}$	$5.50\ 10^{-9}$	**$5.79\ 10^{-9}$**
Americium									
Am-237	W 1 10^{-3}	$7.07\ 10^{-13}$	$8.15\ 10^{-13}$	$4.16\ 10^{-11}$	$1.33\ 10^{-12}$	$3.74\ 10^{-12}$	$5.77\ 10^{-13}$	$2.97\ 10^{-12}$	**$6.47\ 10^{-12}$**
Am-238	W 1 10^{-3}	$6.15\ 10^{-11}$	$2.20\ 10^{-12}$	$7.80\ 10^{-11}$	$3.26\ 10^{-10}$	**$4.05\ 10^{-9}$**	$1.80\ 10^{-12}$	$1.55\ 10^{-10}$	$2.32\ 10^{-10}$
Am-239	W 1 10^{-3}	$2.26\ 10^{-11}$	$6.22\ 10^{-12}$	$4.75\ 10^{-10}$	$2.74\ 10^{-11}$	$1.90\ 10^{-10}$	$2.87\ 10^{-12}$	$1.72\ 10^{-10}$	**$1.24\ 10^{-10}$**
Am-240	W 1 10^{-3}	$2.80\ 10^{-10}$	$7.67\ 10^{-11}$	$1.06\ 10^{-9}$	$2.71\ 10^{-10}$	$2.10\ 10^{-9}$	$4.24\ 10^{-11}$	$6.34\ 10^{-10}$	**$4.96\ 10^{-10}$**
Am-241	W 1 10^{-3}	$3.25\ 10^{-5}$	$2.67\ 10^{-9}$	$1.84\ 10^{-5}$	$1.74\ 10^{-4}$	**$2.17\ 10^{-3}$**	$1.60\ 10^{-9}$	$7.82\ 10^{-5}$	$1.20\ 10^{-4}$
Am-242m	W 1 10^{-3}	$3.21\ 10^{-5}$	$1.38\ 10^{-9}$	$4.20\ 10^{-6}$	$1.69\ 10^{-4}$	**$2.12\ 10^{-3}$**	$5.64\ 10^{-10}$	$7.48\ 10^{-5}$	$1.15\ 10^{-4}$
Am-242	W 1 10^{-3}	$1.94\ 10^{-9}$	$2.94\ 10^{-12}$	$5.20\ 10^{-8}$	$1.32\ 10^{-8}$	**$1.65\ 10^{-7}$**	$2.52\ 10^{-12}$	$8.54\ 10^{-9}$	$1.58\ 10^{-8}$
Am-243	W 1 10^{-3}	$3.26\ 10^{-5}$	$1.52\ 10^{-8}$	$1.78\ 10^{-5}$	$1.73\ 10^{-4}$	**$2.17\ 10^{-3}$**	$8.29\ 10^{-9}$	$7.74\ 10^{-5}$	$1.19\ 10^{-4}$
Am-244m	W 1 10^{-3}	$4.36\ 10^{-11}$	$1.15\ 10^{-13}$	$1.08\ 10^{-10}$	$2.56\ 10^{-10}$	**$3.20\ 10^{-9}$**	$1.13\ 10^{-13}$	$1.31\ 10^{-10}$	$1.90\ 10^{-10}$
Am-244	W 1 10^{-3}	$1.06\ 10^{-9}$	$1.60\ 10^{-11}$	$2.01\ 10^{-9}$	$6.00\ 10^{-9}$	**$7.47\ 10^{-8}$**	$9.67\ 10^{-12}$	$3.34\ 10^{-9}$	$4.47\ 10^{-9}$
Am-245	W 1 10^{-3}	$1.31\ 10^{-12}$	$3.04\ 10^{-13}$	$1.25\ 10^{-10}$	$5.66\ 10^{-12}$	$6.22\ 10^{-11}$	$3.01\ 10^{-13}$	$1.28\ 10^{-11}$	**$2.18\ 10^{-11}$**
Am-246m	W 1 10^{-3}	$6.52\ 10^{-13}$	$6.63\ 10^{-13}$	$5.78\ 10^{-11}$	$2.43\ 10^{-12}$	$2.24\ 10^{-11}$	$6.38\ 10^{-13}$	$2.80\ 10^{-12}$	**$9.02\ 10^{-12}$**
Am-246	W 1 10^{-3}	$1.09\ 10^{-12}$	$8.93\ 10^{-13}$	$1.12\ 10^{-10}$	$3.83\ 10^{-12}$	$3.63\ 10^{-11}$	$7.75\ 10^{-13}$	$5.45\ 10^{-12}$	**$1.71\ 10^{-11}$**
Curium									
Cm-238	W 1 10^{-3}	$1.17\ 10^{-10}$	$2.16\ 10^{-11}$	$8.73\ 10^{-9}$	$5.48\ 10^{-10}$	$6.59\ 10^{-9}$	$2.03\ 10^{-11}$	$3.07\ 10^{-10}$	**$1.44\ 10^{-9}$**
Cm-240	W 1 10^{-3}	$3.01\ 10^{-7}$	$8.32\ 10^{-10}$	$7.51\ 10^{-6}$	$1.82\ 10^{-6}$	**$2.27\ 10^{-5}$**	$7.93\ 10^{-10}$	$9.92\ 10^{-7}$	$2.17\ 10^{-6}$
Cm-241	W 1 10^{-3}	$7.79\ 10^{-9}$	$2.88\ 10^{-10}$	$9.01\ 10^{-8}$	$4.17\ 10^{-8}$	**$5.13\ 10^{-7}$**	$1.84\ 10^{-10}$	$2.15\ 10^{-8}$	$3.97\ 10^{-8}$
Cm-242	W 1 10^{-3}	$5.70\ 10^{-7}$	$9.44\ 10^{-10}$	$1.55\ 10^{-5}$	$3.90\ 10^{-6}$	**$4.87\ 10^{-5}$**	$9.41\ 10^{-10}$	$2.45\ 10^{-6}$	$4.67\ 10^{-6}$
Cm-243	W 1 10^{-3}	$2.07\ 10^{-5}$	$6.29\ 10^{-9}$	$1.94\ 10^{-5}$	$1.18\ 10^{-4}$	**$1.47\ 10^{-3}$**	$3.83\ 10^{-9}$	$5.76\ 10^{-5}$	$8.30\ 10^{-5}$
Cm-244	W 1 10^{-3}	$1.59\ 10^{-5}$	$1.04\ 10^{-9}$	$1.93\ 10^{-5}$	$9.38\ 10^{-5}$	**$1.17\ 10^{-3}$**	$1.01\ 10^{-9}$	$4.78\ 10^{-5}$	$6.70\ 10^{-5}$
Cm-245	W 1 10^{-3}	$3.37\ 10^{-5}$	$6.69\ 10^{-9}$	$1.80\ 10^{-5}$	$1.79\ 10^{-4}$	**$2.24\ 10^{-3}$**	$3.68\ 10^{-9}$	$7.96\ 10^{-5}$	$1.23\ 10^{-4}$
Cm-246	W 1 10^{-3}	$3.34\ 10^{-5}$	$4.00\ 10^{-9}$	$1.82\ 10^{-5}$	$1.78\ 10^{-4}$	**$2.22\ 10^{-3}$**	$2.26\ 10^{-9}$	$7.94\ 10^{-5}$	$1.22\ 10^{-4}$
Cm-247	W 1 10^{-3}	$3.07\ 10^{-5}$	$2.23\ 10^{-8}$	$1.67\ 10^{-5}$	$1.63\ 10^{-4}$	**$2.04\ 10^{-3}$**	$1.45\ 10^{-8}$	$7.30\ 10^{-5}$	$1.12\ 10^{-4}$
Cm-248	W 1 10^{-3}	$1.21\ 10^{-4}$	$1.07\ 10^{-6}$	$6.65\ 10^{-5}$	$6.52\ 10^{-4}$	**$8.12\ 10^{-3}$**	$4.71\ 10^{-7}$	$2.89\ 10^{-4}$	$4.47\ 10^{-4}$
Cm-249	W 1 10^{-3}	$1.19\ 10^{-11}$	$2.12\ 10^{-13}$	$7.51\ 10^{-11}$	$6.26\ 10^{-11}$	**$7.78\ 10^{-10}$**	$2.05\ 10^{-13}$	$3.11\ 10^{-11}$	$5.22\ 10^{-11}$
Cm-250	W 1 10^{-3}	$6.90\ 10^{-4}$	$8.49\ 10^{-6}$	$3.80\ 10^{-4}$	$3.71\ 10^{-3}$	**$4.61\ 10^{-2}$**	$3.71\ 10^{-6}$	$1.65\ 10^{-3}$	$2.54\ 10^{-3}$
Berkelium									
Bk-245	W 1 10^{-3}	$1.81\ 10^{-10}$	$3.58\ 10^{-11}$	$4.76\ 10^{-9}$	$7.05\ 10^{-10}$	$7.60\ 10^{-9}$	$1.75\ 10^{-11}$	$8.63\ 10^{-10}$	**$1.19\ 10^{-9}$**
Bk-246	W 1 10^{-3}	$2.55\ 10^{-10}$	$6.44\ 10^{-11}$	$7.74\ 10^{-10}$	$3.79\ 10^{-10}$	$3.60\ 10^{-9}$	$3.47\ 10^{-11}$	$4.73\ 10^{-10}$	**$4.63\ 10^{-10}$**
Bk-247	W 1 10^{-3}	$3.43\ 10^{-5}$	$6.28\ 10^{-9}$	$1.88\ 10^{-5}$	$2.64\ 10^{-4}$	**$3.30\ 10^{-3}$**	$4.60\ 10^{-9}$	$4.54\ 10^{-5}$	$1.55\ 10^{-4}$
Bk-249	W 1 10^{-3}	$8.42\ 10^{-8}$	$5.27\ 10^{-11}$	$1.19\ 10^{-8}$	$6.46\ 10^{-7}$	**$8.07\ 10^{-6}$**	$4.18\ 10^{-11}$	$1.10\ 10^{-7}$	$3.75\ 10^{-7}$
Bk-250	W 1 10^{-3}	$3.83\ 10^{-10}$	$5.12\ 10^{-12}$	$8.18\ 10^{-10}$	$3.30\ 10^{-9}$	**$4.11\ 10^{-8}$**	$4.17\ 10^{-12}$	$7.08\ 10^{-10}$	$2.04\ 10^{-9}$

Table 2.1, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	Class/f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Californium									
Cf-244	W 1 10^{-3}	$1.73\ 10^{-10}$	$2.18\ 10^{-11}$	$1.57\ 10^{-8}$	$1.34\ 10^{-9}$	$1.65\ 10^{-8}$	$2.18\ 10^{-11}$	$3.03\ 10^{-10}$	**$2.68\ 10^{-9}$**
	Y 1 10^{-3}	$4.45\ 10^{-11}$	$1.21\ 10^{-12}$	$2.02\ 10^{-8}$	$3.63\ 10^{-10}$	$4.52\ 10^{-9}$	$1.20\ 10^{-12}$	$7.74\ 10^{-11}$	**$2.64\ 10^{-9}$**
Cf-246	W 1 10^{-3}	$8.28\ 10^{-9}$	$5.97\ 10^{-10}$	$9.45\ 10^{-7}$	$7.85\ 10^{-8}$	$9.74\ 10^{-7}$	$5.97\ 10^{-10}$	$2.33\ 10^{-8}$	**$1.61\ 10^{-7}$**
	Y 1 10^{-3}	$9.86\ 10^{-10}$	$3.52\ 10^{-11}$	$1.30\ 10^{-6}$	$8.84\ 10^{-9}$	$1.10\ 10^{-7}$	$3.50\ 10^{-11}$	$6.04\ 10^{-9}$	**$1.62\ 10^{-7}$**
Cf-248	W 1 10^{-3}	$1.75\ 10^{-6}$	$1.05\ 10^{-9}$	$1.83\ 10^{-5}$	$1.67\ 10^{-5}$	**$2.08\ 10^{-4}$**	$1.03\ 10^{-9}$	$3.83\ 10^{-6}$	$1.20\ 10^{-5}$
	Y 1 10^{-3}	$3.98\ 10^{-7}$	$1.59\ 10^{-10}$	$9.67\ 10^{-5}$	$3.61\ 10^{-6}$	$4.51\ 10^{-5}$	$1.40\ 10^{-10}$	$7.83\ 10^{-7}$	**$1.37\ 10^{-5}$**
Cf-249	W 1 10^{-3}	$3.44\ 10^{-5}$	$2.29\ 10^{-8}$	$1.96\ 10^{-5}$	$2.66\ 10^{-4}$	**$3.32\ 10^{-3}$**	$1.83\ 10^{-8}$	$4.60\ 10^{-5}$	$1.56\ 10^{-4}$
	Y 1 10^{-3}	$1.31\ 10^{-5}$	$1.37\ 10^{-8}$	$3.59\ 10^{-4}$	$1.04\ 10^{-4}$	**$1.30\ 10^{-3}$**	$1.08\ 10^{-8}$	$1.85\ 10^{-5}$	$1.03\ 10^{-4}$
Cf-250	W 1 10^{-3}	$1.34\ 10^{-5}$	$6.37\ 10^{-9}$	$2.05\ 10^{-5}$	$1.17\ 10^{-4}$	**$1.46\ 10^{-3}$**	$3.79\ 10^{-9}$	$2.38\ 10^{-5}$	$7.08\ 10^{-5}$
	Y 1 10^{-3}	$4.49\ 10^{-6}$	$4.06\ 10^{-9}$	$2.71\ 10^{-4}$	$3.96\ 10^{-5}$	$4.95\ 10^{-4}$	$2.28\ 10^{-9}$	$8.11\ 10^{-6}$	**$5.57\ 10^{-5}$**
Cf-251	W 1 10^{-3}	$3.51\ 10^{-5}$	$9.25\ 10^{-9}$	$1.94\ 10^{-5}$	$2.70\ 10^{-4}$	**$3.38\ 10^{-3}$**	$6.37\ 10^{-9}$	$4.66\ 10^{-5}$	$1.59\ 10^{-4}$
	Y 1 10^{-3}	$1.34\ 10^{-5}$	$5.63\ 10^{-9}$	$3.60\ 10^{-4}$	$1.06\ 10^{-4}$	**$1.33\ 10^{-3}$**	$3.76\ 10^{-9}$	$1.88\ 10^{-5}$	$1.05\ 10^{-4}$
Cf-252	W 1 10^{-3}	$5.43\ 10^{-6}$	$6.56\ 10^{-8}$	$3.74\ 10^{-5}$	$5.50\ 10^{-5}$	**$6.86\ 10^{-4}$**	$3.38\ 10^{-8}$	$1.33\ 10^{-5}$	$3.70\ 10^{-5}$
	Y 1 10^{-3}	$1.09\ 10^{-6}$	$6.12\ 10^{-8}$	$2.99\ 10^{-4}$	$1.10\ 10^{-5}$	$1.37\ 10^{-4}$	$3.20\ 10^{-8}$	$2.73\ 10^{-6}$	**$4.24\ 10^{-5}$**
Cf-253	W 1 10^{-3}	$4.80\ 10^{-8}$	$9.18\ 10^{-11}$	$3.94\ 10^{-6}$	$4.96\ 10^{-7}$	$6.19\ 10^{-6}$	$9.09\ 10^{-11}$	$1.27\ 10^{-7}$	**$7.68\ 10^{-7}$**
	Y 1 10^{-3}	$4.33\ 10^{-9}$	$7.23\ 10^{-12}$	$6.82\ 10^{-6}$	$4.10\ 10^{-8}$	$5.12\ 10^{-7}$	$6.49\ 10^{-12}$	$1.06\ 10^{-8}$	**$8.43\ 10^{-7}$**
Cf-254	W 1 10^{-3}	$4.52\ 10^{-6}$	$2.63\ 10^{-7}$	$3.37\ 10^{-4}$	$4.69\ 10^{-5}$	$5.82\ 10^{-4}$	$1.40\ 10^{-7}$	$1.26\ 10^{-5}$	**$6.85\ 10^{-5}$**
	Y 1 10^{-3}	$4.10\ 10^{-7}$	$2.48\ 10^{-7}$	$6.44\ 10^{-4}$	$3.07\ 10^{-6}$	$3.60\ 10^{-5}$	$1.24\ 10^{-7}$	$1.35\ 10^{-6}$	**$7.93\ 10^{-5}$**
Einsteinium									
Es-250	W 1 10^{-3}	$2.46\ 10^{-10}$	$1.43\ 10^{-12}$	$4.00\ 10^{-10}$	$2.15\ 10^{-9}$	**$2.68\ 10^{-8}$**	$1.12\ 10^{-12}$	$4.40\ 10^{-10}$	$1.30\ 10^{-9}$
Es-251	W 1 10^{-3}	$1.85\ 10^{-10}$	$9.01\ 10^{-12}$	$4.06\ 10^{-9}$	$1.27\ 10^{-9}$	**$1.57\ 10^{-8}$**	$5.28\ 10^{-12}$	$4.01\ 10^{-10}$	$1.28\ 10^{-9}$
Es-253	W 1 10^{-3}	$5.09\ 10^{-8}$	$7.84\ 10^{-10}$	$6.34\ 10^{-6}$	$5.18\ 10^{-7}$	$6.47\ 10^{-6}$	$7.83\ 10^{-10}$	$1.39\ 10^{-7}$	**$1.07\ 10^{-6}$**
Es-254m	W 1 10^{-3}	$8.10\ 10^{-9}$	$4.65\ 10^{-10}$	$8.91\ 10^{-7}$	$7.25\ 10^{-8}$	$9.01\ 10^{-7}$	$4.50\ 10^{-10}$	$2.17\ 10^{-8}$	**$1.51\ 10^{-7}$**
Es-254	W 1 10^{-3}	$1.57\ 10^{-6}$	$3.72\ 10^{-9}$	$1.83\ 10^{-5}$	$1.51\ 10^{-5}$	**$1.88\ 10^{-4}$**	$2.44\ 10^{-9}$	$3.50\ 10^{-6}$	$1.11\ 10^{-5}$
Fermium									
Fm-252	W 1 10^{-3}	$7.04\ 10^{-9}$	$5.67\ 10^{-10}$	$6.31\ 10^{-7}$	$6.38\ 10^{-8}$	$7.87\ 10^{-7}$	$5.67\ 10^{-10}$	$1.80\ 10^{-8}$	**$1.14\ 10^{-7}$**
Fm-253	W 1 10^{-3}	$7.54\ 10^{-9}$	$1.10\ 10^{-10}$	$9.20\ 10^{-7}$	$7.66\ 10^{-8}$	$9.57\ 10^{-7}$	$1.05\ 10^{-10}$	$2.06\ 10^{-8}$	**$1.56\ 10^{-7}$**
Fm-254	W 1 10^{-3}	$7.05\ 10^{-10}$	$2.38\ 10^{-10}$	$1.08\ 10^{-7}$	$4.51\ 10^{-9}$	$5.36\ 10^{-8}$	$2.38\ 10^{-10}$	$1.29\ 10^{-9}$	**$1.57\ 10^{-8}$**
Fm-255	W 1 10^{-3}	$1.83\ 10^{-9}$	$5.49\ 10^{-10}$	$5.23\ 10^{-7}$	$1.42\ 10^{-8}$	$1.72\ 10^{-7}$	$5.48\ 10^{-10}$	$6.38\ 10^{-9}$	**$7.21\ 10^{-8}$**
Fm-257	W 1 10^{-3}	$5.89\ 10^{-7}$	$1.29\ 10^{-9}$	$2.21\ 10^{-5}$	$6.15\ 10^{-6}$	**$7.69\ 10^{-5}$**	$1.22\ 10^{-9}$	$1.58\ 10^{-6}$	$6.32\ 10^{-6}$
Mendelevium									
Md-257	W 1 10^{-3}	$1.25\ 10^{-9}$	$3.54\ 10^{-11}$	$6.55\ 10^{-8}$	$1.27\ 10^{-8}$	**$1.59\ 10^{-7}$**	$3.48\ 10^{-11}$	$3.34\ 10^{-9}$	$1.55\ 10^{-8}$
Md-258	W 1 10^{-3}	$4.71\ 10^{-7}$	$1.50\ 10^{-9}$	$1.42\ 10^{-5}$	$4.66\ 10^{-6}$	**$5.82\ 10^{-5}$**	$1.24\ 10^{-9}$	$1.13\ 10^{-6}$	$4.47\ 10^{-6}$

TABLE 2.2

Exposure-to-Dose Conversion Factors for Ingestion

Explanation of Entries

For each radionuclide, values in SI units for the organ dose equivalent conversion factors, $h_{T,50}$, and the effective dose equivalent conversion factor, $h_{E,50}$, based upon the weighting factors set forth on page 6, are listed in Table 2.2 for ingestion. The limiting coefficient, with respect to determining the ALI, is indicated by bold-faced type.

f_1: The fractional uptake from the small intestine to blood (f_1) for common chemical forms of the radionuclide are shown.

$h_{T,50}$: The tissue dose equivalent conversion factor for organ or tissue T (expressed in Sv/Bq), i.e., the committed dose equivalent per unit intake of radionuclide.

$h_{E,50}$: The effective dose equivalent conversion factor (expressed in Sv/Bq), i.e., the committed effective dose equivalent per unit intake of radionuclide:

$$h_{E,50} = \sum_T w_T \, h_{T,50} \, .$$

To convert to conventional units (mrem/μCi), multiply table entries by **3.7 × 10^9**.

As an example, consider the factor for breast for ingestion of C-11:

$$h_{breast,50} = 2.98 \times 10^{-12}\ \text{Sv/Bq} \times \mathbf{3.7 \times 10^9} = 1.1 \times 10^{-2}\ \text{mrem}/\mu\text{Ci}.$$

Table 2.2. Exposure-to-Dose Conversion Factors for Ingestion

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Hydrogen									
H-3	1.0	$1.73\ 10^{-11}$	$1.73\ 10^{-11}$	$1.73\ 10^{-11}$	$1.73\ 10^{-11}$	$1.73\ 10^{-11}$	$1.73\ 10^{-11}$	$1.73\ 10^{-11}$	**$1.73\ 10^{-11}$**
Beryllium									
Be-7	$5\ 10^{-3}$	$5.67\ 10^{-11}$	$6.97\ 10^{-12}$	$1.41\ 10^{-12}$	$1.23\ 10^{-11}$	$5.03\ 10^{-12}$	$6.08\ 10^{-13}$	$5.83\ 10^{-11}$	**$3.45\ 10^{-11}$**
Be-10	$5\ 10^{-3}$	$2.42\ 10^{-11}$	$2.42\ 10^{-11}$	$2.42\ 10^{-11}$	$7.23\ 10^{-10}$	$2.15\ 10^{-9}$	$2.42\ 10^{-11}$	$3.66\ 10^{-9}$ **$1.29\ 10^{-8}$**	$1.26\ 10^{-9}$ LLI wall
Carbon									
C-11	1.0	$3.41\ 10^{-12}$	$2.98\ 10^{-12}$	$3.09\ 10^{-12}$	$3.18\ 10^{-12}$	$3.03\ 10^{-12}$	$2.97\ 10^{-12}$	$3.54\ 10^{-12}$	**$3.29\ 10^{-12}$**
C-14	1.0	$5.64\ 10^{-10}$	$5.64\ 10^{-10}$	$5.64\ 10^{-10}$	$5.64\ 10^{-10}$	$5.64\ 10^{-10}$	$5.64\ 10^{-10}$	$5.64\ 10^{-10}$	**$5.64\ 10^{-10}$**
Fluorine									
F-18	1.0	$4.97\ 10^{-12}$	$6.36\ 10^{-12}$	$6.54\ 10^{-12}$	$5.94\ 10^{-11}$	$6.02\ 10^{-11}$	$4.52\ 10^{-12}$	$7.03\ 10^{-11}$ **$2.87\ 10^{-10}$**	$3.31\ 10^{-11}$ ST wall
Sodium									
Na-22	1.0	$2.81\ 10^{-9}$	$2.58\ 10^{-9}$	$2.51\ 10^{-9}$	$4.29\ 10^{-9}$	$5.54\ 10^{-9}$	$2.50\ 10^{-9}$	$3.18\ 10^{-9}$	**$3.10\ 10^{-9}$**
Na-24	1.0	$3.43\ 10^{-10}$	$2.71\ 10^{-10}$	$2.60\ 10^{-10}$	$3.74\ 10^{-10}$	$4.68\ 10^{-10}$	$2.60\ 10^{-10}$	$5.31\ 10^{-10}$	**$3.84\ 10^{-10}$**
Magnesium									
Mg-28	$5\ 10^{-1}$	$8.68\ 10^{-10}$	$2.72\ 10^{-10}$	$1.96\ 10^{-10}$	$9.24\ 10^{-10}$	$1.49\ 10^{-9}$	$1.68\ 10^{-10}$	$5.78\ 10^{-9}$	**$2.18\ 10^{-9}$**
Aluminum									
Al-26	$1\ 10^{-2}$	$3.01\ 10^{-9}$	$6.45\ 10^{-10}$	$3.76\ 10^{-10}$	$1.35\ 10^{-9}$	$9.71\ 10^{-10}$	$3.12\ 10^{-10}$	$9.47\ 10^{-9}$	**$3.94\ 10^{-9}$**
Silicon									
Si-31	$1\ 10^{-2}$	$1.14\ 10^{-13}$	$8.05\ 10^{-14}$	$7.55\ 10^{-14}$	$8.33\ 10^{-14}$	$7.58\ 10^{-14}$	$7.20\ 10^{-14}$	$4.86\ 10^{-10}$	**$1.46\ 10^{-10}$**
Si-32	$1\ 10^{-2}$	$1.17\ 10^{-10}$	$1.17\ 10^{-10}$	$1.17\ 10^{-10}$	$1.17\ 10^{-10}$	$1.17\ 10^{-10}$	$1.17\ 10^{-10}$	$1.69\ 10^{-9}$ **$6.21\ 10^{-9}$**	$5.90\ 10^{-10}$ LLI wall
Phosphorus									
P-32	$8\ 10^{-1}$	$6.55\ 10^{-10}$	$6.55\ 10^{-10}$	$6.55\ 10^{-10}$	$8.09\ 10^{-9}$	$7.87\ 10^{-9}$	$6.55\ 10^{-10}$	$2.67\ 10^{-9}$	**$2.37\ 10^{-9}$**
P-33	$8\ 10^{-1}$	$9.37\ 10^{-11}$	$9.37\ 10^{-11}$	$9.37\ 10^{-11}$	$4.99\ 10^{-10}$	$1.32\ 10^{-9}$	$9.37\ 10^{-11}$	$3.22\ 10^{-10}$	**$2.48\ 10^{-10}$**
Sulphur									
S-35	$8\ 10^{-1}$	$7.63\ 10^{-11}$	$7.63\ 10^{-11}$	$7.63\ 10^{-11}$	$7.63\ 10^{-11}$	$7.63\ 10^{-11}$	$7.63\ 10^{-11}$	$2.25\ 10^{-10}$	**$1.21\ 10^{-10}$**
	$1\ 10^{-1}$	$9.53\ 10^{-12}$	$9.53\ 10^{-12}$	$9.53\ 10^{-12}$	$9.53\ 10^{-12}$	$9.53\ 10^{-12}$	$9.53\ 10^{-12}$	$6.39\ 10^{-10}$ **$2.23\ 10^{-9}$**	$1.98\ 10^{-10}$ LLI wall
Chlorine									
Cl-36	1.0	$7.99\ 10^{-10}$	$7.99\ 10^{-10}$	$7.99\ 10^{-10}$	$7.99\ 10^{-10}$	$7.99\ 10^{-10}$	$7.99\ 10^{-10}$	$8.61\ 10^{-10}$	**$8.18\ 10^{-10}$**
Cl-38	1.0	$8.75\ 10^{-12}$	$8.52\ 10^{-12}$	$8.76\ 10^{-12}$	$8.12\ 10^{-12}$	$7.54\ 10^{-12}$	$7.06\ 10^{-12}$	$1.92\ 10^{-10}$ **$8.96\ 10^{-10}$**	$6.36\ 10^{-11}$ ST wall
Cl-39	1.0	$1.06\ 10^{-11}$	$1.02\ 10^{-11}$	$1.05\ 10^{-11}$	$9.78\ 10^{-12}$	$8.93\ 10^{-12}$	$8.21\ 10^{-12}$	$1.42\ 10^{-10}$ **$6.23\ 10^{-10}$**	$4.96\ 10^{-11}$ ST wall
Potassium									
K-40	1.0	$5.07\ 10^{-9}$	$4.89\ 10^{-9}$	$4.85\ 10^{-9}$	$4.91\ 10^{-9}$	$4.88\ 10^{-9}$	$4.85\ 10^{-9}$	$5.18\ 10^{-9}$	**$5.02\ 10^{-9}$**
K-42	1.0	$2.13\ 10^{-10}$	$2.08\ 10^{-10}$	$2.07\ 10^{-10}$	$2.08\ 10^{-10}$	$2.07\ 10^{-10}$	$2.06\ 10^{-10}$	$5.30\ 10^{-10}$	**$3.06\ 10^{-10}$**
K-43	1.0	$1.80\ 10^{-10}$	$1.65\ 10^{-10}$	$1.70\ 10^{-10}$	$1.78\ 10^{-10}$	$1.68\ 10^{-10}$	$1.62\ 10^{-10}$	$2.89\ 10^{-10}$	**$2.08\ 10^{-10}$**
K-44	1.0	$5.19\ 10^{-12}$	$5.17\ 10^{-12}$	$5.55\ 10^{-12}$	$4.69\ 10^{-12}$	$4.08\ 10^{-12}$	$3.65\ 10^{-12}$	$1.44\ 10^{-10}$ **$6.65\ 10^{-10}$**	$4.67\ 10^{-11}$ ST wall
K-45	1.0	$3.33\ 10^{-12}$	$3.48\ 10^{-12}$	$3.77\ 10^{-12}$	$3.13\ 10^{-12}$	$2.65\ 10^{-12}$	$2.16\ 10^{-12}$	$9.26\ 10^{-11}$ **$4.21\ 10^{-10}$**	$3.01\ 10^{-11}$ ST wall
Calcium									
Ca-41	$3\ 10^{-1}$	$2.71\ 10^{-12}$	$3.19\ 10^{-12}$	$2.84\ 10^{-12}$	$1.78\ 10^{-9}$	**$4.01\ 10^{-9}$**	$2.84\ 10^{-12}$	$2.74\ 10^{-11}$	$3.44\ 10^{-10}$
Ca-45	$3\ 10^{-1}$	$5.36\ 10^{-11}$	$5.36\ 10^{-11}$	$5.36\ 10^{-11}$	$3.47\ 10^{-9}$	$5.23\ 10^{-9}$	$5.36\ 10^{-11}$	$8.40\ 10^{-10}$	**$8.55\ 10^{-10}$**
Ca-47	$3\ 10^{-1}$	$7.46\ 10^{-10}$	$2.26\ 10^{-10}$	$1.54\ 10^{-10}$	$1.49\ 10^{-9}$	$4.07\ 10^{-9}$	$1.38\ 10^{-10}$	$4.06\ 10^{-9}$	**$1.76\ 10^{-9}$**
Scandium									
Sc-43	$1\ 10^{-4}$	$1.17\ 10^{-10}$	$1.81\ 10^{-11}$	$6.38\ 10^{-12}$	$2.73\ 10^{-11}$	$9.36\ 10^{-12}$	$6.44\ 10^{-13}$	$5.67\ 10^{-10}$	**$2.06\ 10^{-10}$**
Sc-44	$1\ 10^{-4}$	$2.00\ 10^{-10}$	$3.40\ 10^{-11}$	$1.26\ 10^{-11}$	$4.81\ 10^{-11}$	$1.68\ 10^{-11}$	$1.51\ 10^{-12}$	$1.08\ 10^{-9}$	**$3.87\ 10^{-10}$**

Table 2.2, Cont'd.

Nuclide	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Sc-44m	$1\ 10^{-4}$	$1.70\ 10^{-9}$	$2.01\ 10^{-10}$	$3.15\ 10^{-11}$	$3.38\ 10^{-10}$	$1.14\ 10^{-10}$	$4.60\ 10^{-12}$	$7.64\ 10^{-9}$	**$2.79\ 10^{-9}$**
Sc-46	$1\ 10^{-4}$	$2.01\ 10^{-9}$	$2.51\ 10^{-10}$	$4.86\ 10^{-11}$	$4.03\ 10^{-10}$	$1.39\ 10^{-10}$	$7.69\ 10^{-12}$	$3.78\ 10^{-9}$	**$1.73\ 10^{-9}$**
Sc-47	$1\ 10^{-4}$	$1.12\ 10^{-10}$	$1.21\ 10^{-11}$	$1.62\ 10^{-12}$	$3.13\ 10^{-11}$	$1.01\ 10^{-11}$	$1.19\ 10^{-13}$	$1.90\ 10^{-9}$ **$6.14\ 10^{-9}$**	$6.04\ 10^{-10}$ LLI wall
Sc-48	$1\ 10^{-4}$	$2.04\ 10^{-9}$	$2.74\ 10^{-10}$	$5.98\ 10^{-11}$	$4.26\ 10^{-10}$	$1.46\ 10^{-10}$	$8.91\ 10^{-12}$	$4.47\ 10^{-9}$	**$1.96\ 10^{-9}$**
Sc-49	$1\ 10^{-4}$	$1.25\ 10^{-14}$	$3.80\ 10^{-15}$	$2.50\ 10^{-15}$	$4.45\ 10^{-15}$	$1.92\ 10^{-15}$	$4.38\ 10^{-16}$	$2.27\ 10^{-10}$	**$6.80\ 10^{-11}$**
Titanium									
Ti-44	$1\ 10^{-2}$	$4.70\ 10^{-9}$	$2.54\ 10^{-9}$	$2.35\ 10^{-9}$	$3.04\ 10^{-9}$	$2.56\ 10^{-9}$	$2.31\ 10^{-9}$	$1.30\ 10^{-8}$	**$6.25\ 10^{-9}$**
Ti-45	$1\ 10^{-2}$	$6.84\ 10^{-11}$	$1.15\ 10^{-11}$	$4.62\ 10^{-12}$	$1.64\ 10^{-11}$	$5.76\ 10^{-12}$	$5.60\ 10^{-13}$	$4.69\ 10^{-10}$	**$1.62\ 10^{-10}$**
Vanadium									
V-47	$1\ 10^{-2}$	$6.81\ 10^{-12}$	$2.26\ 10^{-12}$	$1.84\ 10^{-12}$	$2.56\ 10^{-12}$	$1.05\ 10^{-12}$	$1.65\ 10^{-13}$	$1.49\ 10^{-10}$ **$4.54\ 10^{-10}$**	$4.73\ 10^{-11}$ ST wall
V-48	$1\ 10^{-2}$	$2.73\ 10^{-9}$	$3.54\ 10^{-10}$	$7.53\ 10^{-11}$	$5.93\ 10^{-10}$	$2.37\ 10^{-10}$	$1.92\ 10^{-11}$	$4.99\ 10^{-9}$	**$2.32\ 10^{-9}$**
V-49	$1\ 10^{-2}$	$5.32\ 10^{-13}$	$2.27\ 10^{-13}$	$2.23\ 10^{-13}$	$3.46\ 10^{-12}$	$8.78\ 10^{-12}$	$2.32\ 10^{-13}$	$5.24\ 10^{-11}$ **$1.84\ 10^{-10}$**	$1.66\ 10^{-11}$ LLI wall
Chromium									
Cr-48	$1\ 10^{-1}$	$3.31\ 10^{-10}$	$5.01\ 10^{-11}$	$1.96\ 10^{-11}$	$9.38\ 10^{-11}$	$4.16\ 10^{-11}$	$1.40\ 10^{-11}$	$4.49\ 10^{-10}$	**$2.40\ 10^{-10}$**
	$1\ 10^{-2}$	$3.47\ 10^{-10}$	$4.13\ 10^{-11}$	$7.91\ 10^{-12}$	$8.41\ 10^{-11}$	$2.86\ 10^{-11}$	$2.02\ 10^{-12}$	$4.74\ 10^{-10}$	**$2.47\ 10^{-10}$**
Cr-49	$1\ 10^{-1}$	$1.10\ 10^{-11}$	$3.21\ 10^{-12}$	$2.40\ 10^{-12}$	$4.15\ 10^{-12}$	$1.69\ 10^{-12}$	$2.80\ 10^{-13}$	$1.51\ 10^{-10}$	**$4.95\ 10^{-11}$**
	$1\ 10^{-2}$	$1.11\ 10^{-11}$	$3.16\ 10^{-12}$	$2.33\ 10^{-12}$	$4.12\ 10^{-12}$	$1.61\ 10^{-12}$	$2.01\ 10^{-13}$	$1.53\ 10^{-10}$	**$4.98\ 10^{-11}$**
Cr-51	$1\ 10^{-1}$	$4.00\ 10^{-11}$	$7.51\ 10^{-12}$	$4.38\ 10^{-12}$	$1.25\ 10^{-11}$	$7.86\ 10^{-12}$	$3.71\ 10^{-12}$	$8.75\ 10^{-11}$	**$3.98\ 10^{-11}$**
	$1\ 10^{-2}$	$3.96\ 10^{-11}$	$4.49\ 10^{-12}$	$9.47\ 10^{-13}$	$8.52\ 10^{-12}$	$3.19\ 10^{-12}$	$4.26\ 10^{-13}$	$9.17\ 10^{-11}$	**$3.93\ 10^{-11}$**
Manganese									
Mn-51	$1\ 10^{-1}$	$1.16\ 10^{-11}$	$3.34\ 10^{-12}$	$2.46\ 10^{-12}$	$4.05\ 10^{-12}$	$1.80\ 10^{-12}$	$3.46\ 10^{-13}$	$2.36\ 10^{-10}$	**$7.51\ 10^{-11}$**
Mn-52	$1\ 10^{-1}$	$2.74\ 10^{-9}$	$4.55\ 10^{-10}$	$2.04\ 10^{-10}$	$7.59\ 10^{-10}$	$4.22\ 10^{-10}$	$1.04\ 10^{-10}$	$3.87\ 10^{-9}$	**$2.05\ 10^{-9}$**
Mn-52m	$1\ 10^{-1}$	$7.78\ 10^{-12}$	$3.36\ 10^{-12}$	$3.06\ 10^{-12}$	$3.36\ 10^{-12}$	$1.53\ 10^{-12}$	$3.44\ 10^{-13}$	$1.52\ 10^{-10}$ **$5.18\ 10^{-10}$**	$4.88\ 10^{-11}$ ST wall
Mn-53	$1\ 10^{-1}$	$2.09\ 10^{-12}$	$1.55\ 10^{-12}$	$1.53\ 10^{-12}$	$2.18\ 10^{-11}$	$2.25\ 10^{-10}$	$1.62\ 10^{-12}$	$6.28\ 10^{-11}$	**$2.92\ 10^{-11}$**
Mn-54	$1\ 10^{-1}$	$9.48\ 10^{-10}$	$2.77\ 10^{-10}$	$2.29\ 10^{-10}$	$4.89\ 10^{-10}$	$5.71\ 10^{-10}$	$1.33\ 10^{-10}$	$1.21\ 10^{-9}$	**$7.48\ 10^{-10}$**
Mn-56	$1\ 10^{-1}$	$8.53\ 10^{-11}$	$1.76\ 10^{-11}$	$8.80\ 10^{-12}$	$2.43\ 10^{-11}$	$1.06\ 10^{-11}$	$2.40\ 10^{-12}$	$7.84\ 10^{-10}$	**$2.64\ 10^{-10}$**
Iron									
Fe-52	$1\ 10^{-1}$	$6.37\ 10^{-10}$	$1.08\ 10^{-10}$	$4.13\ 10^{-11}$	$1.59\ 10^{-10}$	$6.52\ 10^{-11}$	$1.95\ 10^{-11}$	$4.37\ 10^{-9}$	**$1.51\ 10^{-9}$**
Fe-55	$1\ 10^{-1}$	$1.07\ 10^{-10}$	$1.04\ 10^{-10}$	$1.02\ 10^{-10}$	$1.05\ 10^{-10}$	$1.05\ 10^{-10}$	$1.10\ 10^{-10}$	$3.00\ 10^{-10}$	**$1.64\ 10^{-10}$**
Fe-59	$1\ 10^{-1}$	$1.66\ 10^{-9}$	$7.37\ 10^{-10}$	$6.35\ 10^{-10}$	$8.45\ 10^{-10}$	$6.61\ 10^{-10}$	$6.03\ 10^{-10}$	$3.56\ 10^{-9}$	**$1.81\ 10^{-9}$**
Fe-60	$1\ 10^{-1}$	$3.51\ 10^{-8}$	$3.15\ 10^{-8}$	$3.14\ 10^{-8}$	$3.30\ 10^{-8}$	$3.06\ 10^{-8}$	$3.06\ 10^{-8}$	$6.04\ 10^{-8}$	**$4.12\ 10^{-8}$**
Cobalt									
Co-55	$5\ 10^{-2}$	$7.72\ 10^{-10}$	$1.10\ 10^{-10}$	$3.07\ 10^{-11}$	$1.68\ 10^{-10}$	$6.12\ 10^{-11}$	$9.57\ 10^{-12}$	$3.13\ 10^{-9}$	**$1.18\ 10^{-9}$**
	$3\ 10^{-1}$	$6.27\ 10^{-10}$	$1.20\ 10^{-10}$	$6.06\ 10^{-11}$	$1.66\ 10^{-10}$	$8.21\ 10^{-11}$	$4.23\ 10^{-11}$	$2.47\ 10^{-9}$	**$9.46\ 10^{-10}$**
Co-56	$5\ 10^{-2}$	$3.47\ 10^{-9}$	$6.18\ 10^{-10}$	$3.04\ 10^{-10}$	$8.70\ 10^{-10}$	$4.32\ 10^{-10}$	$2.32\ 10^{-10}$	$5.37\ 10^{-9}$	**$2.73\ 10^{-9}$**
	$3\ 10^{-1}$	$3.93\ 10^{-9}$	$1.61\ 10^{-9}$	$1.41\ 10^{-9}$	$1.88\ 10^{-9}$	$1.44\ 10^{-9}$	$1.32\ 10^{-9}$	$5.68\ 10^{-9}$	**$3.41\ 10^{-9}$**
Co-57	$5\ 10^{-2}$	$1.83\ 10^{-10}$	$4.10\ 10^{-11}$	$2.89\ 10^{-11}$	$8.84\ 10^{-11}$	$4.92\ 10^{-11}$	$1.93\ 10^{-11}$	$4.42\ 10^{-10}$	**$2.01\ 10^{-10}$**
	$3\ 10^{-1}$	$2.94\ 10^{-10}$	$1.58\ 10^{-10}$	$1.63\ 10^{-10}$	$2.67\ 10^{-10}$	$2.12\ 10^{-10}$	$1.15\ 10^{-10}$	$5.39\ 10^{-10}$	**$3.20\ 10^{-10}$**
Co-58	$5\ 10^{-2}$	$1.04\ 10^{-9}$	$1.79\ 10^{-10}$	$8.53\ 10^{-11}$	$2.60\ 10^{-10}$	$1.25\ 10^{-10}$	$6.31\ 10^{-11}$	$1.58\ 10^{-9}$	**$8.09\ 10^{-10}$**
	$3\ 10^{-1}$	$1.08\ 10^{-9}$	$4.50\ 10^{-10}$	$4.05\ 10^{-10}$	$5.40\ 10^{-10}$	$4.07\ 10^{-10}$	$3.64\ 10^{-10}$	$1.65\ 10^{-9}$	**$9.68\ 10^{-10}$**
Co-58m	$5\ 10^{-2}$	$4.71\ 10^{-12}$	$8.65\ 10^{-13}$	$4.81\ 10^{-13}$	$1.22\ 10^{-12}$	$6.59\ 10^{-13}$	$4.05\ 10^{-13}$	$7.69\ 10^{-11}$	**$2.46\ 10^{-11}$**
	$3\ 10^{-1}$	$5.52\ 10^{-12}$	$2.73\ 10^{-12}$	$2.58\ 10^{-12}$	$3.15\ 10^{-12}$	$2.57\ 10^{-12}$	$2.41\ 10^{-12}$	$6.38\ 10^{-11}$	**$2.18\ 10^{-11}$**
Co-60	$5\ 10^{-2}$	$3.19\ 10^{-9}$	$1.10\ 10^{-9}$	$8.77\ 10^{-10}$	$1.32\ 10^{-9}$	$9.39\ 10^{-10}$	$7.88\ 10^{-10}$	$4.97\ 10^{-9}$	**$2.77\ 10^{-9}$**
	$3\ 10^{-1}$	$7.23\ 10^{-9}$	$5.08\ 10^{-9}$	$4.96\ 10^{-9}$	$5.49\ 10^{-9}$	$4.81\ 10^{-9}$	$4.68\ 10^{-9}$	$1.06\ 10^{-8}$	**$7.28\ 10^{-9}$**

Table 2.2, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Co-60m	$5\ 10^{-2}$	$1.93\ 10^{-14}$	$7.75\ 10^{-15}$	$7.05\ 10^{-15}$	$9.17\ 10^{-15}$	$5.62\ 10^{-15}$	$3.32\ 10^{-15}$	$3.21\ 10^{-12}$	$9.70\ 10^{-13}$
	$3\ 10^{-1}$	$3.50\ 10^{-14}$	$2.33\ 10^{-14}$	$2.30\ 10^{-14}$	$2.54\ 10^{-14}$	$2.08\ 10^{-14}$	$1.86\ 10^{-14}$	$3.21\ 10^{-12}$	$9.82\ 10^{-13}$
								$1.36\ 10^{-11}$	ST wall
Co-61	$5\ 10^{-2}$	$4.36\ 10^{-12}$	$8.72\ 10^{-13}$	$4.76\ 10^{-13}$	$2.02\ 10^{-12}$	$7.49\ 10^{-13}$	$1.41\ 10^{-13}$	$2.32\ 10^{-10}$	**$7.11\ 10^{-11}$**
	$3\ 10^{-1}$	$4.64\ 10^{-12}$	$1.57\ 10^{-12}$	$1.24\ 10^{-12}$	$2.65\ 10^{-12}$	$1.50\ 10^{-12}$	$9.03\ 10^{-13}$	$2.14\ 10^{-10}$	**$6.60\ 10^{-11}$**
Co-62m	$5\ 10^{-2}$	$5.16\ 10^{-12}$	$2.34\ 10^{-12}$	$2.28\ 10^{-12}$	$2.12\ 10^{-12}$	$1.03\ 10^{-12}$	$2.61\ 10^{-13}$	$9.61\ 10^{-11}$	$3.10\ 10^{-11}$
	$3\ 10^{-1}$	$5.10\ 10^{-12}$	$2.36\ 10^{-12}$	$2.31\ 10^{-12}$	$2.13\ 10^{-12}$	$1.05\ 10^{-12}$	$2.97\ 10^{-13}$	$9.56\ 10^{-11}$	$3.09\ 10^{-11}$
								$3.56\ 10^{-10}$	ST wall
Nickel									
Ni-56	$5\ 10^{-2}$	$1.63\ 10^{-9}$	$2.36\ 10^{-10}$	$7.86\ 10^{-11}$	$3.81\ 10^{-10}$	$1.58\ 10^{-10}$	$5.24\ 10^{-11}$	$1.83\ 10^{-9}$	**$1.05\ 10^{-9}$**
Ni-57	$5\ 10^{-2}$	$1.03\ 10^{-9}$	$1.44\ 10^{-10}$	$3.68\ 10^{-11}$	$2.22\ 10^{-10}$	$8.05\ 10^{-11}$	$1.07\ 10^{-11}$	$2.34\ 10^{-9}$	**$1.02\ 10^{-9}$**
Ni-59	$5\ 10^{-2}$	$3.83\ 10^{-11}$	$3.58\ 10^{-11}$	$3.50\ 10^{-11}$	$3.66\ 10^{-11}$	$3.62\ 10^{-11}$	$3.90\ 10^{-11}$	$1.03\ 10^{-10}$	**$5.67\ 10^{-11}$**
Ni-63	$5\ 10^{-2}$	$8.50\ 10^{-11}$	$8.50\ 10^{-11}$	$8.50\ 10^{-11}$	$8.50\ 10^{-11}$	$8.50\ 10^{-11}$	$8.50\ 10^{-11}$	$3.20\ 10^{-10}$	**$1.56\ 10^{-10}$**
Ni-65	$5\ 10^{-2}$	$2.43\ 10^{-11}$	$5.63\ 10^{-12}$	$2.75\ 10^{-12}$	$7.26\ 10^{-12}$	$2.89\ 10^{-12}$	$6.79\ 10^{-13}$	$5.32\ 10^{-10}$	**$1.68\ 10^{-10}$**
Ni-66	$5\ 10^{-2}$	$6.79\ 10^{-11}$	$2.03\ 10^{-11}$	$1.46\ 10^{-11}$	$2.44\ 10^{-11}$	$1.69\ 10^{-11}$	$1.34\ 10^{-11}$	$1.07\ 10^{-8}$	$3.24\ 10^{-9}$
								$3.44\ 10^{-8}$	LLI wall
Copper									
Cu-60	$5\ 10^{-1}$	$1.36\ 10^{-11}$	$5.85\ 10^{-12}$	$5.32\ 10^{-12}$	$5.81\ 10^{-12}$	$2.84\ 10^{-12}$	$9.20\ 10^{-13}$	$1.55\ 10^{-10}$	$5.21\ 10^{-11}$
								$4.99\ 10^{-10}$	ST wall
Cu-61	$5\ 10^{-1}$	$5.46\ 10^{-11}$	$1.52\ 10^{-11}$	$1.09\ 10^{-11}$	$1.92\ 10^{-11}$	$1.12\ 10^{-11}$	$7.25\ 10^{-12}$	$3.28\ 10^{-10}$	**$1.18\ 10^{-10}$**
Cu-64	$5\ 10^{-1}$	$4.78\ 10^{-11}$	$1.59\ 10^{-11}$	$1.28\ 10^{-11}$	$1.94\ 10^{-11}$	$1.39\ 10^{-11}$	$1.13\ 10^{-11}$	$3.57\ 10^{-10}$	**$1.26\ 10^{-10}$**
Cu-67	$5\ 10^{-1}$	$1.18\ 10^{-10}$	$6.29\ 10^{-11}$	$5.94\ 10^{-11}$	$8.13\ 10^{-11}$	$6.76\ 10^{-11}$	$5.52\ 10^{-11}$	$9.84\ 10^{-10}$	**$3.55\ 10^{-10}$**
Zinc									
Zn-62	$5\ 10^{-1}$	$3.00\ 10^{-10}$	$1.07\ 10^{-10}$	$8.70\ 10^{-11}$	$2.04\ 10^{-10}$	$1.65\ 10^{-10}$	$7.76\ 10^{-11}$	$2.84\ 10^{-9}$	**$9.85\ 10^{-10}$**
Zn-63	$5\ 10^{-1}$	$8.96\ 10^{-12}$	$3.41\ 10^{-12}$	$2.92\ 10^{-12}$	$3.87\ 10^{-12}$	$2.07\ 10^{-12}$	$9.23\ 10^{-13}$	$1.85\ 10^{-10}$	$5.92\ 10^{-11}$
								$5.63\ 10^{-10}$	ST wall
Zn-65	$5\ 10^{-1}$	$3.56\ 10^{-9}$	$3.28\ 10^{-9}$	$3.08\ 10^{-9}$	$4.50\ 10^{-9}$	$4.50\ 10^{-9}$	$3.21\ 10^{-9}$	$4.59\ 10^{-9}$	**$3.90\ 10^{-9}$**
Zn-69	$5\ 10^{-1}$	$4.17\ 10^{-13}$	$4.17\ 10^{-13}$	$4.17\ 10^{-13}$	$5.36\ 10^{-13}$	$5.18\ 10^{-13}$	$4.17\ 10^{-13}$	$7.91\ 10^{-11}$	**$2.40\ 10^{-11}$**
Zn-69m	$5\ 10^{-1}$	$1.23\ 10^{-10}$	$4.42\ 10^{-11}$	$3.63\ 10^{-11}$	$9.15\ 10^{-11}$	$7.27\ 10^{-11}$	$3.28\ 10^{-11}$	$9.99\ 10^{-10}$	**$3.55\ 10^{-10}$**
Zn-71m	$5\ 10^{-1}$	$1.19\ 10^{-10}$	$3.26\ 10^{-11}$	$2.30\ 10^{-11}$	$4.86\ 10^{-11}$	$3.09\ 10^{-11}$	$1.59\ 10^{-11}$	$6.62\ 10^{-10}$	**$2.43\ 10^{-10}$**
Zn-72	$5\ 10^{-1}$	$1.08\ 10^{-9}$	$4.46\ 10^{-10}$	$3.74\ 10^{-10}$	$8.89\ 10^{-10}$	$1.19\ 10^{-9}$	$3.64\ 10^{-10}$	$3.20\ 10^{-9}$	**$1.49\ 10^{-9}$**
Gallium									
Ga-65	$1\ 10^{-3}$	$2.52\ 10^{-12}$	$1.23\ 10^{-12}$	$1.23\ 10^{-12}$	$1.30\ 10^{-12}$	$5.88\ 10^{-13}$	$1.02\ 10^{-13}$	$7.70\ 10^{-11}$	$2.42\ 10^{-11}$
								$2.89\ 10^{-10}$	ST wall
Ga-66	$1\ 10^{-3}$	$5.29\ 10^{-10}$	$7.65\ 10^{-11}$	$2.27\ 10^{-11}$	$1.13\ 10^{-10}$	$3.99\ 10^{-11}$	$3.64\ 10^{-12}$	$3.80\ 10^{-9}$	**$1.30\ 10^{-9}$**
Ga-67	$1\ 10^{-3}$	$1.58\ 10^{-10}$	$1.70\ 10^{-11}$	$2.38\ 10^{-12}$	$4.14\ 10^{-11}$	$1.40\ 10^{-11}$	$2.43\ 10^{-13}$	$5.49\ 10^{-10}$	**$2.12\ 10^{-10}$**
Ga-68	$1\ 10^{-3}$	$1.95\ 10^{-11}$	$4.56\ 10^{-12}$	$2.79\ 10^{-12}$	$5.81\ 10^{-12}$	$2.18\ 10^{-12}$	$2.61\ 10^{-13}$	$2.86\ 10^{-10}$	**$9.24\ 10^{-11}$**
Ga-70	$1\ 10^{-3}$	$3.13\ 10^{-14}$	$1.06\ 10^{-14}$	$9.40\ 10^{-15}$	$1.09\ 10^{-14}$	$4.93\ 10^{-15}$	$1.07\ 10^{-15}$	$6.75\ 10^{-11}$	$2.03\ 10^{-11}$
								$2.50\ 10^{-10}$	ST wall
Ga-72	$1\ 10^{-3}$	$8.52\ 10^{-10}$	$1.19\ 10^{-10}$	$3.18\ 10^{-11}$	$1.79\ 10^{-10}$	$6.23\ 10^{-11}$	$4.95\ 10^{-12}$	$3.31\ 10^{-9}$	**$1.25\ 10^{-9}$**
Ga-73	$1\ 10^{-3}$	$4.62\ 10^{-11}$	$6.51\ 10^{-12}$	$1.93\ 10^{-12}$	$1.17\ 10^{-11}$	$3.94\ 10^{-12}$	$1.93\ 10^{-13}$	$8.81\ 10^{-10}$	**$2.79\ 10^{-10}$**
Germanium									
Ge-66	1.0	$3.69\ 10^{-11}$	$3.31\ 10^{-11}$	$3.36\ 10^{-11}$	$3.51\ 10^{-11}$	$3.25\ 10^{-11}$	$3.23\ 10^{-11}$	$1.08\ 10^{-10}$	**$5.68\ 10^{-11}$**
Ge-67	1.0	$2.71\ 10^{-12}$	$3.25\ 10^{-12}$	$3.64\ 10^{-12}$	$3.09\ 10^{-12}$	$2.63\ 10^{-12}$	$2.17\ 10^{-12}$	$1.10\ 10^{-10}$	$3.52\ 10^{-11}$
								$5.09\ 10^{-10}$	ST wall
Ge-68	1.0	$2.42\ 10^{-10}$	$2.23\ 10^{-10}$	$2.28\ 10^{-10}$	$2.33\ 10^{-10}$	$2.25\ 10^{-10}$	$2.22\ 10^{-10}$	$4.22\ 10^{-10}$	**$2.89\ 10^{-10}$**
Ge-69	1.0	$7.44\ 10^{-11}$	$6.75\ 10^{-11}$	$6.86\ 10^{-11}$	$7.20\ 10^{-11}$	$6.65\ 10^{-11}$	$6.59\ 10^{-11}$	$1.72\ 10^{-10}$	**$1.01\ 10^{-10}$**
Ge-71	1.0	$1.94\ 10^{-12}$	$1.81\ 10^{-12}$	$1.75\ 10^{-12}$	$1.88\ 10^{-12}$	$1.86\ 10^{-12}$	$2.10\ 10^{-12}$	$4.31\ 10^{-12}$	**$2.60\ 10^{-12}$**

Table 2.2, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Ge-75	1.0	$4.30\ 10^{-12}$	$4.31\ 10^{-12}$	$4.33\ 10^{-12}$	$4.34\ 10^{-12}$	$4.29\ 10^{-12}$	$4.24\ 10^{-12}$	$7.46\ 10^{-11}$ **$3.29\ 10^{-10}$**	$2.54\ 10^{-11}$ ST wall
Ge-77	1.0	$8.62\ 10^{-11}$	$8.21\ 10^{-11}$	$8.30\ 10^{-11}$	$8.68\ 10^{-11}$	$8.21\ 10^{-11}$	$7.87\ 10^{-11}$	$3.21\ 10^{-10}$	**$1.55\ 10^{-10}$**
Ge-78	1.0	$2.82\ 10^{-11}$	$2.74\ 10^{-11}$	$2.76\ 10^{-11}$	$2.81\ 10^{-11}$	$2.69\ 10^{-11}$	$2.62\ 10^{-11}$	$1.75\ 10^{-10}$ **$5.89\ 10^{-10}$**	$7.19\ 10^{-11}$ ST wall
Arsenic									
As-69	$5\ 10^{-1}$	$4.26\ 10^{-12}$	$1.71\ 10^{-12}$	$1.56\ 10^{-12}$	$1.86\ 10^{-12}$	$1.03\ 10^{-12}$	$5.22\ 10^{-13}$	$1.15\ 10^{-10}$ **$4.24\ 10^{-10}$**	$3.62\ 10^{-11}$ ST wall
As-70	$5\ 10^{-1}$	$4.68\ 10^{-11}$	$1.50\ 10^{-11}$	$1.15\ 10^{-11}$	$1.68\ 10^{-11}$	$8.19\ 10^{-12}$	$3.37\ 10^{-12}$	$3.19\ 10^{-10}$	**$1.13\ 10^{-10}$**
As-71	$5\ 10^{-1}$	$3.06\ 10^{-10}$	$7.91\ 10^{-11}$	$5.84\ 10^{-11}$	$1.12\ 10^{-10}$	$7.03\ 10^{-11}$	$4.70\ 10^{-11}$	$9.82\ 10^{-10}$	**$4.07\ 10^{-10}$**
As-72	$5\ 10^{-1}$	$6.40\ 10^{-10}$	$1.94\ 10^{-10}$	$1.48\ 10^{-10}$	$2.38\ 10^{-10}$	$1.63\ 10^{-10}$	$1.28\ 10^{-10}$	$4.66\ 10^{-9}$	**$1.64\ 10^{-9}$**
As-73	$5\ 10^{-1}$	$4.78\ 10^{-11}$	$3.78\ 10^{-11}$	$3.74\ 10^{-11}$	$4.29\ 10^{-11}$	$4.02\ 10^{-11}$	$3.92\ 10^{-11}$	$5.38\ 10^{-10}$	**$1.91\ 10^{-10}$**
As-74	$5\ 10^{-1}$	$6.25\ 10^{-10}$	$2.58\ 10^{-10}$	$2.31\ 10^{-10}$	$3.04\ 10^{-10}$	$2.36\ 10^{-10}$	$2.03\ 10^{-10}$	$2.65\ 10^{-9}$	**$1.07\ 10^{-9}$**
As-76	$5\ 10^{-1}$	$2.16\ 10^{-10}$	$1.09\ 10^{-10}$	$9.83\ 10^{-11}$	$1.20\ 10^{-10}$	$1.02\ 10^{-10}$	$9.35\ 10^{-11}$	$4.35\ 10^{-9}$	**$1.41\ 10^{-9}$**
As-77	$5\ 10^{-1}$	$2.73\ 10^{-11}$	$2.42\ 10^{-11}$	$2.39\ 10^{-11}$	$2.46\ 10^{-11}$	$2.41\ 10^{-11}$	$2.38\ 10^{-11}$	$1.09\ 10^{-9}$ **$3.18\ 10^{-9}$**	$3.44\ 10^{-10}$ LLI wall
As-78	$5\ 10^{-1}$	$3.07\ 10^{-11}$	$1.13\ 10^{-11}$	$8.92\ 10^{-12}$	$1.27\ 10^{-11}$	$8.05\ 10^{-12}$	$5.60\ 10^{-12}$	$5.63\ 10^{-10}$	**$1.81\ 10^{-10}$**
Selenium									
Se-70	$8\ 10^{-1}$	$4.00\ 10^{-11}$	$1.78\ 10^{-11}$	$1.56\ 10^{-11}$	$1.99\ 10^{-11}$	$1.35\ 10^{-11}$	$1.02\ 10^{-11}$	$2.64\ 10^{-10}$	**$9.67\ 10^{-11}$**
	$5\ 10^{-2}$	$6.54\ 10^{-11}$	$1.42\ 10^{-11}$	$7.46\ 10^{-12}$	$1.88\ 10^{-11}$	$7.04\ 10^{-12}$	$1.07\ 10^{-12}$	$3.90\ 10^{-10}$	**$1.39\ 10^{-10}$**
Se-73	$8\ 10^{-1}$	$1.07\ 10^{-10}$	$5.33\ 10^{-11}$	$5.07\ 10^{-11}$	$6.46\ 10^{-11}$	$5.08\ 10^{-11}$	$4.16\ 10^{-11}$	$4.83\ 10^{-10}$	**$1.96\ 10^{-10}$**
	$5\ 10^{-2}$	$2.27\ 10^{-10}$	$3.28\ 10^{-11}$	$1.07\ 10^{-11}$	$5.55\ 10^{-11}$	$1.98\ 10^{-11}$	$2.91\ 10^{-12}$	$1.21\ 10^{-9}$	**$4.34\ 10^{-10}$**
Se-73m	$8\ 10^{-1}$	$9.04\ 10^{-12}$	$4.59\ 10^{-12}$	$4.39\ 10^{-12}$	$5.44\ 10^{-12}$	$4.22\ 10^{-12}$	$3.43\ 10^{-12}$	$6.20\ 10^{-11}$	**$2.30\ 10^{-11}$**
	$5\ 10^{-2}$	$1.81\ 10^{-11}$	$2.85\ 10^{-12}$	$1.13\ 10^{-12}$	$4.55\ 10^{-12}$	$1.66\ 10^{-12}$	$2.53\ 10^{-13}$	$1.21\ 10^{-10}$	**$4.19\ 10^{-11}$**
Se-75	$8\ 10^{-1}$	$1.80\ 10^{-9}$	$1.45\ 10^{-9}$	$1.66\ 10^{-9}$	$2.07\ 10^{-9}$	$1.70\ 10^{-9}$	$1.13\ 10^{-9}$	$4.68\ 10^{-9}$	**$2.60\ 10^{-9}$**
	$5\ 10^{-2}$	$5.92\ 10^{-10}$	$1.41\ 10^{-10}$	$1.10\ 10^{-10}$	$2.43\ 10^{-10}$	$1.43\ 10^{-10}$	$7.14\ 10^{-11}$	$8.47\ 10^{-10}$	**$4.72\ 10^{-10}$**
Se-79	$8\ 10^{-1}$	$9.06\ 10^{-10}$	$9.06\ 10^{-10}$	$9.06\ 10^{-10}$	$9.06\ 10^{-10}$	$9.06\ 10^{-10}$	$9.06\ 10^{-10}$	$5.73\ 10^{-9}$	**$2.35\ 10^{-9}$**
	$5\ 10^{-2}$	$5.66\ 10^{-11}$	$5.66\ 10^{-11}$	$5.66\ 10^{-11}$	$5.66\ 10^{-11}$	$5.66\ 10^{-11}$	$5.66\ 10^{-11}$	$1.04\ 10^{-9}$	**$3.51\ 10^{-10}$**
Se-81	$8\ 10^{-1}$	$2.18\ 10^{-13}$	$2.07\ 10^{-13}$	$2.07\ 10^{-13}$	$2.07\ 10^{-13}$	$2.01\ 10^{-13}$	$1.97\ 10^{-13}$	$5.30\ 10^{-11}$	$1.60\ 10^{-11}$
	$5\ 10^{-2}$	$3.21\ 10^{-14}$	$1.53\ 10^{-14}$	$1.44\ 10^{-14}$	$1.67\ 10^{-14}$	$9.34\ 10^{-15}$	$4.52\ 10^{-15}$	$5.65\ 10^{-11}$ **$2.17\ 10^{-10}$**	$1.70\ 10^{-11}$ ST wall
Se-81m	$8\ 10^{-1}$	$3.21\ 10^{-12}$	$3.02\ 10^{-12}$	$3.00\ 10^{-12}$	$3.09\ 10^{-12}$	$3.01\ 10^{-12}$	$2.95\ 10^{-12}$	$1.28\ 10^{-10}$	**$4.05\ 10^{-11}$**
	$5\ 10^{-2}$	$5.78\ 10^{-13}$	$1.80\ 10^{-13}$	$1.35\ 10^{-13}$	$2.81\ 10^{-13}$	$1.51\ 10^{-13}$	$8.30\ 10^{-14}$	$1.88\ 10^{-10}$	**$5.67\ 10^{-11}$**
Se-83	$8\ 10^{-1}$	$8.46\ 10^{-12}$	$4.69\ 10^{-12}$	$4.58\ 10^{-12}$	$4.65\ 10^{-12}$	$2.99\ 10^{-12}$	$1.87\ 10^{-12}$	$1.02\ 10^{-10}$ **$3.19\ 10^{-10}$**	$3.47\ 10^{-11}$ ST wall
	$5\ 10^{-2}$	$9.40\ 10^{-12}$	$3.60\ 10^{-12}$	$3.17\ 10^{-12}$	$3.76\ 10^{-12}$	$1.68\ 10^{-12}$	$3.69\ 10^{-13}$	$1.33\ 10^{-10}$	**$4.35\ 10^{-11}$**
Bromine									
Br-74	1.0	$8.27\ 10^{-12}$	$8.73\ 10^{-12}$	$9.78\ 10^{-12}$	$7.88\ 10^{-12}$	$6.44\ 10^{-12}$	$5.52\ 10^{-12}$	$1.49\ 10^{-10}$ **$6.34\ 10^{-10}$**	$5.05\ 10^{-11}$ ST wall
Br-74m	1.0	$1.57\ 10^{-11}$	$1.62\ 10^{-11}$	$1.76\ 10^{-11}$	$1.53\ 10^{-11}$	$1.33\ 10^{-11}$	$1.20\ 10^{-11}$	$2.35\ 10^{-10}$ **$1.01\ 10^{-9}$**	$8.16\ 10^{-11}$ ST wall
Br-75	1.0	$1.52\ 10^{-11}$	$1.54\ 10^{-11}$	$1.65\ 10^{-11}$	$1.61\ 10^{-11}$	$1.46\ 10^{-11}$	$1.32\ 10^{-11}$	$1.28\ 10^{-10}$ **$5.26\ 10^{-10}$**	$4.94\ 10^{-11}$ ST wall
Br-76	1.0	$3.17\ 10^{-10}$	$2.74\ 10^{-10}$	$2.76\ 10^{-10}$	$2.88\ 10^{-10}$	$2.72\ 10^{-10}$	$2.73\ 10^{-10}$	$5.39\ 10^{-10}$	**$3.66\ 10^{-10}$**
Br-77	1.0	$7.95\ 10^{-11}$	$6.80\ 10^{-11}$	$7.12\ 10^{-11}$	$7.99\ 10^{-11}$	$7.23\ 10^{-11}$	$6.71\ 10^{-11}$	$1.00\ 10^{-10}$	**$8.24\ 10^{-11}$**
Br-80	1.0	$7.98\ 10^{-13}$	$8.28\ 10^{-13}$	$8.49\ 10^{-13}$	$8.14\ 10^{-13}$	$7.91\ 10^{-13}$	$7.71\ 10^{-13}$	$5.07\ 10^{-11}$ **$2.49\ 10^{-10}$**	$1.58\ 10^{-11}$ ST wall
Br-80m	1.0	$3.94\ 10^{-11}$	$3.91\ 10^{-11}$	$3.93\ 10^{-11}$	$3.99\ 10^{-11}$	$3.95\ 10^{-11}$	$3.90\ 10^{-11}$	$1.56\ 10^{-10}$	**$7.45\ 10^{-11}$**

Table 2.2, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Br-82	1.0	$4.48\ 10^{-10}$	$3.81\ 10^{-10}$	$3.84\ 10^{-10}$	$4.14\ 10^{-10}$	$3.80\ 10^{-10}$	$3.83\ 10^{-10}$	$5.80\ 10^{-10}$	**$4.62\ 10^{-10}$**
Br-83	1.0	$7.35\ 10^{-12}$	$7.34\ 10^{-12}$	$7.35\ 10^{-12}$	$7.35\ 10^{-12}$	$7.33\ 10^{-12}$	$7.33\ 10^{-12}$	$6.54\ 10^{-11}$ **$2.97\ 10^{-10}$**	$2.47\ 10^{-11}$ ST wall
Br-84	1.0	$6.75\ 10^{-12}$	$6.62\ 10^{-12}$	$6.99\ 10^{-12}$	$6.21\ 10^{-12}$	$5.56\ 10^{-12}$	$5.20\ 10^{-12}$	$1.48\ 10^{-10}$ **$6.82\ 10^{-10}$**	$4.91\ 10^{-11}$ ST wall
Rubidium									
Rb-79	1.0	$2.74\ 10^{-12}$	$3.40\ 10^{-12}$	$3.86\ 10^{-12}$	$3.29\ 10^{-12}$	$2.87\ 10^{-12}$	$2.20\ 10^{-12}$	$8.58\ 10^{-11}$ **$3.88\ 10^{-10}$**	$2.79\ 10^{-11}$ ST wall
Rb-81	1.0	$2.12\ 10^{-11}$	$2.01\ 10^{-11}$	$2.11\ 10^{-11}$	$2.56\ 10^{-11}$	$2.93\ 10^{-11}$	$1.85\ 10^{-11}$	$7.92\ 10^{-11}$	**$3.91\ 10^{-11}$**
Rb-81m	1.0	$2.82\ 10^{-12}$	$2.63\ 10^{-12}$	$2.72\ 10^{-12}$	$3.38\ 10^{-12}$	$3.92\ 10^{-12}$	$2.51\ 10^{-12}$	$1.44\ 10^{-11}$ **$5.79\ 10^{-11}$**	$6.35\ 10^{-12}$ ST wall
Rb-82m	1.0	$8.05\ 10^{-11}$	$7.58\ 10^{-11}$	$7.74\ 10^{-11}$	$9.07\ 10^{-11}$	$8.84\ 10^{-11}$	$6.99\ 10^{-11}$	$1.86\ 10^{-10}$	**$1.12\ 10^{-10}$**
Rb-83	1.0	$1.98\ 10^{-9}$	$1.73\ 10^{-9}$	$1.79\ 10^{-9}$	$2.61\ 10^{-9}$	$3.02\ 10^{-9}$	$1.74\ 10^{-9}$	$2.17\ 10^{-9}$	**$2.08\ 10^{-9}$**
Rb-84	1.0	$2.52\ 10^{-9}$	$2.29\ 10^{-9}$	$2.29\ 10^{-9}$	$3.43\ 10^{-9}$	$4.41\ 10^{-9}$	$2.29\ 10^{-9}$	$2.79\ 10^{-9}$	**$2.70\ 10^{-9}$**
Rb-86	1.0	$2.15\ 10^{-9}$	$2.14\ 10^{-9}$	$2.14\ 10^{-9}$	$3.72\ 10^{-9}$	$6.86\ 10^{-9}$	$2.14\ 10^{-9}$	$2.33\ 10^{-9}$	**$2.53\ 10^{-9}$**
Rb-87	1.0	$1.14\ 10^{-9}$	$1.14\ 10^{-9}$	$1.14\ 10^{-9}$	$2.02\ 10^{-9}$	$3.80\ 10^{-9}$	$1.14\ 10^{-9}$	$1.17\ 10^{-9}$	**$1.33\ 10^{-9}$**
Rb-88	1.0	$2.78\ 10^{-12}$	$2.82\ 10^{-12}$	$2.91\ 10^{-12}$	$2.76\ 10^{-12}$	$2.75\ 10^{-12}$	$2.43\ 10^{-12}$	$1.50\ 10^{-10}$ **$7.32\ 10^{-10}$**	$4.71\ 10^{-11}$ ST wall
Rb-89	1.0	$3.32\ 10^{-12}$	$3.38\ 10^{-12}$	$3.68\ 10^{-12}$	$3.53\ 10^{-12}$	$4.19\ 10^{-12}$	$2.21\ 10^{-12}$	$8.04\ 10^{-11}$ **$3.63\ 10^{-10}$**	$2.65\ 10^{-11}$ ST wall
Strontium									
Sr-80	$3\ 10^{-1}$	$4.30\ 10^{-11}$	$1.26\ 10^{-11}$	$9.14\ 10^{-12}$	$1.55\ 10^{-11}$	$7.35\ 10^{-12}$	$5.09\ 10^{-12}$	$9.87\ 10^{-10}$	**$3.12\ 10^{-10}$**
	$1\ 10^{-2}$	$4.41\ 10^{-11}$	$8.94\ 10^{-12}$	$4.71\ 10^{-12}$	$1.20\ 10^{-11}$	$4.37\ 10^{-12}$	$5.65\ 10^{-13}$	$1.08\ 10^{-9}$	**$3.38\ 10^{-10}$**
Sr-81	$3\ 10^{-1}$	$1.32\ 10^{-11}$	$3.82\ 10^{-12}$	$2.92\ 10^{-12}$	$4.85\ 10^{-12}$	$2.25\ 10^{-12}$	$7.34\ 10^{-13}$	$1.79\ 10^{-10}$	**$5.85\ 10^{-11}$**
	$1\ 10^{-2}$	$1.46\ 10^{-11}$	$3.57\ 10^{-12}$	$2.44\ 10^{-12}$	$4.66\ 10^{-12}$	$1.81\ 10^{-12}$	$2.27\ 10^{-13}$	$1.88\ 10^{-10}$	**$6.14\ 10^{-11}$**
Sr-82	$3\ 10^{-1}$	$1.56\ 10^{-9}$	$7.95\ 10^{-10}$	$7.09\ 10^{-10}$	$4.90\ 10^{-9}$	$6.69\ 10^{-9}$	$6.95\ 10^{-10}$	$1.55\ 10^{-8}$	**$6.04\ 10^{-9}$**
	$1\ 10^{-2}$	$1.22\ 10^{-9}$	$1.62\ 10^{-10}$	$4.45\ 10^{-11}$	$3.92\ 10^{-10}$	$2.99\ 10^{-10}$	$2.59\ 10^{-11}$	$2.07\ 10^{-8}$ **$7.10\ 10^{-8}$**	$6.61\ 10^{-9}$ LLI wall
Sr-83	$3\ 10^{-1}$	$3.87\ 10^{-10}$	$7.65\ 10^{-11}$	$4.15\ 10^{-11}$	$1.53\ 10^{-10}$	$2.40\ 10^{-10}$	$3.30\ 10^{-11}$	$1.31\ 10^{-9}$	**$5.33\ 10^{-10}$**
	$1\ 10^{-2}$	$4.88\ 10^{-10}$	$6.15\ 10^{-11}$	$1.31\ 10^{-11}$	$1.01\ 10^{-10}$	$4.04\ 10^{-11}$	$2.63\ 10^{-12}$	$1.75\ 10^{-9}$	**$6.70\ 10^{-10}$**
Sr-85	$3\ 10^{-1}$	$6.25\ 10^{-10}$	$2.53\ 10^{-10}$	$2.06\ 10^{-10}$	$5.97\ 10^{-10}$	$6.06\ 10^{-10}$	$2.05\ 10^{-10}$	$7.31\ 10^{-10}$	**$5.34\ 10^{-10}$**
	$1\ 10^{-2}$	$5.82\ 10^{-10}$	$7.34\ 10^{-11}$	$1.67\ 10^{-11}$	$1.30\ 10^{-10}$	$5.69\ 10^{-11}$	$8.14\ 10^{-12}$	$7.56\ 10^{-10}$	**$4.03\ 10^{-10}$**
Sr-85m	$3\ 10^{-1}$	$5.22\ 10^{-12}$	$1.29\ 10^{-12}$	$8.21\ 10^{-13}$	$2.23\ 10^{-12}$	$1.55\ 10^{-12}$	$2.72\ 10^{-13}$	$1.44\ 10^{-11}$	**$6.23\ 10^{-12}$**
	$1\ 10^{-2}$	$5.63\ 10^{-12}$	$1.16\ 10^{-12}$	$6.11\ 10^{-13}$	$1.92\ 10^{-12}$	$7.13\ 10^{-13}$	$5.37\ 10^{-14}$	$1.52\ 10^{-11}$	**$6.46\ 10^{-12}$**
Sr-87m	$3\ 10^{-1}$	$2.04\ 10^{-11}$	$4.13\ 10^{-12}$	$2.25\ 10^{-12}$	$6.12\ 10^{-12}$	$2.58\ 10^{-12}$	$9.20\ 10^{-13}$	$8.30\ 10^{-11}$	**$3.17\ 10^{-11}$**
	$1\ 10^{-2}$	$2.34\ 10^{-11}$	$3.87\ 10^{-12}$	$1.53\ 10^{-12}$	$6.10\ 10^{-12}$	$2.11\ 10^{-12}$	$1.62\ 10^{-13}$	$9.47\ 10^{-11}$	**$3.58\ 10^{-11}$**
Sr-89	$3\ 10^{-1}$	$2.40\ 10^{-10}$	$2.40\ 10^{-10}$	$2.40\ 10^{-10}$	$3.23\ 10^{-9}$	$4.81\ 10^{-9}$	$2.40\ 10^{-10}$	$6.11\ 10^{-9}$	**$2.50\ 10^{-9}$**
	$1\ 10^{-2}$	$8.05\ 10^{-12}$	$7.98\ 10^{-12}$	$7.97\ 10^{-12}$	$1.08\ 10^{-10}$	$1.61\ 10^{-10}$	$7.97\ 10^{-12}$	$8.25\ 10^{-9}$ **$2.89\ 10^{-8}$**	$2.50\ 10^{-9}$ LLI wall
Sr-90	$3\ 10^{-1}$	$1.51\ 10^{-9}$	$1.51\ 10^{-9}$	$1.51\ 10^{-9}$	$1.94\ 10^{-7}$	**$4.19\ 10^{-7}$**	$1.51\ 10^{-9}$	$6.14\ 10^{-9}$	$3.85\ 10^{-8}$
	$1\ 10^{-2}$	$5.04\ 10^{-11}$	$5.04\ 10^{-11}$	$5.04\ 10^{-11}$	$6.45\ 10^{-9}$	$1.39\ 10^{-8}$	$5.04\ 10^{-11}$	$6.70\ 10^{-9}$	**$3.23\ 10^{-9}$**
Sr-91	$3\ 10^{-1}$	$2.10\ 10^{-10}$	$4.98\ 10^{-11}$	$3.05\ 10^{-11}$	$1.08\ 10^{-10}$	$7.90\ 10^{-11}$	$2.41\ 10^{-11}$	$1.98\ 10^{-9}$	**$6.74\ 10^{-10}$**
	$1\ 10^{-2}$	$2.48\ 10^{-10}$	$3.57\ 10^{-11}$	$9.81\ 10^{-12}$	$5.53\ 10^{-11}$	$2.02\ 10^{-11}$	$1.90\ 10^{-12}$	$2.54\ 10^{-9}$	**$8.39\ 10^{-10}$**
Sr-92	$3\ 10^{-1}$	$8.01\ 10^{-11}$	$2.69\ 10^{-11}$	$1.89\ 10^{-11}$	$3.87\ 10^{-11}$	$2.13\ 10^{-11}$	$1.35\ 10^{-11}$	$1.37\ 10^{-9}$	**$4.43\ 10^{-10}$**
	$1\ 10^{-2}$	$8.18\ 10^{-11}$	$1.70\ 10^{-11}$	$7.22\ 10^{-12}$	$2.29\ 10^{-11}$	$8.49\ 10^{-12}$	$1.30\ 10^{-12}$	$1.72\ 10^{-9}$	**$5.43\ 10^{-10}$**
Yttrium									
Y-86	$1\ 10^{-4}$	$1.21\ 10^{-9}$	$1.68\ 10^{-10}$	$4.27\ 10^{-11}$	$2.56\ 10^{-10}$	$8.81\ 10^{-11}$	$6.08\ 10^{-12}$	$2.56\ 10^{-9}$	**$1.14\ 10^{-9}$**
Y-86m	$1\ 10^{-4}$	$6.94\ 10^{-11}$	$9.68\ 10^{-12}$	$2.47\ 10^{-12}$	$1.50\ 10^{-11}$	$5.15\ 10^{-12}$	$3.35\ 10^{-13}$	$1.50\ 10^{-10}$	**$6.61\ 10^{-11}$**

Table 2.2, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Y-87	$1\ 10^{-4}$	$6.97\ 10^{-10}$	$7.84\ 10^{-11}$	$1.15\ 10^{-11}$	$1.38\ 10^{-10}$	$4.60\ 10^{-11}$	$1.44\ 10^{-12}$	$1.51\ 10^{-9}$	**$6.58\ 10^{-10}$**
Y-88	$1\ 10^{-4}$	$2.56\ 10^{-9}$	$3.18\ 10^{-10}$	$6.74\ 10^{-11}$	$5.05\ 10^{-10}$	$1.78\ 10^{-10}$	$1.14\ 10^{-11}$	$2.85\ 10^{-9}$	**$1.62\ 10^{-9}$**
Y-90	$1\ 10^{-4}$	$1.43\ 10^{-14}$	$1.27\ 10^{-14}$	$1.26\ 10^{-14}$	$3.70\ 10^{-13}$	$3.67\ 10^{-13}$	$1.26\ 10^{-14}$	$9.68\ 10^{-9}$ **$3.16\ 10^{-8}$**	$2.91\ 10^{-9}$ LLI wall
Y-90m	$1\ 10^{-4}$	$5.41\ 10^{-11}$	$8.62\ 10^{-12}$	$3.19\ 10^{-12}$	$1.37\ 10^{-11}$	$4.70\ 10^{-12}$	$3.00\ 10^{-13}$	$5.81\ 10^{-10}$	**$1.91\ 10^{-10}$**
Y-91	$1\ 10^{-4}$	$3.54\ 10^{-12}$	$5.54\ 10^{-13}$	$2.02\ 10^{-13}$	$6.59\ 10^{-12}$	$6.13\ 10^{-12}$	$1.29\ 10^{-13}$	$8.57\ 10^{-9}$ **$3.02\ 10^{-8}$**	$2.57\ 10^{-9}$ LLI wall
Y-91m	$1\ 10^{-4}$	$6.94\ 10^{-12}$	$1.84\ 10^{-12}$	$1.28\ 10^{-12}$	$2.24\ 10^{-12}$	$8.71\ 10^{-13}$	$1.17\ 10^{-13}$	$2.92\ 10^{-11}$	**$1.12\ 10^{-11}$**
Y-92	$1\ 10^{-4}$	$1.96\ 10^{-11}$	$3.55\ 10^{-12}$	$1.39\ 10^{-12}$	$4.91\ 10^{-12}$	$1.75\ 10^{-12}$	$1.77\ 10^{-13}$	$1.70\ 10^{-9}$	**$5.15\ 10^{-10}$**
Y-93	$1\ 10^{-4}$	$2.20\ 10^{-11}$	$3.13\ 10^{-12}$	$8.67\ 10^{-13}$	$4.93\ 10^{-12}$	$1.73\ 10^{-12}$	$1.26\ 10^{-13}$	$4.09\ 10^{-9}$	**$1.23\ 10^{-9}$**
Y-94	$1\ 10^{-4}$	$3.61\ 10^{-12}$	$1.37\ 10^{-12}$	$1.25\ 10^{-12}$	$1.33\ 10^{-12}$	$6.07\ 10^{-13}$	$1.34\ 10^{-13}$	$1.73\ 10^{-10}$ **$6.41\ 10^{-10}$**	$5.33\ 10^{-11}$ ST wall
Y-95	$1\ 10^{-4}$	$1.12\ 10^{-12}$	$5.55\ 10^{-13}$	$5.55\ 10^{-13}$	$4.97\ 10^{-13}$	$2.52\ 10^{-13}$	$6.80\ 10^{-14}$	$8.98\ 10^{-11}$ **$3.75\ 10^{-10}$**	$2.75\ 10^{-11}$ ST wall
Zirconium									
Zr-86	$2\ 10^{-3}$	$1.16\ 10^{-9}$	$1.37\ 10^{-10}$	$2.36\ 10^{-11}$	$2.30\ 10^{-10}$	$7.89\ 10^{-11}$	$3.90\ 10^{-12}$	$2.31\ 10^{-9}$	**$1.04\ 10^{-9}$**
Zr-88	$2\ 10^{-3}$	$5.28\ 10^{-10}$	$7.36\ 10^{-11}$	$2.41\ 10^{-11}$	$1.58\ 10^{-10}$	$1.30\ 10^{-10}$	$1.06\ 10^{-11}$	$7.80\ 10^{-10}$	**$4.03\ 10^{-10}$**
Zr-89	$2\ 10^{-3}$	$9.34\ 10^{-10}$	$1.17\ 10^{-10}$	$2.27\ 10^{-11}$	$1.89\ 10^{-10}$	$6.57\ 10^{-11}$	$3.62\ 10^{-12}$	$2.15\ 10^{-9}$	**$9.25\ 10^{-10}$**
Zr-93	$2\ 10^{-3}$	$9.23\ 10^{-14}$	$1.97\ 10^{-13}$	$1.15\ 10^{-13}$	$7.42\ 10^{-10}$	**$9.14\ 10^{-9}$**	$7.31\ 10^{-14}$	$2.83\ 10^{-10}$	$4.48\ 10^{-10}$
Zr-95	$2\ 10^{-3}$	$8.16\ 10^{-10}$	$1.05\ 10^{-10}$	$2.34\ 10^{-11}$	$2.14\ 10^{-10}$	$4.86\ 10^{-10}$	$8.27\ 10^{-12}$	$2.53\ 10^{-9}$	**$1.02\ 10^{-9}$**
Zr-97	$2\ 10^{-3}$	$6.22\ 10^{-10}$	$8.12\ 10^{-11}$	$1.76\ 10^{-11}$	$1.30\ 10^{-10}$	$4.55\ 10^{-11}$	$2.66\ 10^{-12}$	$6.98\ 10^{-9}$	**$2.28\ 10^{-9}$**
Niobium									
Nb-88	$1\ 10^{-2}$	$3.55\ 10^{-12}$	$2.13\ 10^{-12}$	$2.34\ 10^{-12}$	$1.86\ 10^{-12}$	$9.47\ 10^{-13}$	$2.22\ 10^{-13}$	$7.41\ 10^{-11}$ **$2.90\ 10^{-10}$**	$2.40\ 10^{-11}$ ST wall
Nb-89	$1\ 10^{-2}$	$8.06\ 10^{-11}$	$1.42\ 10^{-11}$	$6.04\ 10^{-12}$	$2.01\ 10^{-11}$	$7.65\ 10^{-12}$	$8.56\ 10^{-13}$	$8.38\ 10^{-10}$	**$2.77\ 10^{-10}$**
Nb-89	$1\ 10^{-2}$	$5.09\ 10^{-11}$	$1.06\ 10^{-11}$	$5.90\ 10^{-12}$	$1.41\ 10^{-11}$	$5.39\ 10^{-12}$	$6.19\ 10^{-13}$	$3.81\ 10^{-10}$	**$1.31\ 10^{-10}$**
Nb-90	$1\ 10^{-2}$	$1.35\ 10^{-9}$	$1.87\ 10^{-10}$	$5.12\ 10^{-11}$	$2.91\ 10^{-10}$	$1.09\ 10^{-10}$	$9.11\ 10^{-12}$	$3.50\ 10^{-9}$	**$1.46\ 10^{-9}$**
Nb-93m	$1\ 10^{-2}$	$3.34\ 10^{-11}$	$2.57\ 10^{-12}$	$2.45\ 10^{-12}$	$2.32\ 10^{-11}$	$5.98\ 10^{-11}$	$2.44\ 10^{-12}$	$4.25\ 10^{-10}$ **$1.47\ 10^{-9}$**	$1.41\ 10^{-10}$ LLI wall
Nb-94	$1\ 10^{-2}$	$1.80\ 10^{-9}$	$3.47\ 10^{-10}$	$1.72\ 10^{-10}$	$7.39\ 10^{-10}$	$7.65\ 10^{-10}$	$1.23\ 10^{-10}$	$4.30\ 10^{-9}$	**$1.93\ 10^{-9}$**
Nb-95	$1\ 10^{-2}$	$8.05\ 10^{-10}$	$1.07\ 10^{-10}$	$2.74\ 10^{-11}$	$1.99\ 10^{-10}$	$2.94\ 10^{-10}$	$1.18\ 10^{-11}$	$1.47\ 10^{-9}$	**$6.95\ 10^{-10}$**
Nb-95m	$1\ 10^{-2}$	$9.30\ 10^{-11}$	$1.06\ 10^{-11}$	$2.82\ 10^{-12}$	$3.33\ 10^{-11}$	$4.31\ 10^{-11}$	$1.63\ 10^{-12}$	$1.97\ 10^{-9}$ **$6.47\ 10^{-9}$**	$6.22\ 10^{-10}$ LLI wall
Nb-96	$1\ 10^{-2}$	$1.19\ 10^{-9}$	$1.59\ 10^{-10}$	$3.65\ 10^{-11}$	$2.54\ 10^{-10}$	$9.13\ 10^{-11}$	$6.37\ 10^{-12}$	$3.05\ 10^{-9}$	**$1.27\ 10^{-9}$**
Nb-97	$1\ 10^{-2}$	$1.45\ 10^{-11}$	$3.30\ 10^{-12}$	$1.98\ 10^{-12}$	$4.20\ 10^{-12}$	$1.60\ 10^{-12}$	$2.11\ 10^{-13}$	$1.94\ 10^{-10}$	**$6.30\ 10^{-11}$**
Nb-98	$1\ 10^{-2}$	$3.19\ 10^{-11}$	$8.45\ 10^{-12}$	$5.73\ 10^{-12}$	$9.97\ 10^{-12}$	$3.96\ 10^{-12}$	$6.38\ 10^{-13}$	$3.02\ 10^{-10}$	**$1.02\ 10^{-10}$**
Molybdenum									
Mo-90	$8\ 10^{-1}$	$2.42\ 10^{-10}$	$1.12\ 10^{-10}$	$1.12\ 10^{-10}$	$1.75\ 10^{-10}$	$1.84\ 10^{-10}$	$7.82\ 10^{-11}$	$6.90\ 10^{-10}$	**$3.27\ 10^{-10}$**
	$5\ 10^{-2}$	$6.21\ 10^{-10}$	$8.39\ 10^{-11}$	$2.37\ 10^{-11}$	$1.37\ 10^{-10}$	$5.37\ 10^{-11}$	$7.04\ 10^{-12}$	$1.77\ 10^{-9}$	**$7.19\ 10^{-10}$**
Mo-93	$8\ 10^{-1}$	$1.27\ 10^{-10}$	$9.96\ 10^{-11}$	$1.06\ 10^{-10}$	$2.82\ 10^{-10}$	$1.15\ 10^{-9}$	$9.42\ 10^{-11}$	$7.79\ 10^{-10}$	**$3.64\ 10^{-10}$**
	$5\ 10^{-2}$	$2.54\ 10^{-11}$	$6.78\ 10^{-12}$	$6.63\ 10^{-12}$	$1.97\ 10^{-11}$	$7.22\ 10^{-11}$	$5.89\ 10^{-12}$	$1.74\ 10^{-10}$	**$6.52\ 10^{-11}$**
Mo-93m	$8\ 10^{-1}$	$1.42\ 10^{-10}$	$6.03\ 10^{-11}$	$5.48\ 10^{-11}$	$7.68\ 10^{-11}$	$5.70\ 10^{-11}$	$3.64\ 10^{-11}$	$3.09\ 10^{-10}$	**$1.56\ 10^{-10}$**
	$5\ 10^{-2}$	$3.35\ 10^{-10}$	$5.78\ 10^{-11}$	$1.98\ 10^{-11}$	$8.40\ 10^{-11}$	$3.08\ 10^{-11}$	$4.12\ 10^{-12}$	$7.22\ 10^{-10}$	**$3.22\ 10^{-10}$**
Mo-99	$8\ 10^{-1}$	$2.21\ 10^{-10}$	$1.83\ 10^{-10}$	$1.93\ 10^{-10}$	$5.33\ 10^{-10}$	$7.69\ 10^{-10}$	$1.64\ 10^{-10}$	$2.08\ 10^{-9}$	**$8.22\ 10^{-10}$**
	$5\ 10^{-2}$	$2.18\ 10^{-10}$	$3.43\ 10^{-11}$	$1.51\ 10^{-11}$	$8.32\ 10^{-11}$	$6.32\ 10^{-11}$	$1.03\ 10^{-11}$	$4.28\ 10^{-9}$ **$1.37\ 10^{-8}$**	$1.36\ 10^{-9}$ LLI wall
Mo-101	$8\ 10^{-1}$	$3.46\ 10^{-12}$	$1.92\ 10^{-12}$	$1.91\ 10^{-12}$	$1.92\ 10^{-12}$	$1.15\ 10^{-12}$	$5.86\ 10^{-13}$	$8.70\ 10^{-11}$ **$3.24\ 10^{-10}$**	$2.78\ 10^{-11}$ ST wall
	$5\ 10^{-2}$	$3.84\ 10^{-12}$	$1.63\ 10^{-12}$	$1.51\ 10^{-12}$	$1.67\ 10^{-12}$	$7.61\ 10^{-13}$	$1.59\ 10^{-13}$	$9.35\ 10^{-11}$ **$3.24\ 10^{-10}$**	$2.97\ 10^{-11}$ ST wall

Table 2.2, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Technetium									
Tc-93	$8\ 10^{-1}$	$3.46\ 10^{-11}$	$1.48\ 10^{-11}$	$1.21\ 10^{-11}$	$1.60\ 10^{-11}$	$1.04\ 10^{-11}$	$9.78\ 10^{-11}$	$8.74\ 10^{-11}$	**$4.37\ 10^{-11}$**
Tc-93m	$8\ 10^{-1}$	$1.23\ 10^{-11}$	$5.21\ 10^{-12}$	$4.34\ 10^{-12}$	$5.70\ 10^{-12}$	$3.66\ 10^{-12}$	$4.24\ 10^{-11}$	$4.53\ 10^{-11}$	**$2.00\ 10^{-11}$**
Tc-94	$8\ 10^{-1}$	$1.25\ 10^{-10}$	$5.08\ 10^{-11}$	$4.34\ 10^{-11}$	$5.77\ 10^{-11}$	$3.89\ 10^{-11}$	$4.84\ 10^{-10}$	$2.98\ 10^{-10}$	**$1.56\ 10^{-10}$**
Tc-94m	$8\ 10^{-1}$	$1.74\ 10^{-11}$	$8.24\ 10^{-12}$	$7.61\ 10^{-12}$	$8.63\ 10^{-12}$	$5.65\ 10^{-12}$	$1.94\ 10^{-10}$	$2.07\ 10^{-10}$	**$7.57\ 10^{-11}$**
Tc-95	$8\ 10^{-1}$	$1.14\ 10^{-10}$	$4.73\ 10^{-11}$	$4.12\ 10^{-11}$	$5.51\ 10^{-11}$	$3.97\ 10^{-11}$	$3.71\ 10^{-10}$	$2.21\ 10^{-10}$	**$1.26\ 10^{-10}$**
Tc-95m	$8\ 10^{-1}$	$3.17\ 10^{-10}$	$1.73\ 10^{-10}$	$1.67\ 10^{-10}$	$2.03\ 10^{-10}$	$1.63\ 10^{-10}$	$7.96\ 10^{-10}$	$7.15\ 10^{-10}$	**$3.93\ 10^{-10}$**
Tc-96	$8\ 10^{-1}$	$6.99\ 10^{-10}$	$3.35\ 10^{-10}$	$3.04\ 10^{-10}$	$3.84\ 10^{-10}$	$2.91\ 10^{-10}$	$1.55\ 10^{-9}$	$1.27\ 10^{-9}$	**$7.45\ 10^{-10}$**
Tc-96m	$8\ 10^{-1}$	$6.11\ 10^{-12}$	$2.94\ 10^{-12}$	$2.67\ 10^{-12}$	$3.35\ 10^{-12}$	$2.54\ 10^{-12}$	$1.99\ 10^{-11}$	$1.75\ 10^{-11}$	**$8.61\ 10^{-12}$**
Tc-97	$8\ 10^{-1}$	$1.68\ 10^{-11}$	$1.01\ 10^{-11}$	$1.02\ 10^{-11}$	$1.27\ 10^{-11}$	$1.17\ 10^{-11}$	$1.77\ 10^{-10}$	$1.07\ 10^{-10}$	**$4.63\ 10^{-11}$**
Tc-97m	$8\ 10^{-1}$	$5.75\ 10^{-11}$	$5.22\ 10^{-11}$	$5.24\ 10^{-11}$	$5.46\ 10^{-11}$	$5.37\ 10^{-11}$	$1.44\ 10^{-9}$	$8.54\ 10^{-10}$	**$3.36\ 10^{-10}$**
Tc-98	$8\ 10^{-1}$	$7.26\ 10^{-10}$	$4.61\ 10^{-10}$	$4.54\ 10^{-10}$	$5.08\ 10^{-10}$	$4.26\ 10^{-10}$	$3.54\ 10^{-9}$	$2.78\ 10^{-9}$	**$1.32\ 10^{-9}$**
Tc-99	$8\ 10^{-1}$	$6.04\ 10^{-11}$	$6.04\ 10^{-11}$	$6.04\ 10^{-11}$	$6.04\ 10^{-11}$	$6.04\ 10^{-11}$	$1.62\ 10^{-9}$	$1.02\ 10^{-9}$	**$3.95\ 10^{-10}$**
Tc-99m	$8\ 10^{-1}$	$9.75\ 10^{-12}$	$3.57\ 10^{-12}$	$3.14\ 10^{-12}$	$6.29\ 10^{-12}$	$4.06\ 10^{-12}$	$8.46\ 10^{-11}$	$3.34\ 10^{-11}$	**$1.68\ 10^{-11}$**
Tc-101	$8\ 10^{-1}$	$6.29\ 10^{-13}$	$4.06\ 10^{-13}$	$4.13\ 10^{-13}$	$4.36\ 10^{-13}$	$2.55\ 10^{-13}$	$3.89\ 10^{-12}$	$3.66\ 10^{-11}$ **$1.50\ 10^{-10}$**	$1.14\ 10^{-11}$ ST wall
Tc-104	$8\ 10^{-1}$	$4.73\ 10^{-12}$	$2.72\ 10^{-12}$	$2.70\ 10^{-12}$	$2.62\ 10^{-12}$	$1.59\ 10^{-12}$	$2.79\ 10^{-11}$	$1.60\ 10^{-10}$ **$6.26\ 10^{-10}$**	$5.11\ 10^{-11}$ ST wall
Ruthenium									
Ru-94	$5\ 10^{-2}$	$4.25\ 10^{-11}$	$8.57\ 10^{-12}$	$4.24\ 10^{-12}$	$1.15\ 10^{-11}$	$4.29\ 10^{-12}$	$6.66\ 10^{-13}$	$2.66\ 10^{-10}$	**$9.37\ 10^{-11}$**
Ru-97	$5\ 10^{-2}$	$2.38\ 10^{-10}$	$2.63\ 10^{-11}$	$6.43\ 10^{-12}$	$5.25\ 10^{-11}$	$1.93\ 10^{-11}$	$3.22\ 10^{-12}$	$3.89\ 10^{-10}$	**$1.88\ 10^{-10}$**
Ru-103	$5\ 10^{-2}$	$5.72\ 10^{-10}$	$1.20\ 10^{-10}$	$7.31\ 10^{-11}$	$1.66\ 10^{-10}$	$9.63\ 10^{-11}$	$6.25\ 10^{-11}$	$2.10\ 10^{-9}$	**$8.24\ 10^{-10}$**
Ru-105	$5\ 10^{-2}$	$9.67\ 10^{-11}$	$1.59\ 10^{-11}$	$6.21\ 10^{-12}$	$2.35\ 10^{-11}$	$8.89\ 10^{-12}$	$1.82\ 10^{-12}$	$8.54\ 10^{-10}$	**$2.87\ 10^{-10}$**
Ru-106	$5\ 10^{-2}$	$1.64\ 10^{-9}$	$1.44\ 10^{-9}$	$1.42\ 10^{-9}$	$1.46\ 10^{-9}$	$1.43\ 10^{-9}$	$1.41\ 10^{-9}$	$2.11\ 10^{-8}$ **$7.09\ 10^{-8}$**	$7.40\ 10^{-9}$ LLI wall
Rhodium									
Rh-99	$5\ 10^{-2}$	$6.93\ 10^{-10}$	$1.04\ 10^{-10}$	$4.37\ 10^{-11}$	$1.82\ 10^{-10}$	$8.17\ 10^{-11}$	$3.19\ 10^{-11}$	$1.29\ 10^{-9}$	**$6.08\ 10^{-10}$**
Rh-99m	$5\ 10^{-2}$	$8.22\ 10^{-11}$	$1.31\ 10^{-11}$	$4.64\ 10^{-12}$	$2.01\ 10^{-11}$	$7.13\ 10^{-12}$	$8.73\ 10^{-13}$	$1.73\ 10^{-10}$	**$7.77\ 10^{-11}$**
Rh-100	$5\ 10^{-2}$	$1.11\ 10^{-9}$	$1.56\ 10^{-10}$	$4.48\ 10^{-11}$	$2.37\ 10^{-10}$	$8.73\ 10^{-11}$	$1.43\ 10^{-11}$	$1.73\ 10^{-9}$	**$8.56\ 10^{-10}$**
Rh-101	$5\ 10^{-2}$	$6.47\ 10^{-10}$	$2.62\ 10^{-10}$	$2.43\ 10^{-10}$	$4.04\ 10^{-10}$	$3.12\ 10^{-10}$	$2.09\ 10^{-10}$	$1.11\ 10^{-9}$	**$6.26\ 10^{-10}$**
Rh-101m	$5\ 10^{-2}$	$3.24\ 10^{-10}$	$3.81\ 10^{-11}$	$1.06\ 10^{-11}$	$7.17\ 10^{-11}$	$2.75\ 10^{-11}$	$6.01\ 10^{-12}$	$5.64\ 10^{-10}$	**$2.67\ 10^{-10}$**
Rh-102	$5\ 10^{-2}$	$3.54\ 10^{-9}$	$1.50\ 10^{-9}$	$1.31\ 10^{-9}$	$1.83\ 10^{-9}$	$1.41\ 10^{-9}$	$1.28\ 10^{-9}$	$4.19\ 10^{-9}$	**$2.82\ 10^{-9}$**
Rh-102m	$5\ 10^{-2}$	$7.84\ 10^{-10}$	$2.94\ 10^{-10}$	$2.49\ 10^{-10}$	$3.57\ 10^{-10}$	$2.74\ 10^{-10}$	$2.35\ 10^{-10}$	$3.14\ 10^{-9}$ **$9.69\ 10^{-9}$**	$1.27\ 10^{-9}$ LLI wall
Rh-103m	$5\ 10^{-2}$	$4.02\ 10^{-14}$	$8.65\ 10^{-15}$	$4.93\ 10^{-15}$	$1.01\ 10^{-14}$	$5.29\ 10^{-15}$	$3.27\ 10^{-15}$	$1.04\ 10^{-11}$	**$3.14\ 10^{-12}$**
Rh-105	$5\ 10^{-2}$	$5.80\ 10^{-11}$	$8.97\ 10^{-12}$	$3.86\ 10^{-12}$	$1.47\ 10^{-11}$	$6.75\ 10^{-12}$	$2.91\ 10^{-12}$	$1.27\ 10^{-9}$ **$3.79\ 10^{-9}$**	$3.99\ 10^{-10}$ LLI wall
Rh-106m	$5\ 10^{-2}$	$1.30\ 10^{-10}$	$2.62\ 10^{-11}$	$1.26\ 10^{-11}$	$3.50\ 10^{-11}$	$1.30\ 10^{-11}$	$1.94\ 10^{-12}$	$4.38\ 10^{-10}$	**$1.74\ 10^{-10}$**
Rh-107	$5\ 10^{-2}$	$1.24\ 10^{-12}$	$4.80\ 10^{-13}$	$4.16\ 10^{-13}$	$5.85\ 10^{-13}$	$2.51\ 10^{-13}$	$3.76\ 10^{-14}$	$5.25\ 10^{-11}$ **$1.87\ 10^{-10}$**	$1.63\ 10^{-11}$ ST wall
Palladium									
Pd-100	$5\ 10^{-3}$	$1.43\ 10^{-9}$	$1.60\ 10^{-10}$	$2.77\ 10^{-11}$	$3.00\ 10^{-10}$	$1.03\ 10^{-10}$	$4.59\ 10^{-12}$	$2.44\ 10^{-9}$	**$1.16\ 10^{-9}$**
Pd-101	$5\ 10^{-3}$	$1.04\ 10^{-10}$	$1.27\ 10^{-11}$	$3.01\ 10^{-12}$	$2.19\ 10^{-11}$	$7.31\ 10^{-12}$	$3.71\ 10^{-13}$	$2.68\ 10^{-10}$	**$1.12\ 10^{-10}$**
Pd-103	$5\ 10^{-3}$	$4.13\ 10^{-11}$	$1.58\ 10^{-12}$	$1.28\ 10^{-13}$	$6.58\ 10^{-12}$	$2.00\ 10^{-12}$	$4.40\ 10^{-14}$	$6.72\ 10^{-10}$ **$2.32\ 10^{-9}$**	$2.13\ 10^{-10}$ LLI wall
Pd-107	$5\ 10^{-3}$	$9.91\ 10^{-15}$	$9.91\ 10^{-15}$	$9.91\ 10^{-15}$	$5.36\ 10^{-14}$	$1.43\ 10^{-13}$	$9.91\ 10^{-15}$	$1.35\ 10^{-10}$ **$4.72\ 10^{-10}$**	$4.04\ 10^{-11}$ LLI wall
Pd-109	$5\ 10^{-3}$	$7.90\ 10^{-12}$	$6.27\ 10^{-13}$	$1.49\ 10^{-13}$	$2.04\ 10^{-12}$	$1.02\ 10^{-12}$	$9.48\ 10^{-14}$	$1.95\ 10^{-9}$	**$5.87\ 10^{-10}$**

Table 2.2, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Silver									
Ag-102	$5\ 10^{-2}$	$5.28\ 10^{-12}$	$2.78\ 10^{-12}$	$2.82\ 10^{-12}$	$2.57\ 10^{-12}$	$1.24\ 10^{-12}$	$2.86\ 10^{-13}$	$8.36\ 10^{-11}$ **$3.00\ 10^{-10}$**	$2.75\ 10^{-11}$ ST wall
Ag-103	$5\ 10^{-2}$	$1.48\ 10^{-11}$	$3.52\ 10^{-12}$	$2.18\ 10^{-12}$	$4.72\ 10^{-12}$	$1.81\ 10^{-12}$	$2.61\ 10^{-13}$	$1.17\ 10^{-10}$	**$4.02\ 10^{-11}$**
Ag-104	$5\ 10^{-2}$	$5.27\ 10^{-11}$	$1.25\ 10^{-11}$	$7.68\ 10^{-12}$	$1.55\ 10^{-11}$	$5.98\ 10^{-12}$	$9.26\ 10^{-13}$	$1.47\ 10^{-10}$	**$6.22\ 10^{-11}$**
Ag-104m	$5\ 10^{-2}$	$1.83\ 10^{-11}$	$4.63\ 10^{-12}$	$2.99\ 10^{-12}$	$5.65\ 10^{-12}$	$2.21\ 10^{-12}$	$3.58\ 10^{-13}$	$1.30\ 10^{-10}$	**$4.55\ 10^{-11}$**
Ag-105	$5\ 10^{-2}$	$6.43\ 10^{-10}$	$1.11\ 10^{-10}$	$9.56\ 10^{-11}$	$1.77\ 10^{-10}$	$7.95\ 10^{-11}$	$2.00\ 10^{-11}$	$1.13\ 10^{-9}$	**$5.52\ 10^{-10}$**
Ag-106	$5\ 10^{-2}$	$3.01\ 10^{-12}$	$1.18\ 10^{-12}$	$1.06\ 10^{-12}$	$1.27\ 10^{-12}$	$5.46\ 10^{-13}$	$9.84\ 10^{-14}$	$7.20\ 10^{-11}$ **$2.42\ 10^{-10}$**	$2.28\ 10^{-11}$ ST wall
Ag-106m	$5\ 10^{-2}$	$2.59\ 10^{-9}$	$3.84\ 10^{-10}$	$1.92\ 10^{-10}$	$5.83\ 10^{-10}$	$2.29\ 10^{-10}$	$3.92\ 10^{-11}$	$3.15\ 10^{-9}$	**$1.75\ 10^{-9}$**
Ag-108m	$5\ 10^{-2}$	$1.93\ 10^{-9}$	$5.14\ 10^{-10}$	$6.03\ 10^{-10}$	$6.63\ 10^{-10}$	$3.55\ 10^{-10}$	$1.30\ 10^{-10}$	$4.44\ 10^{-9}$	**$2.06\ 10^{-9}$**
Ag-110m	$5\ 10^{-2}$	$2.99\ 10^{-9}$	$7.51\ 10^{-10}$	$8.30\ 10^{-10}$	$9.42\ 10^{-10}$	$4.93\ 10^{-10}$	$1.81\ 10^{-10}$	$6.08\ 10^{-9}$	**$2.92\ 10^{-9}$**
Ag-111	$5\ 10^{-2}$	$3.58\ 10^{-11}$	$1.09\ 10^{-11}$	$8.84\ 10^{-12}$	$1.38\ 10^{-11}$	$9.67\ 10^{-12}$	$7.48\ 10^{-12}$	$4.51\ 10^{-9}$ **$1.48\ 10^{-8}$**	$1.37\ 10^{-9}$ LLI wall
Ag-112	$5\ 10^{-2}$	$4.44\ 10^{-11}$	$8.89\ 10^{-12}$	$4.30\ 10^{-12}$	$1.19\ 10^{-11}$	$4.86\ 10^{-12}$	$1.37\ 10^{-12}$	$1.42\ 10^{-9}$	**$4.41\ 10^{-10}$**
Ag-115	$5\ 10^{-2}$	$3.93\ 10^{-12}$	$1.13\ 10^{-12}$	$8.88\ 10^{-13}$	$1.34\ 10^{-12}$	$5.83\ 10^{-13}$	$1.29\ 10^{-13}$	$1.39\ 10^{-10}$ **$4.13\ 10^{-10}$**	$4.31\ 10^{-11}$ ST wall
Cadmium									
Cd-104	$5\ 10^{-2}$	$6.25\ 10^{-11}$	$1.17\ 10^{-11}$	$4.91\ 10^{-12}$	$1.64\ 10^{-11}$	$5.88\ 10^{-12}$	$7.37\ 10^{-13}$	$1.43\ 10^{-10}$	**$6.30\ 10^{-11}$**
Cd-107	$5\ 10^{-2}$	$1.05\ 10^{-11}$	$1.01\ 10^{-12}$	$3.28\ 10^{-13}$	$2.42\ 10^{-12}$	$8.11\ 10^{-13}$	$2.00\ 10^{-13}$	$2.15\ 10^{-10}$	**$6.76\ 10^{-11}$**
Cd-109	$5\ 10^{-2}$	$3.46\ 10^{-10}$	$3.10\ 10^{-10}$	$3.17\ 10^{-10}$	$3.70\ 10^{-10}$	$3.28\ 10^{-10}$	$2.75\ 10^{-10}$	$1.10\ 10^{-8}$ **$4.08\ 10^{-8}$**	$3.55\ 10^{-9}$ Kidneys
Cd-113	$5\ 10^{-2}$	$3.75\ 10^{-9}$	$3.75\ 10^{-9}$	$3.75\ 10^{-9}$	$3.75\ 10^{-9}$	$3.75\ 10^{-9}$	$3.75\ 10^{-9}$	$1.48\ 10^{-7}$ **$6.16\ 10^{-7}$**	$4.70\ 10^{-8}$ Kidneys
Cd-113m	$5\ 10^{-2}$	$3.44\ 10^{-9}$	$3.44\ 10^{-9}$	$3.44\ 10^{-9}$	$3.44\ 10^{-9}$	$3.44\ 10^{-9}$	$3.44\ 10^{-9}$	$1.37\ 10^{-7}$ **$5.64\ 10^{-7}$**	$4.35\ 10^{-8}$ Kidneys
Cd-115	$5\ 10^{-2}$	$3.17\ 10^{-10}$	$4.44\ 10^{-11}$	$1.65\ 10^{-11}$	$7.40\ 10^{-11}$	$3.06\ 10^{-11}$	$9.49\ 10^{-12}$	$4.81\ 10^{-9}$ **$1.50\ 10^{-8}$**	$1.54\ 10^{-9}$ LLI wall
Cd-115m	$5\ 10^{-2}$	$1.84\ 10^{-10}$	$1.66\ 10^{-10}$	$1.64\ 10^{-10}$	$1.68\ 10^{-10}$	$1.64\ 10^{-10}$	$1.61\ 10^{-10}$	$1.42\ 10^{-8}$	**$4.37\ 10^{-9}$**
Cd-117	$5\ 10^{-2}$	$8.74\ 10^{-11}$	$1.60\ 10^{-11}$	$6.68\ 10^{-12}$	$2.37\ 10^{-11}$	$8.83\ 10^{-12}$	$1.56\ 10^{-12}$	$9.17\ 10^{-10}$	**$3.03\ 10^{-10}$**
Cd-117m	$5\ 10^{-2}$	$2.08\ 10^{-10}$	$3.63\ 10^{-11}$	$1.44\ 10^{-11}$	$5.24\ 10^{-11}$	$1.91\ 10^{-11}$	$2.83\ 10^{-12}$	$8.51\ 10^{-10}$	**$3.21\ 10^{-10}$**
Indium									
In-109	$2\ 10^{-2}$	$7.34\ 10^{-11}$	$1.16\ 10^{-11}$	$4.10\ 10^{-12}$	$1.98\ 10^{-11}$	$7.06\ 10^{-12}$	$6.00\ 10^{-13}$	$1.77\ 10^{-10}$	**$7.64\ 10^{-11}$**
In-110 69.1 m	$2\ 10^{-2}$	$3.72\ 10^{-10}$	$6.00\ 10^{-11}$	$2.10\ 10^{-11}$	$8.69\ 10^{-11}$	$3.05\ 10^{-11}$	$3.06\ 10^{-12}$	$5.67\ 10^{-10}$	**$2.86\ 10^{-10}$**
In-110 4.9 h	$2\ 10^{-2}$	$3.15\ 10^{-11}$	$7.35\ 10^{-12}$	$4.49\ 10^{-12}$	$9.33\ 10^{-12}$	$3.57\ 10^{-12}$	$5.06\ 10^{-13}$	$2.77\ 10^{-10}$	**$9.39\ 10^{-11}$**
In-111	$2\ 10^{-2}$	$4.15\ 10^{-10}$	$4.37\ 10^{-11}$	$8.35\ 10^{-12}$	$1.08\ 10^{-10}$	$3.73\ 10^{-11}$	$2.10\ 10^{-12}$	$7.80\ 10^{-10}$	**$3.59\ 10^{-10}$**
In-112	$2\ 10^{-2}$	$5.08\ 10^{-13}$	$2.65\ 10^{-13}$	$2.66\ 10^{-13}$	$2.58\ 10^{-13}$	$1.19\ 10^{-13}$	$2.28\ 10^{-14}$	$2.07\ 10^{-11}$ **$7.98\ 10^{-11}$**	$6.46\ 10^{-12}$ ST wall
In-113m	$2\ 10^{-2}$	$9.58\ 10^{-12}$	$1.86\ 10^{-12}$	$9.25\ 10^{-13}$	$2.82\ 10^{-12}$	$1.02\ 10^{-12}$	$9.97\ 10^{-14}$	$8.37\ 10^{-11}$	**$2.83\ 10^{-11}$**
In-114m	$2\ 10^{-2}$	$2.49\ 10^{-10}$	$1.32\ 10^{-10}$	$1.23\ 10^{-10}$	$3.51\ 10^{-9}$	$1.81\ 10^{-9}$	$1.17\ 10^{-10}$	$1.34\ 10^{-8}$ **$4.36\ 10^{-8}$**	$4.61\ 10^{-9}$ LLI wall
In-115	$2\ 10^{-2}$	$4.86\ 10^{-9}$	$4.86\ 10^{-9}$	$4.86\ 10^{-9}$	$1.53\ 10^{-7}$	$7.91\ 10^{-8}$	$4.86\ 10^{-9}$	$6.41\ 10^{-8}$	**$4.26\ 10^{-8}$**
In-115m	$2\ 10^{-2}$	$2.20\ 10^{-11}$	$3.16\ 10^{-12}$	$1.03\ 10^{-12}$	$6.11\ 10^{-12}$	$2.19\ 10^{-12}$	$1.86\ 10^{-13}$	$2.88\ 10^{-10}$	**$9.33\ 10^{-11}$**
In-116m	$2\ 10^{-2}$	$3.19\ 10^{-11}$	$8.64\ 10^{-12}$	$5.73\ 10^{-12}$	$1.01\ 10^{-11}$	$4.04\ 10^{-12}$	$7.07\ 10^{-13}$	$1.60\ 10^{-10}$	**$5.93\ 10^{-11}$**
In-117	$2\ 10^{-2}$	$7.82\ 10^{-12}$	$2.15\ 10^{-12}$	$1.54\ 10^{-12}$	$2.88\ 10^{-12}$	$1.12\ 10^{-12}$	$1.38\ 10^{-13}$	$7.68\ 10^{-11}$	**$2.59\ 10^{-11}$**
In-117m	$2\ 10^{-2}$	$2.19\ 10^{-11}$	$3.60\ 10^{-12}$	$1.34\ 10^{-12}$	$6.31\ 10^{-12}$	$2.23\ 10^{-12}$	$2.12\ 10^{-13}$	$3.61\ 10^{-10}$	**$1.15\ 10^{-10}$**
In-119m	$2\ 10^{-2}$	$8.74\ 10^{-14}$	$3.42\ 10^{-14}$	$3.11\ 10^{-14}$	$3.70\ 10^{-14}$	$1.77\ 10^{-14}$	$4.99\ 10^{-15}$	$9.58\ 10^{-11}$ **$3.70\ 10^{-10}$**	$2.88\ 10^{-11}$ ST wall

Table 2.2, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Tin									
Sn-110	$2\ 10^{-2}$	$2.13\ 10^{-10}$	$3.06\ 10^{-11}$	$8.68\ 10^{-12}$	$4.86\ 10^{-11}$	$1.72\ 10^{-11}$	$1.50\ 10^{-12}$	$1.16\ 10^{-9}$	**$4.13\ 10^{-10}$**
Sn-111	$2\ 10^{-2}$	$7.42\ 10^{-12}$	$1.58\ 10^{-12}$	$9.98\ 10^{-13}$	$2.23\ 10^{-12}$	$9.70\ 10^{-13}$	$1.06\ 10^{-13}$	$5.66\ 10^{-11}$	**$1.95\ 10^{-11}$**
Sn-113	$2\ 10^{-2}$	$3.88\ 10^{-10}$	$5.68\ 10^{-11}$	$2.54\ 10^{-11}$	$1.78\ 10^{-10}$	$2.34\ 10^{-10}$	$2.16\ 10^{-11}$	$2.32\ 10^{-9}$ **$7.91\ 10^{-9}$**	$8.33\ 10^{-10}$ LLI wall
Sn-117m	$2\ 10^{-2}$	$2.23\ 10^{-10}$	$2.39\ 10^{-11}$	$5.50\ 10^{-12}$	$1.03\ 10^{-10}$	$4.78\ 10^{-10}$	$3.03\ 10^{-12}$	$2.37\ 10^{-9}$ **$7.94\ 10^{-9}$**	$7.97\ 10^{-10}$ LLI wall
Sn-119m	$2\ 10^{-2}$	$4.11\ 10^{-11}$	$1.05\ 10^{-11}$	$9.20\ 10^{-12}$	$8.07\ 10^{-11}$	$1.82\ 10^{-10}$	$8.89\ 10^{-12}$	$1.16\ 10^{-9}$ **$4.04\ 10^{-9}$**	$3.76\ 10^{-10}$ LLI wall
Sn-121	$2\ 10^{-2}$	$2.00\ 10^{-13}$	$2.00\ 10^{-13}$	$2.00\ 10^{-13}$	$2.23\ 10^{-12}$	$2.51\ 10^{-11}$	$2.00\ 10^{-13}$	$8.09\ 10^{-10}$ **$2.36\ 10^{-9}$**	$2.44\ 10^{-10}$ LLI wall
Sn-121m	$2\ 10^{-2}$	$4.31\ 10^{-11}$	$2.95\ 10^{-11}$	$2.90\ 10^{-11}$	$2.32\ 10^{-10}$	$6.12\ 10^{-10}$	$2.86\ 10^{-11}$	$1.18\ 10^{-9}$ **$4.47\ 10^{-9}$**	$4.19\ 10^{-10}$ LLI wall
Sn-123	$2\ 10^{-2}$	$3.80\ 10^{-11}$	$3.22\ 10^{-11}$	$3.15\ 10^{-11}$	$2.41\ 10^{-10}$	$6.62\ 10^{-10}$	$3.13\ 10^{-11}$	$7.35\ 10^{-9}$ **$2.59\ 10^{-8}$**	$2.27\ 10^{-9}$ LLI wall
Sn-123m	$2\ 10^{-2}$	$1.62\ 10^{-12}$	$4.25\ 10^{-13}$	$2.90\ 10^{-13}$	$7.72\ 10^{-13}$	$2.98\ 10^{-13}$	$2.38\ 10^{-14}$	$9.57\ 10^{-11}$	**$2.93\ 10^{-11}$**
Sn-125	$2\ 10^{-2}$	$2.88\ 10^{-10}$	$4.41\ 10^{-11}$	$1.60\ 10^{-11}$	$2.08\ 10^{-10}$	$2.38\ 10^{-10}$	$9.78\ 10^{-12}$	$1.07\ 10^{-8}$ **$3.67\ 10^{-8}$**	$3.33\ 10^{-9}$ LLI wall
Sn-126	$2\ 10^{-2}$	$2.41\ 10^{-9}$	$7.96\ 10^{-10}$	$5.99\ 10^{-10}$	$2.72\ 10^{-9}$	$5.06\ 10^{-9}$	$5.51\ 10^{-10}$	$1.33\ 10^{-8}$	**$5.27\ 10^{-9}$**
Sn-127	$2\ 10^{-2}$	$9.21\ 10^{-11}$	$1.75\ 10^{-11}$	$7.98\ 10^{-12}$	$2.48\ 10^{-11}$	$1.03\ 10^{-11}$	$1.20\ 10^{-12}$	$6.01\ 10^{-10}$	**$2.10\ 10^{-10}$**
Sn-128	$2\ 10^{-2}$	$5.00\ 10^{-11}$	$1.10\ 10^{-11}$	$6.34\ 10^{-12}$	$1.49\ 10^{-11}$	$5.57\ 10^{-12}$	$6.83\ 10^{-13}$	$4.39\ 10^{-10}$	**$1.49\ 10^{-10}$**
Antimony									
Sb-115	$1\ 10^{-1}$	$5.96\ 10^{-12}$	$2.02\ 10^{-12}$	$1.66\ 10^{-12}$	$2.28\ 10^{-12}$	$9.55\ 10^{-13}$	$1.68\ 10^{-13}$	$5.72\ 10^{-11}$	**$1.95\ 10^{-11}$**
	$1\ 10^{-2}$	$6.02\ 10^{-12}$	$2.01\ 10^{-12}$	$1.64\ 10^{-12}$	$2.28\ 10^{-12}$	$9.36\ 10^{-13}$	$1.45\ 10^{-13}$	$5.75\ 10^{-11}$	**$1.96\ 10^{-11}$**
Sb-116	$1\ 10^{-1}$	$4.76\ 10^{-12}$	$2.18\ 10^{-12}$	$2.10\ 10^{-12}$	$2.05\ 10^{-12}$	$9.67\ 10^{-13}$	$2.29\ 10^{-13}$	$5.64\ 10^{-11}$ **$1.91\ 10^{-10}$**	$1.90\ 10^{-11}$ ST wall
	$1\ 10^{-2}$	$4.78\ 10^{-12}$	$2.18\ 10^{-12}$	$2.09\ 10^{-12}$	$2.04\ 10^{-12}$	$9.62\ 10^{-13}$	$2.21\ 10^{-13}$	$5.65\ 10^{-11}$ **$1.91\ 10^{-10}$**	$1.90\ 10^{-11}$ ST wall
Sb-116m	$1\ 10^{-1}$	$5.02\ 10^{-11}$	$1.27\ 10^{-11}$	$8.22\ 10^{-12}$	$1.56\ 10^{-11}$	$6.25\ 10^{-12}$	$1.10\ 10^{-12}$	$1.62\ 10^{-10}$	**$6.62\ 10^{-11}$**
	$1\ 10^{-2}$	$5.12\ 10^{-11}$	$1.27\ 10^{-11}$	$8.05\ 10^{-12}$	$1.57\ 10^{-11}$	$6.09\ 10^{-12}$	$8.94\ 10^{-13}$	$1.64\ 10^{-10}$	**$6.70\ 10^{-11}$**
Sb-117	$1\ 10^{-1}$	$1.49\ 10^{-11}$	$2.36\ 10^{-12}$	$9.26\ 10^{-13}$	$5.03\ 10^{-12}$	$2.00\ 10^{-12}$	$1.65\ 10^{-13}$	$5.09\ 10^{-11}$	**$2.01\ 10^{-11}$**
	$1\ 10^{-2}$	$1.55\ 10^{-11}$	$2.34\ 10^{-12}$	$8.14\ 10^{-13}$	$5.04\ 10^{-12}$	$1.67\ 10^{-12}$	$6.35\ 10^{-14}$	$5.28\ 10^{-11}$	**$2.08\ 10^{-11}$**
Sb-118m	$1\ 10^{-1}$	$2.85\ 10^{-10}$	$5.04\ 10^{-11}$	$1.93\ 10^{-11}$	$7.36\ 10^{-11}$	$2.84\ 10^{-11}$	$4.81\ 10^{-12}$	$5.11\ 10^{-10}$	**$2.44\ 10^{-10}$**
	$1\ 10^{-2}$	$3.00\ 10^{-10}$	$5.06\ 10^{-11}$	$1.75\ 10^{-11}$	$7.47\ 10^{-11}$	$2.62\ 10^{-11}$	$2.48\ 10^{-12}$	$5.37\ 10^{-10}$	**$2.56\ 10^{-10}$**
Sb-119	$1\ 10^{-1}$	$3.57\ 10^{-11}$	$2.80\ 10^{-12}$	$1.14\ 10^{-12}$	$1.13\ 10^{-11}$	$2.04\ 10^{-11}$	$9.51\ 10^{-13}$	$2.61\ 10^{-10}$	**$8.97\ 10^{-11}$**
	$1\ 10^{-2}$	$3.81\ 10^{-11}$	$2.11\ 10^{-12}$	$1.84\ 10^{-13}$	$9.06\ 10^{-12}$	$4.01\ 10^{-12}$	$9.45\ 10^{-14}$	$2.84\ 10^{-10}$	**$9.62\ 10^{-11}$**
Sb-120 15.89 m	$1\ 10^{-1}$	$1.00\ 10^{-12}$	$4.97\ 10^{-13}$	$4.91\ 10^{-13}$	$4.93\ 10^{-13}$	$2.26\ 10^{-13}$	$4.48\ 10^{-14}$	$3.01\ 10^{-11}$ **$1.12\ 10^{-10}$**	$9.49\ 10^{-12}$ ST wall
	$1\ 10^{-2}$	$1.01\ 10^{-12}$	$4.95\ 10^{-13}$	$4.88\ 10^{-13}$	$4.91\ 10^{-13}$	$2.23\ 10^{-13}$	$4.13\ 10^{-14}$	$3.02\ 10^{-11}$ **$1.12\ 10^{-10}$**	$9.51\ 10^{-12}$ ST wall
Sb-120 5.76 d	$1\ 10^{-1}$	$2.03\ 10^{-9}$	$2.98\ 10^{-10}$	$1.04\ 10^{-10}$	$5.04\ 10^{-10}$	$2.89\ 10^{-10}$	$5.57\ 10^{-11}$	$2.76\ 10^{-9}$ **$1.12\ 10^{-10}$**	$1.46\ 10^{-9}$ ST wall
	$1\ 10^{-2}$	$2.18\ 10^{-9}$	$2.73\ 10^{-10}$	$5.66\ 10^{-11}$	$4.70\ 10^{-10}$	$1.69\ 10^{-10}$	$1.22\ 10^{-11}$	$2.96\ 10^{-9}$ **$1.12\ 10^{-10}$**	$1.54\ 10^{-9}$ ST wall
Sb-122	$1\ 10^{-1}$	$3.49\ 10^{-10}$	$6.29\ 10^{-11}$	$3.12\ 10^{-11}$	$1.45\ 10^{-10}$	$9.62\ 10^{-11}$	$2.40\ 10^{-11}$	$5.69\ 10^{-9}$ **$1.80\ 10^{-8}$**	$1.83\ 10^{-9}$ LLI wall
	$1\ 10^{-2}$	$3.59\ 10^{-10}$	$4.54\ 10^{-11}$	$9.93\ 10^{-12}$	$7.90\ 10^{-11}$	$3.13\ 10^{-11}$	$3.27\ 10^{-12}$	$6.20\ 10^{-9}$ **$1.97\ 10^{-8}$**	$1.97\ 10^{-9}$ LLI wall
Sb-124	$1\ 10^{-1}$	$1.74\ 10^{-9}$	$3.21\ 10^{-10}$	$1.65\ 10^{-10}$	$6.16\ 10^{-10}$	$7.99\ 10^{-10}$	$1.18\ 10^{-10}$	$6.81\ 10^{-9}$	**$2.65\ 10^{-9}$**
	$1\ 10^{-2}$	$1.78\ 10^{-9}$	$2.30\ 10^{-10}$	$5.40\ 10^{-11}$	$3.81\ 10^{-10}$	$1.89\ 10^{-10}$	$1.76\ 10^{-11}$	$7.34\ 10^{-9}$	**$2.74\ 10^{-9}$**

Table 2.2, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Sb-124m	$1\ 10^{-1}$	$1.58\ 10^{-12}$	$5.55\ 10^{-13}$	$4.79\ 10^{-13}$	$6.35\ 10^{-13}$	$3.77\ 10^{-13}$	$6.51\ 10^{-14}$	$1.75\ 10^{-11}$ **$5.37\ 10^{-11}$**	$5.88\ 10^{-12}$ ST wall
	$1\ 10^{-2}$	$1.60\ 10^{-12}$	$5.37\ 10^{-13}$	$4.55\ 10^{-13}$	$5.90\ 10^{-13}$	$2.60\ 10^{-13}$	$4.29\ 10^{-14}$	$1.77\ 10^{-11}$	**$5.91\ 10^{-12}$**
Sb-125	$1\ 10^{-1}$	$5.24\ 10^{-10}$	$1.00\ 10^{-10}$	$6.03\ 10^{-11}$	$2.26\ 10^{-10}$	$5.86\ 10^{-10}$	$4.62\ 10^{-11}$	$1.86\ 10^{-9}$	**$7.59\ 10^{-10}$**
	$1\ 10^{-2}$	$5.27\ 10^{-10}$	$6.22\ 10^{-11}$	$1.36\ 10^{-11}$	$1.21\ 10^{-10}$	$9.05\ 10^{-11}$	$5.58\ 10^{-12}$	$1.99\ 10^{-9}$	**$7.57\ 10^{-10}$**
Sb-126	$1\ 10^{-1}$	$2.73\ 10^{-9}$	$4.17\ 10^{-10}$	$1.66\ 10^{-10}$	$7.23\ 10^{-10}$	$5.17\ 10^{-10}$	$1.05\ 10^{-10}$	$6.29\ 10^{-9}$	**$2.76\ 10^{-9}$**
	$1\ 10^{-2}$	$2.89\ 10^{-9}$	$3.53\ 10^{-10}$	$6.85\ 10^{-11}$	$5.93\ 10^{-10}$	$2.27\ 10^{-10}$	$1.74\ 10^{-11}$	$6.77\ 10^{-9}$	**$2.89\ 10^{-9}$**
Sb-126m	$1\ 10^{-1}$	$5.24\ 10^{-12}$	$2.07\ 10^{-12}$	$1.91\ 10^{-12}$	$2.18\ 10^{-12}$	$1.01\ 10^{-12}$	$1.99\ 10^{-13}$	$7.72\ 10^{-11}$ **$2.64\ 10^{-10}$**	$2.53\ 10^{-11}$ ST wall
	$1\ 10^{-2}$	$5.29\ 10^{-12}$	$2.06\ 10^{-12}$	$1.88\ 10^{-12}$	$2.16\ 10^{-12}$	$9.53\ 10^{-13}$	$1.73\ 10^{-13}$	$7.74\ 10^{-11}$ **$2.64\ 10^{-10}$**	$2.54\ 10^{-11}$ ST wall
Sb-127	$1\ 10^{-1}$	$5.88\ 10^{-10}$	$9.76\ 10^{-11}$	$4.38\ 10^{-11}$	$2.11\ 10^{-10}$	$1.50\ 10^{-10}$	$3.16\ 10^{-11}$	$5.39\ 10^{-9}$ **$1.79\ 10^{-8}$**	$1.81\ 10^{-9}$ LLI wall
	$1\ 10^{-2}$	$6.14\ 10^{-10}$	$7.60\ 10^{-11}$	$1.57\ 10^{-11}$	$1.33\ 10^{-10}$	$5.24\ 10^{-11}$	$4.64\ 10^{-12}$	$5.87\ 10^{-9}$ **$1.96\ 10^{-8}$**	$1.95\ 10^{-9}$ LLI wall
Sb-128 10.4 m	$1\ 10^{-1}$	$3.92\ 10^{-12}$	$2.15\ 10^{-12}$	$2.27\ 10^{-12}$	$1.97\ 10^{-12}$	$9.59\ 10^{-13}$	$2.12\ 10^{-13}$	$4.70\ 10^{-11}$ **$1.63\ 10^{-10}$**	$1.59\ 10^{-11}$ ST wall
	$1\ 10^{-2}$	$3.93\ 10^{-12}$	$2.15\ 10^{-12}$	$2.27\ 10^{-12}$	$1.97\ 10^{-12}$	$9.57\ 10^{-13}$	$2.09\ 10^{-13}$	$4.70\ 10^{-11}$ **$1.63\ 10^{-10}$**	$1.59\ 10^{-11}$ ST wall
Sb-128 9.01 h	$1\ 10^{-1}$	$4.53\ 10^{-10}$	$7.22\ 10^{-11}$	$2.70\ 10^{-11}$	$1.17\ 10^{-10}$	$5.14\ 10^{-11}$	$1.14\ 10^{-11}$	$3.27\ 10^{-9}$ **$1.63\ 10^{-10}$**	$1.13\ 10^{-9}$ ST wall
	$1\ 10^{-2}$	$4.78\ 10^{-10}$	$6.81\ 10^{-11}$	$1.91\ 10^{-11}$	$1.06\ 10^{-10}$	$3.73\ 10^{-11}$	$3.10\ 10^{-12}$	$3.49\ 10^{-9}$ **$1.63\ 10^{-10}$**	$1.19\ 10^{-9}$ ST wall
Sb-129	$1\ 10^{-1}$	$1.46\ 10^{-10}$	$2.74\ 10^{-11}$	$1.22\ 10^{-11}$	$4.04\ 10^{-11}$	$1.95\ 10^{-11}$	$4.45\ 10^{-12}$	$1.38\ 10^{-9}$	**$4.61\ 10^{-10}$**
	$1\ 10^{-2}$	$1.51\ 10^{-10}$	$2.56\ 10^{-11}$	$9.39\ 10^{-12}$	$3.67\ 10^{-11}$	$1.34\ 10^{-11}$	$1.47\ 10^{-12}$	$1.45\ 10^{-9}$	**$4.84\ 10^{-10}$**
Sb-130	$1\ 10^{-1}$	$3.10\ 10^{-11}$	$8.87\ 10^{-12}$	$6.60\ 10^{-12}$	$1.04\ 10^{-11}$	$4.30\ 10^{-12}$	$7.94\ 10^{-13}$	$2.22\ 10^{-10}$	**$7.77\ 10^{-11}$**
	$1\ 10^{-2}$	$3.14\ 10^{-11}$	$8.82\ 10^{-12}$	$6.49\ 10^{-12}$	$1.04\ 10^{-11}$	$4.20\ 10^{-12}$	$6.66\ 10^{-13}$	$2.23\ 10^{-10}$	**$7.83\ 10^{-11}$**
Sb-131	$1\ 10^{-1}$	$1.12\ 10^{-11}$	$3.79\ 10^{-12}$	$3.07\ 10^{-12}$	$4.18\ 10^{-12}$	$2.01\ 10^{-12}$	**$9.08\ 10^{-10}$**	$1.67\ 10^{-10}$	$8.18\ 10^{-11}$
	$1\ 10^{-2}$	$1.13\ 10^{-11}$	$3.73\ 10^{-12}$	$3.00\ 10^{-12}$	$4.11\ 10^{-12}$	$1.84\ 10^{-12}$	**$9.07\ 10^{-10}$**	$1.69\ 10^{-10}$	$8.21\ 10^{-11}$
Tellurium									
Te-116	$2\ 10^{-1}$	$1.12\ 10^{-10}$	$2.31\ 10^{-11}$	$1.11\ 10^{-11}$	$3.22\ 10^{-11}$	$1.41\ 10^{-11}$	$4.05\ 10^{-12}$	$5.28\ 10^{-10}$	**$1.96\ 10^{-10}$**
Te-121	$2\ 10^{-1}$	$6.00\ 10^{-10}$	$1.31\ 10^{-10}$	$8.03\ 10^{-11}$	$2.91\ 10^{-10}$	$4.29\ 10^{-10}$	$7.11\ 10^{-11}$	$7.50\ 10^{-10}$	**$4.54\ 10^{-10}$**
Te-121m	$2\ 10^{-1}$	$7.23\ 10^{-10}$	$5.07\ 10^{-10}$	$4.48\ 10^{-10}$	$3.77\ 10^{-9}$	**$2.74\ 10^{-8}$**	$4.40\ 10^{-10}$	$1.62\ 10^{-9}$	$2.08\ 10^{-9}$
Te-123	$2\ 10^{-1}$	$3.16\ 10^{-12}$	$2.74\ 10^{-12}$	$2.63\ 10^{-12}$	$2.31\ 10^{-9}$	**$2.81\ 10^{-8}$**	$1.99\ 10^{-12}$	$3.70\ 10^{-11}$	$1.13\ 10^{-9}$
Te-123m	$2\ 10^{-1}$	$2.75\ 10^{-10}$	$1.26\ 10^{-10}$	$1.10\ 10^{-10}$	$2.33\ 10^{-9}$	**$2.41\ 10^{-8}$**	$9.44\ 10^{-11}$	$1.42\ 10^{-9}$	$1.53\ 10^{-9}$
Te-125m	$2\ 10^{-1}$	$1.27\ 10^{-10}$	$4.64\ 10^{-11}$	$4.36\ 10^{-11}$	$1.21\ 10^{-9}$	**$1.27\ 10^{-8}$**	$3.93\ 10^{-11}$	$1.40\ 10^{-9}$	$9.92\ 10^{-10}$
Te-127	$2\ 10^{-1}$	$4.02\ 10^{-12}$	$3.00\ 10^{-12}$	$2.89\ 10^{-12}$	$6.57\ 10^{-12}$	$6.46\ 10^{-12}$	$2.86\ 10^{-12}$	$6.13\ 10^{-10}$	**$1.87\ 10^{-10}$**
Te-127m	$2\ 10^{-1}$	$1.25\ 10^{-10}$	$9.74\ 10^{-11}$	$9.62\ 10^{-11}$	$5.43\ 10^{-9}$	$2.07\ 10^{-8}$	$9.43\ 10^{-11}$	$2.98\ 10^{-9}$	**$2.23\ 10^{-9}$**
Te-129	$2\ 10^{-1}$	$1.59\ 10^{-12}$	$6.05\ 10^{-13}$	$4.91\ 10^{-13}$	$7.64\ 10^{-13}$	$5.40\ 10^{-13}$	$3.36\ 10^{-13}$	$1.79\ 10^{-10}$	**$5.45\ 10^{-11}$**
Te-129m	$2\ 10^{-1}$	$2.41\ 10^{-10}$	$1.66\ 10^{-10}$	$1.59\ 10^{-10}$	$3.50\ 10^{-9}$	$7.99\ 10^{-9}$	$1.57\ 10^{-10}$	$7.08\ 10^{-9}$	**$2.89\ 10^{-9}$**
Te-131	$2\ 10^{-1}$	$1.57\ 10^{-11}$	$4.96\ 10^{-12}$	$3.39\ 10^{-12}$	$6.60\ 10^{-12}$	$3.69\ 10^{-12}$	**$4.21\ 10^{-9}$**	$3.73\ 10^{-10}$	$2.44\ 10^{-10}$
Te-131m	$2\ 10^{-1}$	$7.38\ 10^{-10}$	$1.35\ 10^{-10}$	$6.26\ 10^{-11}$	$2.42\ 10^{-10}$	$3.24\ 10^{-10}$	**$4.29\ 10^{-8}$**	$3.07\ 10^{-9}$	$2.46\ 10^{-9}$
Te-132	$2\ 10^{-1}$	$5.41\ 10^{-10}$	$3.50\ 10^{-10}$	$3.30\ 10^{-10}$	$4.44\ 10^{-10}$	$8.30\ 10^{-10}$	**$5.95\ 10^{-8}$**	$1.49\ 10^{-9}$	$2.54\ 10^{-9}$
Te-133	$2\ 10^{-1}$	$1.85\ 10^{-12}$	$1.23\ 10^{-12}$	$1.22\ 10^{-12}$	$1.18\ 10^{-12}$	$7.73\ 10^{-13}$	**$9.39\ 10^{-10}$**	$6.05\ 10^{-11}$	$4.73\ 10^{-11}$
Te-133m	$2\ 10^{-1}$	$3.68\ 10^{-11}$	$1.14\ 10^{-11}$	$8.33\ 10^{-12}$	$1.31\ 10^{-11}$	$6.61\ 10^{-12}$	**$4.17\ 10^{-9}$**	$2.89\ 10^{-10}$	$2.26\ 10^{-10}$
Te-134	$2\ 10^{-1}$	$2.03\ 10^{-11}$	$1.37\ 10^{-11}$	$1.29\ 10^{-11}$	$1.49\ 10^{-11}$	$1.23\ 10^{-11}$	**$8.82\ 10^{-10}$**	$9.65\ 10^{-11}$	$6.63\ 10^{-11}$
Iodine									
I-120	1.0	$2.46\ 10^{-11}$	$2.49\ 10^{-11}$	$2.61\ 10^{-11}$	$2.42\ 10^{-11}$	$2.21\ 10^{-11}$	**$3.45\ 10^{-9}$**	$2.92\ 10^{-10}$	$2.08\ 10^{-10}$
I-120m	1.0	$2.20\ 10^{-11}$	$2.33\ 10^{-11}$	$2.53\ 10^{-11}$	$2.19\ 10^{-11}$	$1.87\ 10^{-11}$	**$1.26\ 10^{-9}$**	$2.69\ 10^{-10}$	$1.34\ 10^{-10}$

Table 2.2, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
I-121	1.0	4.32 10^{-12}	5.99 10^{-12}	5.91 10^{-12}	5.83 10^{-12}	5.12 10^{-12}	**1.37 10^{-9}**	3.10 10^{-11}	5.39 10^{-11}
I-123	1.0	5.61 10^{-12}	7.23 10^{-12}	6.66 10^{-12}	8.68 10^{-12}	7.65 10^{-12}	**4.42 10^{-9}**	2.01 10^{-11}	1.43 10^{-10}
I-124	1.0	5.67 10^{-11}	1.72 10^{-10}	1.44 10^{-10}	1.25 10^{-10}	1.14 10^{-10}	**2.82 10^{-7}**	2.20 10^{-10}	8.60 10^{-9}
I-125	1.0	2.93 10^{-11}	1.45 10^{-10}	4.08 10^{-11}	6.82 10^{-11}	6.63 10^{-11}	**3.44 10^{-7}**	5.80 10^{-11}	1.04 10^{-8}
I-126	1.0	5.55 10^{-11}	2.12 10^{-10}	1.72 10^{-10}	1.50 10^{-10}	1.38 10^{-10}	**6.36 10^{-7}**	2.15 10^{-10}	1.92 10^{-8}
I-128	1.0	1.39 10^{-12}	1.44 10^{-12}	1.47 10^{-12}	1.43 10^{-12}	1.39 10^{-12}	1.08 10^{-10}	6.71 10^{-11} **3.28 10^{-10}**	2.43 10^{-11} ST wall
I-129	1.0	1.38 10^{-10}	3.31 10^{-10}	1.65 10^{-10}	2.21 10^{-10}	2.17 10^{-10}	**2.48 10^{-6}**	1.99 10^{-10}	7.46 10^{-8}
I-130	1.0	5.52 10^{-11}	7.32 10^{-11}	7.18 10^{-11}	6.74 10^{-11}	6.12 10^{-11}	**3.94 10^{-8}**	1.97 10^{-10}	1.28 10^{-9}
I-131	1.0	4.07 10^{-11}	1.21 10^{-10}	1.02 10^{-10}	9.44 10^{-11}	8.72 10^{-11}	**4.76 10^{-7}**	1.57 10^{-10}	1.44 10^{-8}
I-132	1.0	2.33 10^{-11}	2.52 10^{-11}	2.64 10^{-11}	2.46 10^{-11}	2.19 10^{-11}	**3.87 10^{-9}**	1.65 10^{-10}	1.82 10^{-10}
I-132m	1.0	1.45 10^{-11}	1.54 10^{-11}	1.57 10^{-11}	1.54 10^{-11}	1.42 10^{-11}	**3.69 10^{-9}**	7.13 10^{-11}	1.42 10^{-10}
I-133	1.0	3.63 10^{-11}	4.68 10^{-11}	4.53 10^{-11}	4.30 10^{-11}	4.07 10^{-11}	**9.10 10^{-8}**	1.55 10^{-10}	2.80 10^{-9}
I-134	1.0	1.10 10^{-11}	1.17 10^{-11}	1.26 10^{-11}	1.09 10^{-11}	9.32 10^{-12}	**6.21 10^{-10}**	1.34 10^{-10}	6.66 10^{-11}
I-135	1.0	3.61 10^{-11}	3.85 10^{-11}	3.75 10^{-11}	3.65 10^{-11}	3.36 10^{-11}	**1.79 10^{-8}**	1.54 10^{-10}	6.08 10^{-10}
Cesium									
Cs-125	1.0	3.30 10^{-12}	3.70 10^{-12}	4.08 10^{-12}	3.67 10^{-12}	3.24 10^{-12}	2.80 10^{-12}	5.69 10^{-11} **2.49 10^{-10}**	1.96 10^{-11} ST wall
Cs-127	1.0	1.50 10^{-11}	1.34 10^{-11}	1.46 10^{-11}	1.66 10^{-11}	1.48 10^{-11}	1.20 10^{-11}	3.64 10^{-11}	**2.12 10^{-11}**
Cs-129	1.0	5.42 10^{-11}	4.58 10^{-11}	5.00 10^{-11}	6.29 10^{-11}	5.65 10^{-11}	4.32 10^{-11}	7.30 10^{-11}	**5.89 10^{-11}**
Cs-130	1.0	1.73 10^{-12}	2.02 10^{-12}	2.24 10^{-12}	1.95 10^{-12}	1.72 10^{-12}	1.49 10^{-12}	4.71 10^{-11} **2.15 10^{-10}**	1.55 10^{-11} ST wall
Cs-131	1.0	6.12 10^{-11}	5.26 10^{-11}	6.22 10^{-11}	9.96 10^{-11}	8.96 10^{-11}	4.86 10^{-11}	6.64 10^{-11}	**6.67 10^{-11}**
Cs-132	1.0	5.24 10^{-10}	4.27 10^{-10}	4.49 10^{-10}	5.06 10^{-10}	4.60 10^{-10}	4.33 10^{-10}	5.84 10^{-10}	**5.12 10^{-10}**
Cs-134	1.0	2.06 10^{-8}	1.72 10^{-8}	1.76 10^{-8}	1.87 10^{-8}	1.74 10^{-8}	1.76 10^{-8}	2.21 10^{-8}	**1.98 10^{-8}**
Cs-134m	1.0	6.72 10^{-12}	6.28 10^{-12}	6.42 10^{-12}	6.91 10^{-12}	6.57 10^{-12}	6.22 10^{-12}	2.89 10^{-11} **1.15 10^{-10}**	1.33 10^{-11} ST wall
Cs-135	1.0	1.91 10^{-9}	1.91 10^{-9}	1.91 10^{-9}	1.91 10^{-9}	1.91 10^{-9}	1.91 10^{-9}	1.93 10^{-9}	**1.91 10^{-9}**
Cs-135m	1.0	5.30 10^{-12}	5.76 10^{-12}	6.45 10^{-12}	5.42 10^{-12}	4.39 10^{-12}	3.84 10^{-12}	3.73 10^{-11}	**1.50 10^{-11}**
Cs-136	1.0	3.04 10^{-9}	2.65 10^{-9}	2.62 10^{-9}	2.95 10^{-9}	2.71 10^{-9}	2.74 10^{-9}	3.52 10^{-9}	**3.04 10^{-9}**
Cs-137	1.0	1.39 10^{-8}	1.24 10^{-8}	1.27 10^{-8}	1.32 10^{-8}	1.26 10^{-8}	1.26 10^{-8}	1.45 10^{-8}	**1.35 10^{-8}**
Cs-138	1.0	8.00 10^{-12}	8.00 10^{-12}	8.53 10^{-12}	7.37 10^{-12}	6.47 10^{-12}	5.73 10^{-12}	1.57 10^{-10} **7.01 10^{-10}**	5.25 10^{-11} ST wall
Barium									
Ba-126	1 10^{-1}	4.31 10^{-11}	9.15 10^{-12}	5.08 10^{-12}	1.28 10^{-11}	5.01 10^{-12}	1.13 10^{-12}	7.70 10^{-10}	**2.46 10^{-10}**
Ba-128	1 10^{-1}	7.78 10^{-10}	1.04 10^{-10}	3.19 10^{-11}	2.25 10^{-10}	1.22 10^{-10}	1.90 10^{-11}	8.66 10^{-9}	**2.84 10^{-9}**
Ba-131	1 10^{-1}	5.23 10^{-10}	6.30 10^{-11}	1.69 10^{-11}	1.47 10^{-10}	1.80 10^{-10}	9.37 10^{-12}	1.11 10^{-9}	**4.98 10^{-10}**
Ba-131m	1 10^{-1}	6.55 10^{-13}	1.45 10^{-13}	9.87 10^{-14}	2.77 10^{-13}	2.19 10^{-13}	1.15 10^{-14}	1.01 10^{-11} **3.61 10^{-11}**	3.28 10^{-12} ST wall
Ba-133	1 10^{-1}	7.33 10^{-10}	2.73 10^{-10}	2.19 10^{-10}	1.46 10^{-9}	1.97 10^{-9}	2.03 10^{-10}	1.43 10^{-9}	**9.19 10^{-10}**
Ba-133m	1 10^{-1}	6.55 10^{-11}	8.54 10^{-12}	3.61 10^{-12}	2.79 10^{-11}	2.70 10^{-11}	2.88 10^{-12}	1.81 10^{-9} **5.47 10^{-9}**	5.66 10^{-10} LLI wall
Ba-135m	1 10^{-1}	5.24 10^{-11}	6.74 10^{-12}	2.79 10^{-12}	2.10 10^{-11}	1.25 10^{-11}	2.19 10^{-12}	1.47 10^{-9}	**4.60 10^{-10}**
Ba-139	1 10^{-1}	1.56 10^{-12}	5.17 10^{-13}	3.89 10^{-13}	8.59 10^{-13}	4.38 10^{-13}	2.66 10^{-13}	3.57 10^{-10}	**1.08 10^{-10}**
Ba-140	1 10^{-1}	9.96 10^{-10}	1.59 10^{-10}	6.63 10^{-11}	4.39 10^{-10}	5.53 10^{-10}	5.25 10^{-11}	7.37 10^{-9} **2.64 10^{-8}**	2.56 10^{-9} LLI wall
Ba-141	1 10^{-1}	2.86 10^{-12}	1.22 10^{-12}	1.10 10^{-12}	1.47 10^{-12}	1.27 10^{-12}	2.25 10^{-13}	1.84 10^{-10}	**5.65 10^{-11}**
Ba-142	1 10^{-1}	9.88 10^{-12}	2.52 10^{-12}	1.67 10^{-12}	3.00 10^{-12}	1.24 10^{-12}	2.71 10^{-13}	8.89 10^{-11}	**3.01 10^{-11}**

Table 2.2, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Lanthanum									
La-131	$1\ 10^{-3}$	$1.39\ 10^{-11}$	$3.05\ 10^{-12}$	$1.81\ 10^{-12}$	$4.43\ 10^{-12}$	$1.63\ 10^{-12}$	$1.55\ 10^{-13}$	$9.15\ 10^{-11}$	**$3.22\ 10^{-11}$**
La-132	$1\ 10^{-3}$	$2.40\ 10^{-10}$	$3.77\ 10^{-11}$	$1.30\ 10^{-11}$	$5.56\ 10^{-11}$	$1.93\ 10^{-11}$	$1.67\ 10^{-12}$	$1.19\ 10^{-9}$	**$4.30\ 10^{-10}$**
La-135	$1\ 10^{-3}$	$3.38\ 10^{-11}$	$2.71\ 10^{-12}$	$2.73\ 10^{-13}$	$9.96\ 10^{-12}$	$2.68\ 10^{-12}$	$1.79\ 10^{-14}$	$8.81\ 10^{-11}$	**$3.66\ 10^{-11}$**
La-137	$1\ 10^{-3}$	$7.82\ 10^{-11}$	$1.55\ 10^{-11}$	$2.25\ 10^{-11}$	$7.05\ 10^{-11}$	$2.15\ 10^{-10}$	$5.23\ 10^{-12}$	$2.76\ 10^{-10}$	**$1.23\ 10^{-10}$**
La-138	$1\ 10^{-3}$	$1.50\ 10^{-9}$	$4.79\ 10^{-10}$	$5.61\ 10^{-10}$	$7.53\ 10^{-10}$	$1.39\ 10^{-9}$	$1.80\ 10^{-10}$	$3.14\ 10^{-9}$	**$1.59\ 10^{-9}$**
La-140	$1\ 10^{-3}$	$1.34\ 10^{-9}$	$1.80\ 10^{-10}$	$4.01\ 10^{-11}$	$2.81\ 10^{-10}$	$9.77\ 10^{-11}$	$6.40\ 10^{-12}$	$6.26\ 10^{-9}$	**$2.28\ 10^{-9}$**
La-141	$1\ 10^{-3}$	$3.77\ 10^{-12}$	$7.07\ 10^{-13}$	$2.72\ 10^{-13}$	$1.07\ 10^{-12}$	$6.06\ 10^{-13}$	$5.29\ 10^{-14}$	$1.24\ 10^{-9}$	**$3.74\ 10^{-10}$**
La-142	$1\ 10^{-3}$	$6.99\ 10^{-11}$	$1.54\ 10^{-11}$	$8.40\ 10^{-12}$	$1.93\ 10^{-11}$	$7.40\ 10^{-12}$	$1.16\ 10^{-12}$	$5.20\ 10^{-10}$	**$1.79\ 10^{-10}$**
La-143	$1\ 10^{-3}$	$1.70\ 10^{-12}$	$2.49\ 10^{-13}$	$1.07\ 10^{-13}$	$4.44\ 10^{-13}$	$1.56\ 10^{-13}$	$1.26\ 10^{-14}$	$1.24\ 10^{-10}$ **$3.94\ 10^{-10}$**	$3.77\ 10^{-11}$ ST wall
Cerium									
Ce-134	$3\ 10^{-4}$	$6.61\ 10^{-10}$	$7.48\ 10^{-11}$	$1.18\ 10^{-11}$	$1.40\ 10^{-10}$	$4.55\ 10^{-11}$	$1.56\ 10^{-12}$	$8.70\ 10^{-9}$ **$2.78\ 10^{-8}$**	$2.81\ 10^{-9}$ LLI wall
Ce-135	$3\ 10^{-4}$	$8.23\ 10^{-10}$	$1.02\ 10^{-10}$	$2.15\ 10^{-11}$	$1.72\ 10^{-10}$	$5.74\ 10^{-11}$	$2.56\ 10^{-12}$	$2.30\ 10^{-9}$	**$9.37\ 10^{-10}$**
Ce-137	$3\ 10^{-4}$	$1.71\ 10^{-11}$	$1.56\ 10^{-12}$	$2.12\ 10^{-13}$	$5.28\ 10^{-12}$	$1.43\ 10^{-12}$	$8.87\ 10^{-15}$	$7.55\ 10^{-11}$	**$2.79\ 10^{-11}$**
Ce-137m	$3\ 10^{-4}$	$9.59\ 10^{-11}$	$7.61\ 10^{-12}$	$6.85\ 10^{-13}$	$2.76\ 10^{-11}$	$7.66\ 10^{-12}$	$6.33\ 10^{-14}$	$1.88\ 10^{-9}$ **$5.70\ 10^{-9}$**	$5.94\ 10^{-10}$ LLI wall
Ce-139	$3\ 10^{-4}$	$2.57\ 10^{-10}$	$2.42\ 10^{-11}$	$3.56\ 10^{-12}$	$7.43\ 10^{-11}$	$3.37\ 10^{-11}$	$4.49\ 10^{-13}$	$7.69\ 10^{-10}$	**$3.09\ 10^{-10}$**
Ce-141	$3\ 10^{-4}$	$1.08\ 10^{-10}$	$1.11\ 10^{-11}$	$1.43\ 10^{-12}$	$3.39\ 10^{-11}$	$2.30\ 10^{-11}$	$1.80\ 10^{-13}$	$2.50\ 10^{-9}$ **$8.64\ 10^{-9}$**	$7.83\ 10^{-10}$ LLI wall
Ce-143	$3\ 10^{-4}$	$2.12\ 10^{-10}$	$2.32\ 10^{-11}$	$3.82\ 10^{-12}$	$5.07\ 10^{-11}$	$1.61\ 10^{-11}$	$4.35\ 10^{-13}$	$3.89\ 10^{-9}$ **$1.17\ 10^{-8}$**	$1.23\ 10^{-9}$ LLI wall
Ce-144	$3\ 10^{-4}$	$6.98\ 10^{-11}$	$1.22\ 10^{-11}$	$6.52\ 10^{-12}$	$8.92\ 10^{-11}$	$1.28\ 10^{-10}$	$5.15\ 10^{-12}$	$1.88\ 10^{-8}$ **$6.64\ 10^{-8}$**	$5.68\ 10^{-9}$ LLI wall
Praseodymium									
Pr-136	$3\ 10^{-4}$	$3.43\ 10^{-12}$	$1.81\ 10^{-12}$	$1.84\ 10^{-12}$	$1.70\ 10^{-12}$	$8.08\ 10^{-13}$	$1.74\ 10^{-13}$	$6.91\ 10^{-11}$ **$2.55\ 10^{-10}$**	$2.23\ 10^{-11}$ ST wall
Pr-137	$3\ 10^{-4}$	$1.50\ 10^{-11}$	$2.95\ 10^{-12}$	$1.58\ 10^{-12}$	$4.49\ 10^{-12}$	$1.56\ 10^{-12}$	$1.45\ 10^{-13}$	$1.12\ 10^{-10}$	**$3.85\ 10^{-11}$**
Pr-138m	$3\ 10^{-4}$	$1.13\ 10^{-10}$	$2.15\ 10^{-11}$	$1.00\ 10^{-11}$	$2.97\ 10^{-11}$	$1.06\ 10^{-11}$	$1.11\ 10^{-12}$	$3.40\ 10^{-10}$	**$1.39\ 10^{-10}$**
Pr-139	$3\ 10^{-4}$	$1.82\ 10^{-11}$	$2.49\ 10^{-12}$	$7.37\ 10^{-13}$	$4.92\ 10^{-12}$	$1.56\ 10^{-12}$	$6.87\ 10^{-14}$	$9.85\ 10^{-11}$	**$3.52\ 10^{-11}$**
Pr-142	$3\ 10^{-4}$	$2.02\ 10^{-11}$	$3.08\ 10^{-12}$	$7.97\ 10^{-13}$	$4.67\ 10^{-12}$	$1.72\ 10^{-12}$	$1.28\ 10^{-13}$	$4.71\ 10^{-9}$	**$1.42\ 10^{-9}$**
Pr-142m	$3\ 10^{-4}$	$2.59\ 10^{-13}$	$3.90\ 10^{-14}$	$9.61\ 10^{-15}$	$5.96\ 10^{-14}$	$2.19\ 10^{-14}$	$1.58\ 10^{-15}$	$6.02\ 10^{-11}$	**$1.81\ 10^{-11}$**
Pr-143	$3\ 10^{-4}$	$8.99\ 10^{-18}$	$1.09\ 10^{-18}$	$1.91\ 10^{-19}$	$1.03\ 10^{-12}$	$1.03\ 10^{-12}$	$2.66\ 10^{-20}$	$4.22\ 10^{-9}$ **$1.47\ 10^{-8}$**	$1.27\ 10^{-9}$ LLI wall
Pr-144	$3\ 10^{-4}$	$7.38\ 10^{-14}$	$3.38\ 10^{-14}$	$3.15\ 10^{-14}$	$3.22\ 10^{-14}$	$1.52\ 10^{-14}$	$3.59\ 10^{-15}$	$1.05\ 10^{-10}$ **$4.09\ 10^{-10}$**	$3.15\ 10^{-11}$ ST wall
Pr-145	$3\ 10^{-4}$	$2.03\ 10^{-12}$	$3.13\ 10^{-13}$	$9.86\ 10^{-14}$	$4.98\ 10^{-13}$	$1.80\ 10^{-13}$	$1.21\ 10^{-14}$	$1.39\ 10^{-9}$	**$4.18\ 10^{-10}$**
Pr-147	$3\ 10^{-4}$	$1.79\ 10^{-12}$	$8.15\ 10^{-13}$	$7.94\ 10^{-13}$	$8.60\ 10^{-13}$	$3.97\ 10^{-13}$	$6.96\ 10^{-14}$	$6.74\ 10^{-11}$ **$2.52\ 10^{-10}$**	$2.10\ 10^{-11}$ ST wall
Neodymium									
Nd-136	$3\ 10^{-4}$	$3.63\ 10^{-11}$	$8.36\ 10^{-12}$	$4.86\ 10^{-12}$	$1.12\ 10^{-11}$	$4.14\ 10^{-12}$	$4.86\ 10^{-13}$	$2.79\ 10^{-10}$	**$9.62\ 10^{-11}$**
Nd-138	$3\ 10^{-4}$	$1.26\ 10^{-10}$	$1.82\ 10^{-11}$	$5.65\ 10^{-12}$	$2.93\ 10^{-11}$	$9.78\ 10^{-12}$	$5.88\ 10^{-13}$	$2.17\ 10^{-9}$	**$6.89\ 10^{-10}$**
Nd-139	$3\ 10^{-4}$	$4.69\ 10^{-12}$	$1.12\ 10^{-12}$	$7.59\ 10^{-13}$	$1.55\ 10^{-12}$	$5.83\ 10^{-13}$	$6.57\ 10^{-14}$	$4.88\ 10^{-11}$	**$1.63\ 10^{-11}$**
Nd-139m	$3\ 10^{-4}$	$2.58\ 10^{-10}$	$3.85\ 10^{-11}$	$1.18\ 10^{-11}$	$6.26\ 10^{-11}$	$2.10\ 10^{-11}$	$1.43\ 10^{-12}$	$7.14\ 10^{-10}$	**$2.94\ 10^{-10}$**
Nd-141	$3\ 10^{-4}$	$5.83\ 10^{-12}$	$9.01\ 10^{-13}$	$3.29\ 10^{-13}$	$1.87\ 10^{-12}$	$5.83\ 10^{-13}$	$2.40\ 10^{-14}$	$2.44\ 10^{-11}$	**$9.18\ 10^{-12}$**
Nd-147	$3\ 10^{-4}$	$1.79\ 10^{-10}$	$1.87\ 10^{-11}$	$2.44\ 10^{-12}$	$5.05\ 10^{-11}$	$2.22\ 10^{-11}$	$2.64\ 10^{-13}$	$3.76\ 10^{-9}$ **$1.28\ 10^{-8}$**	$1.18\ 10^{-9}$ LLI wall
Nd-149	$3\ 10^{-4}$	$1.60\ 10^{-11}$	$2.96\ 10^{-12}$	$1.38\ 10^{-12}$	$5.01\ 10^{-12}$	$1.74\ 10^{-12}$	$1.14\ 10^{-13}$	$4.03\ 10^{-10}$	**$1.26\ 10^{-10}$**
Nd-151	$3\ 10^{-4}$	$3.13\ 10^{-12}$	$9.38\ 10^{-13}$	$7.93\ 10^{-13}$	$1.14\ 10^{-12}$	$4.85\ 10^{-13}$	$7.32\ 10^{-14}$	$6.70\ 10^{-11}$	**$2.13\ 10^{-11}$**

Table 2.2, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Promethium									
Pm-141	$3~10^{-4}$	$3.45~10^{-12}$	$1.19~10^{-12}$	$1.01~10^{-12}$	$1.39~10^{-12}$	$5.71~10^{-13}$	$9.05~10^{-14}$	$7.97~10^{-11}$ **$2.73~10^{-10}$**	$2.53~10^{-11}$ ST wall
Pm-143	$3~10^{-4}$	$3.87~10^{-10}$	$4.40~10^{-11}$	$9.01~10^{-12}$	$9.23~10^{-11}$	$4.16~10^{-11}$	$1.56~10^{-12}$	$5.39~10^{-10}$	**$2.79~10^{-10}$**
Pm-144	$3~10^{-4}$	$1.79~10^{-9}$	$2.17~10^{-10}$	$4.85~10^{-11}$	$3.86~10^{-10}$	$1.56~10^{-10}$	$9.65~10^{-12}$	$2.13~10^{-9}$	**$1.17~10^{-9}$**
Pm-145	$3~10^{-4}$	$8.06~10^{-11}$	$7.25~10^{-12}$	$3.81~10^{-12}$	$5.30~10^{-11}$	$1.97~10^{-10}$	$4.52~10^{-13}$	$3.12~10^{-10}$	**$1.28~10^{-10}$**
Pm-146	$3~10^{-4}$	$8.86~10^{-10}$	$1.20~10^{-10}$	$4.60~10^{-11}$	$2.76~10^{-10}$	$1.92~10^{-10}$	$1.19~10^{-11}$	$2.35~10^{-9}$	**$9.91~10^{-10}$**
Pm-147	$3~10^{-4}$	$6.86~10^{-15}$	$7.45~10^{-16}$	$1.96~10^{-16}$	$2.09~10^{-11}$	$2.61~10^{-10}$	$3.12~10^{-17}$	$9.08~10^{-10}$ **$3.17~10^{-9}$**	$2.83~10^{-10}$ LLI wall
Pm-148	$3~10^{-4}$	$4.72~10^{-10}$	$6.11~10^{-11}$	$1.19~10^{-11}$	$9.85~10^{-11}$	$3.49~10^{-11}$	$1.85~10^{-12}$	$9.32~10^{-9}$ **$3.10~10^{-8}$**	$2.94~10^{-9}$ LLI wall
Pm-148m	$3~10^{-4}$	$2.18~10^{-9}$	$2.59~10^{-10}$	$4.44~10^{-11}$	$4.41~10^{-10}$	$1.74~10^{-10}$	$6.47~10^{-12}$	$4.75~10^{-9}$	**$2.07~10^{-9}$**
Pm-149	$3~10^{-4}$	$9.19~10^{-12}$	$1.02~10^{-12}$	$1.62~10^{-13}$	$2.27~10^{-12}$	$9.59~10^{-13}$	$1.78~10^{-14}$	$3.56~10^{-9}$ **$1.14~10^{-8}$**	$1.07~10^{-9}$ LLI wall
Pm-150	$3~10^{-4}$	$7.97~10^{-11}$	$1.52~10^{-11}$	$6.54~10^{-12}$	$2.13~10^{-11}$	$7.63~10^{-12}$	$8.07~10^{-13}$	$8.14~10^{-10}$	**$2.70~10^{-10}$**
Pm-151	$3~10^{-4}$	$2.11~10^{-10}$	$2.42~10^{-11}$	$4.23~10^{-12}$	$4.94~10^{-11}$	$1.62~10^{-11}$	$4.55~10^{-13}$	$2.49~10^{-9}$	**$8.09~10^{-10}$**
Samarium									
Sm-141	$3~10^{-4}$	$3.64~10^{-12}$	$1.53~10^{-12}$	$1.43~10^{-12}$	$1.63~10^{-12}$	$7.17~10^{-13}$	$1.31~10^{-13}$	$8.49~10^{-11}$ **$2.95~10^{-10}$**	$2.70~10^{-11}$ ST wall
Sm-141m	$3~10^{-4}$	$1.34~10^{-11}$	$4.31~10^{-12}$	$3.45~10^{-12}$	$5.01~10^{-12}$	$2.06~10^{-12}$	$3.31~10^{-13}$	$1.61~10^{-10}$	**$5.33~10^{-11}$**
Sm-142	$3~10^{-4}$	$2.22~10^{-11}$	$4.97~10^{-12}$	$2.90~10^{-12}$	$6.72~10^{-12}$	$2.46~10^{-12}$	$2.64~10^{-13}$	$5.39~10^{-10}$	**$1.69~10^{-10}$**
Sm-145	$3~10^{-4}$	$1.61~10^{-10}$	$1.24~10^{-11}$	$1.80~10^{-12}$	$6.66~10^{-11}$	$8.33~10^{-11}$	$1.61~10^{-13}$	$6.45~10^{-10}$	**$2.46~10^{-10}$**
Sm-146	$3~10^{-4}$	$0.00~10^{-0}$	$0.00~10^{-0}$	$0.00~10^{-0}$	$7.57~10^{-8}$	**$9.46~10^{-7}$**	$0.00~10^{-0}$	$5.89~10^{-8}$	$5.51~10^{-8}$
Sm-147	$3~10^{-4}$	$0.00~10^{-0}$	$0.00~10^{-0}$	$0.00~10^{-0}$	$6.87~10^{-8}$	**$8.59~10^{-7}$**	$0.00~10^{-0}$	$5.37~10^{-8}$	$5.01~10^{-8}$
Sm-151	$3~10^{-4}$	$2.12~10^{-14}$	$1.03~10^{-15}$	$6.52~10^{-16}$	$2.76~10^{-11}$	$3.45~10^{-10}$	$3.27~10^{-17}$	$3.04~10^{-10}$ **$1.01~10^{-9}$**	$1.05~10^{-10}$ LLI wall
Sm-153	$3~10^{-4}$	$7.17~10^{-11}$	$6.91~10^{-12}$	$7.13~10^{-13}$	$2.72~10^{-11}$	$8.38~10^{-12}$	$2.36~10^{-14}$	$2.62~10^{-9}$ **$8.18~10^{-9}$**	$8.07~10^{-10}$ LLI wall
Sm-155	$3~10^{-4}$	$5.15~10^{-13}$	$1.77~10^{-13}$	$1.51~10^{-13}$	$3.33~10^{-13}$	$1.39~10^{-13}$	$6.28~10^{-15}$	$6.37~10^{-11}$ **$2.31~10^{-10}$**	$1.93~10^{-11}$ ST wall
Sm-156	$3~10^{-4}$	$6.42~10^{-11}$	$7.57~10^{-12}$	$1.44~10^{-12}$	$1.66~10^{-11}$	$5.68~10^{-12}$	$1.48~10^{-13}$	$8.54~10^{-10}$	**$2.76~10^{-10}$**
Europium									
Eu-145	$1~10^{-3}$	$1.29~10^{-9}$	$1.58~10^{-10}$	$3.13~10^{-11}$	$2.71~10^{-10}$	$9.57~10^{-11}$	$4.78~10^{-12}$	$1.76~10^{-9}$	**$9.12~10^{-10}$**
Eu-146	$1~10^{-3}$	$2.19~10^{-9}$	$2.68~10^{-10}$	$5.01~10^{-11}$	$4.50~10^{-10}$	$1.52~10^{-10}$	$7.27~10^{-12}$	$2.95~10^{-9}$	**$1.54~10^{-9}$**
Eu-147	$1~10^{-3}$	$5.81~10^{-10}$	$6.52~10^{-11}$	$1.12~10^{-11}$	$1.41~10^{-10}$	$6.15~10^{-11}$	$1.59~10^{-12}$	$1.20~10^{-9}$	**$5.36~10^{-10}$**
Eu-148	$1~10^{-3}$	$2.36~10^{-9}$	$2.86~10^{-10}$	$5.67~10^{-11}$	$4.96~10^{-10}$	$1.82~10^{-10}$	$9.94~10^{-12}$	$2.82~10^{-9}$	**$1.55~10^{-9}$**
Eu-149	$1~10^{-3}$	$1.18~10^{-10}$	$1.04~10^{-11}$	$1.57~10^{-12}$	$3.99~10^{-11}$	$2.67~10^{-11}$	$2.17~10^{-13}$	$2.91~10^{-10}$	**$1.24~10^{-10}$**
Eu-150 12.62 h	$1~10^{-3}$	$1.72~10^{-11}$	$2.14~10^{-12}$	$4.74~10^{-13}$	$4.23~10^{-12}$	$1.45~10^{-12}$	$5.39~10^{-14}$	$1.33~10^{-9}$	**$4.05~10^{-10}$**
Eu-150 34.2 y	$1~10^{-3}$	$1.90~10^{-9}$	$4.43~10^{-10}$	$4.10~10^{-10}$	$1.02~10^{-9}$	$1.11~10^{-9}$	$1.32~10^{-10}$	$3.22~10^{-9}$	**$1.72~10^{-9}$**
Eu-152	$1~10^{-3}$	$1.33~10^{-9}$	$2.85~10^{-10}$	$2.40~10^{-10}$	$9.19~10^{-10}$	$2.09~10^{-9}$	$6.66~10^{-11}$	$3.92~10^{-9}$	**$1.75~10^{-9}$**
Eu-152m	$1~10^{-3}$	$7.16~10^{-11}$	$1.02~10^{-11}$	$2.78~10^{-12}$	$1.72~10^{-11}$	$5.87~10^{-12}$	$3.49~10^{-13}$	$1.73~10^{-9}$	**$5.40~10^{-10}$**
Eu-154	$1~10^{-3}$	$1.37~10^{-9}$	$2.79~10^{-10}$	$2.16~10^{-10}$	$1.15~10^{-9}$	$4.46~10^{-9}$	$5.71~10^{-11}$	$6.32~10^{-9}$	**$2.58~10^{-9}$**
Eu-155	$1~10^{-3}$	$9.83~10^{-11}$	$1.44~10^{-11}$	$9.64~10^{-12}$	$1.56~10^{-10}$	$1.29~10^{-9}$	$1.78~10^{-12}$	$1.09~10^{-9}$	**$4.13~10^{-10}$**
Eu-156	$1~10^{-3}$	$1.22~10^{-9}$	$1.52~10^{-10}$	$3.24~10^{-11}$	$2.56~10^{-10}$	$1.16~10^{-10}$	$5.23~10^{-12}$	$7.04~10^{-9}$	**$2.48~10^{-9}$**
Eu-157	$1~10^{-3}$	$1.23~10^{-10}$	$1.44~10^{-11}$	$2.74~10^{-12}$	$3.30~10^{-11}$	$1.06~10^{-11}$	$2.69~10^{-13}$	$2.07~10^{-9}$	**$6.59~10^{-10}$**
Eu-158	$1~10^{-3}$	$1.22~10^{-11}$	$3.21~10^{-12}$	$2.24~10^{-12}$	$3.77~10^{-12}$	$1.51~10^{-12}$	$2.47~10^{-13}$	$2.43~10^{-10}$	**$7.71~10^{-11}$**

Table 2.2, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Gadolinium									
Gd-145	3 10^{-4}	1.14 10^{-11}	3.64 10^{-12}	2.89 10^{-12}	3.99 10^{-12}	1.71 10^{-12}	3.29 10^{-13}	9.76 10^{-11} **3.00 10^{-10}**	3.36 10^{-11} ST wall
Gd-146	3 10^{-4}	8.88 10^{-10}	9.31 10^{-11}	1.31 10^{-11}	2.44 10^{-10}	1.15 10^{-10}	2.29 10^{-12}	2.84 10^{-9}	**1.12 10^{-9}**
Gd-147	3 10^{-4}	9.26 10^{-10}	1.12 10^{-10}	2.11 10^{-11}	2.02 10^{-10}	6.72 10^{-11}	2.74 10^{-12}	1.55 10^{-9}	**7.42 10^{-10}**
Gd-148	3 10^{-4}	0.00 10^{-0}	0.00 10^{-0}	0.00 10^{-0}	8.90 10^{-8}	**1.11 10^{-6}**	0.00 10^{-0}	4.98 10^{-8}	5.89 10^{-8}
Gd-149	3 10^{-4}	5.08 10^{-10}	5.38 10^{-11}	7.51 10^{-12}	1.27 10^{-10}	4.24 10^{-11}	8.50 10^{-13}	1.29 10^{-9}	**5.41 10^{-10}**
Gd-151	3 10^{-4}	1.22 10^{-10}	1.04 10^{-11}	1.06 10^{-12}	4.30 10^{-11}	3.39 10^{-11}	1.03 10^{-13}	6.15 10^{-10}	**2.23 10^{-10}**
Gd-152	3 10^{-4}	0.00 10^{-0}	0.00 10^{-0}	0.00 10^{-0}	6.57 10^{-8}	**8.21 10^{-7}**	0.00 10^{0}	3.62 10^{-8}	4.34 10^{-8}
Gd-153	3 10^{-4}	1.97 10^{-10}	1.80 10^{-11}	2.19 10^{-12}	8.07 10^{-11}	7.92 10^{-11}	2.18 10^{-13}	8.44 10^{-10}	**3.17 10^{-10}**
Gd-159	3 10^{-4}	2.86 10^{-11}	3.18 10^{-12}	5.38 10^{-13}	7.92 10^{-12}	2.55 10^{-12}	4.85 10^{-14}	1.76 10^{-9}	**5.35 10^{-10}**
Terbium									
Tb-147	3 10^{-4}	9.15 10^{-11}	1.54 10^{-11}	6.36 10^{-12}	2.32 10^{-11}	8.16 10^{-12}	7.08 10^{-13}	4.39 10^{-10}	**1.61 10^{-10}**
Tb-149	3 10^{-4}	1.71 10^{-10}	2.80 10^{-11}	9.76 10^{-12}	4.33 10^{-11}	1.92 10^{-11}	1.23 10^{-12}	7.39 10^{-10}	**2.76 10^{-10}**
Tb-150	3 10^{-4}	1.29 10^{-10}	2.23 10^{-11}	8.81 10^{-12}	3.21 10^{-11}	1.12 10^{-11}	1.03 10^{-12}	7.78 10^{-10}	**2.74 10^{-10}**
Tb-151	3 10^{-4}	4.20 10^{-10}	5.13 10^{-11}	1.04 10^{-11}	1.00 10^{-10}	3.27 10^{-11}	1.17 10^{-12}	9.19 10^{-10}	**4.03 10^{-10}**
Tb-153	3 10^{-4}	2.35 10^{-10}	2.41 10^{-11}	3.24 10^{-12}	6.83 10^{-11}	2.18 10^{-11}	2.94 10^{-13}	7.35 10^{-10}	**2.92 10^{-10}**
Tb-154	3 10^{-4}	9.89 10^{-10}	1.32 10^{-10}	3.28 10^{-11}	2.14 10^{-10}	7.36 10^{-11}	5.23 10^{-12}	1.66 10^{-9}	**7.96 10^{-10}**
Tb-155	3 10^{-4}	1.96 10^{-10}	1.89 10^{-11}	1.94 10^{-12}	6.70 10^{-11}	2.06 10^{-11}	1.12 10^{-13}	6.12 10^{-10}	**2.44 10^{-10}**
Tb-156	3 10^{-4}	1.64 10^{-9}	2.00 10^{-10}	3.66 10^{-11}	3.57 10^{-10}	1.21 10^{-10}	5.32 10^{-12}	3.03 10^{-9}	**1.40 10^{-9}**
Tb-156m 24.4 h	3 10^{-4}	1.95 10^{-10}	2.13 10^{-11}	2.77 10^{-12}	4.64 10^{-11}	1.54 10^{-11}	4.12 10^{-13}	4.86 10^{-10}	**2.04 10^{-10}**
Tb-156m 5.0 h	3 10^{-4}	5.85 10^{-11}	6.73 10^{-12}	1.02 10^{-12}	1.26 10^{-11}	4.26 10^{-12}	1.55 10^{-13}	2.46 10^{-10}	**9.12 10^{-11}**
Tb-157	3 10^{-4}	6.45 10^{-12}	6.27 10^{-13}	3.07 10^{-13}	1.27 10^{-11}	1.11 10^{-10}	6.50 10^{-14}	8.97 10^{-11} **2.96 10^{-10}**	3.35 10^{-11} LLI wall
Tb-158	3 10^{-4}	9.15 10^{-10}	1.47 10^{-10}	7.57 10^{-11}	4.90 10^{-10}	1.62 10^{-9}	2.04 10^{-11}	2.73 10^{-9}	**1.19 10^{-9}**
Tb-160	3 10^{-4}	1.17 10^{-9}	1.43 10^{-10}	2.72 10^{-11}	2.54 10^{-10}	1.57 10^{-10}	4.29 10^{-12}	4.90 10^{-9}	**1.82 10^{-9}**
Tb-161	3 10^{-4}	6.40 10^{-11}	5.27 10^{-12}	3.77 10^{-13}	2.47 10^{-11}	1.47 10^{-11}	7.70 10^{-15}	2.56 10^{-9} **8.70 10^{-9}**	7.89 10^{-10} LLI wall
Dysprosium									
Dy-155	3 10^{-4}	1.76 10^{-10}	2.31 10^{-11}	5.46 10^{-12}	4.61 10^{-11}	1.50 10^{-11}	6.34 10^{-13}	3.40 10^{-10}	**1.56 10^{-10}**
Dy-157	3 10^{-4}	9.63 10^{-11}	1.20 10^{-11}	2.78 10^{-12}	2.54 10^{-11}	8.08 10^{-12}	2.45 10^{-13}	1.55 10^{-10}	**7.60 10^{-11}**
Dy-159	3 10^{-4}	9.96 10^{-11}	8.30 10^{-12}	6.34 10^{-13}	4.20 10^{-11}	2.53 10^{-11}	6.22 10^{-14}	2.93 10^{-10}	**1.20 10^{-10}**
Dy-165	3 10^{-4}	1.67 10^{-12}	2.81 10^{-13}	1.15 10^{-13}	5.84 10^{-13}	1.94 10^{-13}	8.60 10^{-15}	3.25 10^{-10}	**9.81 10^{-11}**
Dy-166	3 10^{-4}	7.14 10^{-11}	6.91 10^{-12}	6.48 10^{-13}	2.91 10^{-11}	1.36 10^{-11}	4.09 10^{-14}	5.88 10^{-9} **2.24 10^{-8}**	1.79 10^{-9} LLI wall
Holmium									
Ho-155	3 10^{-4}	1.98 10^{-11}	3.19 10^{-12}	1.28 10^{-12}	5.70 10^{-12}	1.94 10^{-12}	1.17 10^{-13}	9.55 10^{-11}	**3.50 10^{-11}**
Ho-157	3 10^{-4}	3.46 10^{-12}	7.65 10^{-13}	5.17 10^{-13}	1.20 10^{-12}	4.59 10^{-13}	3.70 10^{-14}	1.41 10^{-11}	**5.42 10^{-12}**
Ho-159	3 10^{-4}	3.38 10^{-12}	9.40 10^{-13}	7.01 10^{-13}	1.64 10^{-12}	6.33 10^{-13}	3.89 10^{-14}	1.88 10^{-11}	**6.92 10^{-12}**
Ho-161	3 10^{-4}	6.28 10^{-12}	8.60 10^{-13}	2.70 10^{-13}	2.70 10^{-12}	8.09 10^{-13}	2.67 10^{-15}	3.82 10^{-11}	**1.35 10^{-11}**
Ho-162	3 10^{-4}	4.22 10^{-13}	1.88 10^{-13}	1.82 10^{-13}	2.40 10^{-13}	1.08 10^{-13}	1.18 10^{-14}	6.94 10^{-12} **2.46 10^{-11}**	2.27 10^{-12} ST wall
Ho-162m	3 10^{-4}	1.49 10^{-11}	3.27 10^{-12}	1.85 10^{-12}	5.16 10^{-12}	1.86 10^{-12}	1.76 10^{-13}	7.01 10^{-11}	**2.61 10^{-11}**
Ho-164	3 10^{-4}	3.11 10^{-13}	8.34 10^{-14}	6.42 10^{-14}	1.84 10^{-13}	6.98 10^{-14}	4.99 10^{-16}	2.20 10^{-11} **7.27 10^{-11}**	6.73 10^{-12} ST wall
Ho-164m	3 10^{-4}	1.38 10^{-12}	2.76 10^{-13}	1.63 10^{-13}	7.20 10^{-13}	2.45 10^{-13}	1.10 10^{-15}	4.64 10^{-11}	**1.44 10^{-11}**

Table 2.2, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Ho-166	$3\ 10^{-4}$	$1.75\ 10^{-11}$	$2.14\ 10^{-12}$	$3.93\ 10^{-13}$	$5.97\ 10^{-12}$	$2.11\ 10^{-12}$	$4.77\ 10^{-14}$	$5.01\ 10^{-9}$ **$1.46\ 10^{-8}$**	$1.51\ 10^{-9}$ LLI wall
Ho-166m	$3\ 10^{-4}$	$2.05\ 10^{-9}$	$3.48\ 10^{-10}$	$2.16\ 10^{-10}$	$8.12\ 10^{-10}$	$2.35\ 10^{-9}$	$5.53\ 10^{-11}$	$4.74\ 10^{-9}$	**$2.18\ 10^{-9}$**
Ho-167	$3\ 10^{-4}$	$3.16\ 10^{-11}$	$4.96\ 10^{-12}$	$1.79\ 10^{-12}$	$8.75\ 10^{-12}$	$2.95\ 10^{-12}$	$1.55\ 10^{-13}$	$2.63\ 10^{-10}$	**$8.90\ 10^{-11}$**
Erbium									
Er-161	$3\ 10^{-4}$	$8.15\ 10^{-11}$	$1.34\ 10^{-11}$	$4.90\ 10^{-12}$	$2.33\ 10^{-11}$	$7.75\ 10^{-12}$	$5.45\ 10^{-13}$	$2.22\ 10^{-10}$	**$9.26\ 10^{-11}$**
Er-165	$3\ 10^{-4}$	$1.91\ 10^{-11}$	$2.01\ 10^{-12}$	$2.81\ 10^{-13}$	$8.31\ 10^{-12}$	$2.36\ 10^{-12}$	$2.30\ 10^{-15}$	$5.38\ 10^{-11}$	**$2.23\ 10^{-11}$**
Er-169	$3\ 10^{-4}$	$1.62\ 10^{-14}$	$1.09\ 10^{-14}$	$1.09\ 10^{-14}$	$5.61\ 10^{-13}$	$6.83\ 10^{-12}$	$1.09\ 10^{-14}$	$1.35\ 10^{-9}$ **$4.68\ 10^{-9}$**	$4.06\ 10^{-10}$ LLI wall
Er-171	$3\ 10^{-4}$	$9.26\ 10^{-11}$	$1.20\ 10^{-11}$	$2.90\ 10^{-12}$	$2.52\ 10^{-11}$	$8.25\ 10^{-12}$	$2.54\ 10^{-13}$	$1.21\ 10^{-9}$	**$3.91\ 10^{-10}$**
Er-172	$3\ 10^{-4}$	$5.08\ 10^{-10}$	$5.95\ 10^{-11}$	$9.86\ 10^{-12}$	$1.11\ 10^{-10}$	$3.94\ 10^{-11}$	$1.30\ 10^{-12}$	$3.29\ 10^{-9}$ **$1.13\ 10^{-8}$**	$1.14\ 10^{-9}$ LLI wall
Thulium									
Tm-162	$3\ 10^{-4}$	$6.24\ 10^{-12}$	$2.43\ 10^{-12}$	$2.16\ 10^{-12}$	$2.56\ 10^{-12}$	$1.15\ 10^{-12}$	$2.32\ 10^{-13}$	$6.43\ 10^{-11}$ **$2.03\ 10^{-10}$**	$2.18\ 10^{-11}$ ST wall
Tm-166	$3\ 10^{-4}$	$3.54\ 10^{-10}$	$5.29\ 10^{-11}$	$1.59\ 10^{-11}$	$8.44\ 10^{-11}$	$2.89\ 10^{-11}$	$2.21\ 10^{-12}$	$7.48\ 10^{-10}$	**$3.34\ 10^{-10}$**
Tm-167	$3\ 10^{-4}$	$2.08\ 10^{-10}$	$2.03\ 10^{-11}$	$2.20\ 10^{-12}$	$6.56\ 10^{-11}$	$2.73\ 10^{-11}$	$1.88\ 10^{-13}$	$1.87\ 10^{-9}$ **$6.20\ 10^{-9}$**	$6.26\ 10^{-10}$ LLI wall
Tm-170	$3\ 10^{-4}$	$9.56\ 10^{-12}$	$1.30\ 10^{-12}$	$4.86\ 10^{-13}$	$3.08\ 10^{-11}$	$4.14\ 10^{-11}$	$4.07\ 10^{-13}$	$4.76\ 10^{-9}$ **$1.68\ 10^{-8}$**	$1.43\ 10^{-9}$ LLI wall
Tm-171	$3\ 10^{-4}$	$1.38\ 10^{-12}$	$2.65\ 10^{-13}$	$1.60\ 10^{-13}$	$1.04\ 10^{-11}$	$1.20\ 10^{-10}$	$1.48\ 10^{-13}$	$3.71\ 10^{-10}$ **$1.31\ 10^{-9}$**	$1.16\ 10^{-10}$ LLI wall
Tm-172	$3\ 10^{-4}$	$3.21\ 10^{-10}$	$4.32\ 10^{-11}$	$9.16\ 10^{-12}$	$7.17\ 10^{-11}$	$2.61\ 10^{-11}$	$1.47\ 10^{-12}$	$5.85\ 10^{-9}$ **$1.86\ 10^{-8}$**	$1.85\ 10^{-9}$ LLI wall
Tm-173	$3\ 10^{-4}$	$9.72\ 10^{-11}$	$1.28\ 10^{-11}$	$3.22\ 10^{-12}$	$2.22\ 10^{-11}$	$7.39\ 10^{-12}$	$3.32\ 10^{-13}$	$1.02\ 10^{-9}$	**$3.37\ 10^{-10}$**
Tm-175	$3\ 10^{-4}$	$2.50\ 10^{-12}$	$1.09\ 10^{-12}$	$1.06\ 10^{-12}$	$1.08\ 10^{-12}$	$5.06\ 10^{-13}$	$9.82\ 10^{-14}$	$5.73\ 10^{-11}$ **$2.00\ 10^{-10}$**	$1.83\ 10^{-11}$ ST wall
Ytterbium									
Yb-162	$3\ 10^{-4}$	$8.47\ 10^{-12}$	$2.36\ 10^{-12}$	$1.65\ 10^{-12}$	$3.05\ 10^{-12}$	$1.22\ 10^{-12}$	$1.73\ 10^{-13}$	$5.80\ 10^{-11}$	**$2.05\ 10^{-11}$**
Yb-166	$3\ 10^{-4}$	$1.24\ 10^{-9}$	$1.42\ 10^{-10}$	$2.25\ 10^{-11}$	$2.85\ 10^{-10}$	$9.42\ 10^{-11}$	$3.50\ 10^{-12}$	$2.56\ 10^{-9}$	**$1.14\ 10^{-9}$**
Yb-167	$3\ 10^{-4}$	$1.30\ 10^{-12}$	$4.13\ 10^{-13}$	$3.60\ 10^{-13}$	$7.87\ 10^{-13}$	$3.30\ 10^{-13}$	$1.19\ 10^{-14}$	$1.49\ 10^{-11}$	**$5.01\ 10^{-12}$**
Yb-169	$3\ 10^{-4}$	$4.76\ 10^{-10}$	$4.74\ 10^{-11}$	$4.87\ 10^{-12}$	$1.66\ 10^{-10}$	$7.33\ 10^{-11}$	$3.68\ 10^{-13}$	$2.21\ 10^{-9}$	**$8.12\ 10^{-10}$**
Yb-175	$3\ 10^{-4}$	$4.13\ 10^{-11}$	$4.53\ 10^{-12}$	$6.47\ 10^{-13}$	$9.99\ 10^{-12}$	$6.23\ 10^{-12}$	$6.85\ 10^{-14}$	$1.55\ 10^{-9}$ **$5.14\ 10^{-9}$**	$4.76\ 10^{-10}$ LLI wall
Yb-177	$3\ 10^{-4}$	$7.91\ 10^{-12}$	$1.53\ 10^{-12}$	$7.12\ 10^{-13}$	$2.46\ 10^{-12}$	$9.35\ 10^{-13}$	$7.58\ 10^{-14}$	$2.81\ 10^{-10}$	**$8.68\ 10^{-11}$**
Yb-178	$3\ 10^{-4}$	$4.08\ 10^{-12}$	$8.76\ 10^{-13}$	$4.07\ 10^{-13}$	$1.31\ 10^{-12}$	$4.69\ 10^{-13}$	$4.68\ 10^{-14}$	$3.52\ 10^{-10}$	**$1.07\ 10^{-10}$**
Lutetium									
Lu-169	$3\ 10^{-4}$	$6.27\ 10^{-10}$	$8.06\ 10^{-11}$	$1.66\ 10^{-11}$	$1.53\ 10^{-10}$	$5.19\ 10^{-11}$	$2.35\ 10^{-12}$	$1.19\ 10^{-9}$	**$5.49\ 10^{-10}$**
Lu-170	$3\ 10^{-4}$	$1.52\ 10^{-9}$	$1.98\ 10^{-10}$	$4.50\ 10^{-11}$	$3.26\ 10^{-10}$	$1.12\ 10^{-10}$	$7.41\ 10^{-12}$	$2.59\ 10^{-9}$	**$1.23\ 10^{-9}$**
Lu-171	$3\ 10^{-4}$	$7.36\ 10^{-10}$	$8.51\ 10^{-11}$	$1.36\ 10^{-11}$	$1.80\ 10^{-10}$	$6.23\ 10^{-11}$	$1.78\ 10^{-12}$	$1.88\ 10^{-9}$	**$7.85\ 10^{-10}$**
Lu-172	$3\ 10^{-4}$	$1.73\ 10^{-9}$	$2.13\ 10^{-10}$	$3.95\ 10^{-11}$	$3.81\ 10^{-10}$	$1.31\ 10^{-10}$	$5.72\ 10^{-12}$	$3.37\ 10^{-9}$	**$1.53\ 10^{-9}$**
Lu-173	$3\ 10^{-4}$	$2.15\ 10^{-10}$	$2.17\ 10^{-11}$	$2.83\ 10^{-12}$	$9.40\ 10^{-11}$	$1.46\ 10^{-10}$	$7.32\ 10^{-13}$	$7.41\ 10^{-10}$	**$2.95\ 10^{-10}$**
Lu-174	$3\ 10^{-4}$	$1.68\ 10^{-10}$	$1.97\ 10^{-11}$	$4.02\ 10^{-12}$	$8.72\ 10^{-11}$	$3.08\ 10^{-10}$	$1.40\ 10^{-12}$	$7.85\ 10^{-10}$	**$3.01\ 10^{-10}$**
Lu-174m	$3\ 10^{-4}$	$1.11\ 10^{-10}$	$1.07\ 10^{-11}$	$1.17\ 10^{-12}$	$5.91\ 10^{-11}$	$1.64\ 10^{-10}$	$2.41\ 10^{-13}$	$1.78\ 10^{-9}$ **$6.15\ 10^{-9}$**	$5.77\ 10^{-10}$ LLI wall
Lu-176	$3\ 10^{-4}$	$6.80\ 10^{-10}$	$9.14\ 10^{-11}$	$3.15\ 10^{-11}$	$8.31\ 10^{-10}$	$7.23\ 10^{-9}$	$2.13\ 10^{-11}$	$4.91\ 10^{-9}$	**$1.98\ 10^{-9}$**
Lu-176m	$3\ 10^{-4}$	$1.96\ 10^{-12}$	$2.69\ 10^{-13}$	$7.58\ 10^{-14}$	$8.97\ 10^{-13}$	$2.88\ 10^{-13}$	$1.73\ 10^{-15}$	$5.75\ 10^{-10}$	**$1.73\ 10^{-10}$**
Lu-177	$3\ 10^{-4}$	$4.29\ 10^{-11}$	$4.43\ 10^{-12}$	$5.50\ 10^{-13}$	$1.21\ 10^{-11}$	$1.07\ 10^{-11}$	$4.45\ 10^{-14}$	$1.89\ 10^{-9}$ **$6.43\ 10^{-9}$**	$5.81\ 10^{-10}$ LLI wall

Table 2.2, Cont'd.

Nuclide	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Lu-177m	$3\ 10^{-4}$	$1.35\ 10^{-9}$	$1.43\ 10^{-10}$	$1.98\ 10^{-11}$	$3.68\ 10^{-10}$	$4.30\ 10^{-10}$	$3.56\ 10^{-12}$	$5.23\ 10^{-9}$	**$1.99\ 10^{-9}$**
Lu-178	$3\ 10^{-4}$	$7.33\ 10^{-13}$	$2.59\ 10^{-13}$	$2.12\ 10^{-13}$	$2.96\ 10^{-13}$	$1.27\ 10^{-13}$	$2.24\ 10^{-14}$	$1.10\ 10^{-10}$ **$3.67\ 10^{-10}$**	$3.32\ 10^{-11}$ ST wall
Lu-178m	$3\ 10^{-4}$	$4.88\ 10^{-12}$	$1.81\ 10^{-12}$	$1.55\ 10^{-12}$	$2.41\ 10^{-12}$	$1.00\ 10^{-12}$	$1.13\ 10^{-13}$	$8.53\ 10^{-11}$ **$2.84\ 10^{-10}$**	$2.76\ 10^{-11}$ ST wall
Lu-179	$3\ 10^{-4}$	$4.36\ 10^{-12}$	$6.14\ 10^{-13}$	$1.78\ 10^{-13}$	$1.20\ 10^{-12}$	$4.06\ 10^{-13}$	$1.51\ 10^{-14}$	$7.19\ 10^{-10}$	**$2.17\ 10^{-10}$**
Hafnium									
Hf-170	$2\ 10^{-3}$	$6.03\ 10^{-10}$	$7.21\ 10^{-11}$	$1.34\ 10^{-11}$	$1.42\ 10^{-10}$	$4.94\ 10^{-11}$	$2.10\ 10^{-12}$	$1.30\ 10^{-9}$	**$5.73\ 10^{-10}$**
Hf-172	$2\ 10^{-3}$	$5.56\ 10^{-10}$	$1.41\ 10^{-10}$	$9.01\ 10^{-11}$	$9.49\ 10^{-10}$	$6.14\ 10^{-9}$	$6.11\ 10^{-11}$	$2.46\ 10^{-9}$	**$1.21\ 10^{-9}$**
Hf-173	$2\ 10^{-3}$	$2.63\ 10^{-10}$	$3.01\ 10^{-11}$	$4.89\ 10^{-12}$	$8.02\ 10^{-11}$	$2.78\ 10^{-11}$	$4.56\ 10^{-13}$	$6.34\ 10^{-10}$	**$2.71\ 10^{-10}$**
Hf-175	$2\ 10^{-3}$	$4.95\ 10^{-10}$	$5.39\ 10^{-11}$	$8.67\ 10^{-12}$	$1.43\ 10^{-10}$	$9.88\ 10^{-11}$	$2.77\ 10^{-12}$	$1.13\ 10^{-9}$	**$4.92\ 10^{-10}$**
Hf-177m	$2\ 10^{-3}$	$3.50\ 10^{-11}$	$8.46\ 10^{-12}$	$5.38\ 10^{-12}$	$1.33\ 10^{-11}$	$4.96\ 10^{-12}$	$4.07\ 10^{-13}$	$2.06\ 10^{-10}$	**$7.43\ 10^{-11}$**
Hf-178m	$2\ 10^{-3}$	$3.59\ 10^{-9}$	$1.10\ 10^{-9}$	$7.55\ 10^{-10}$	$7.39\ 10^{-9}$	$4.37\ 10^{-8}$	$7.38\ 10^{-10}$	$7.69\ 10^{-9}$	**$5.68\ 10^{-9}$**
Hf-179m	$2\ 10^{-3}$	$1.13\ 10^{-9}$	$1.24\ 10^{-10}$	$1.85\ 10^{-11}$	$2.93\ 10^{-10}$	$2.57\ 10^{-10}$	$4.06\ 10^{-12}$	$3.71\ 10^{-9}$	**$1.46\ 10^{-9}$**
Hf-180m	$2\ 10^{-3}$	$1.72\ 10^{-10}$	$2.37\ 10^{-11}$	$6.74\ 10^{-12}$	$4.47\ 10^{-11}$	$1.49\ 10^{-11}$	$6.41\ 10^{-13}$	$4.81\ 10^{-10}$	**$1.98\ 10^{-10}$**
Hf-181	$2\ 10^{-3}$	$6.62\ 10^{-10}$	$7.70\ 10^{-11}$	$1.29\ 10^{-11}$	$1.85\ 10^{-10}$	$3.86\ 10^{-10}$	$3.65\ 10^{-12}$	$3.53\ 10^{-9}$	**$1.27\ 10^{-9}$**
Hf-182	$2\ 10^{-3}$	$9.01\ 10^{-10}$	$7.33\ 10^{-10}$	$6.35\ 10^{-10}$	$8.47\ 10^{-9}$	**$7.22\ 10^{-8}$**	$5.00\ 10^{-10}$	$2.26\ 10^{-9}$	$4.29\ 10^{-9}$
Hf-182m	$2\ 10^{-3}$	$1.83\ 10^{-11}$	$4.15\ 10^{-12}$	$2.52\ 10^{-12}$	$6.23\ 10^{-12}$	$2.49\ 10^{-12}$	$2.20\ 10^{-13}$	$1.10\ 10^{-10}$	**$3.93\ 10^{-11}$**
Hf-183	$2\ 10^{-3}$	$1.76\ 10^{-11}$	$3.68\ 10^{-12}$	$2.12\ 10^{-12}$	$5.53\ 10^{-12}$	$2.54\ 10^{-12}$	$2.09\ 10^{-13}$	$2.09\ 10^{-10}$	**$6.87\ 10^{-11}$**
Hf-184	$2\ 10^{-3}$	$2.25\ 10^{-10}$	$2.83\ 10^{-11}$	$5.66\ 10^{-12}$	$5.22\ 10^{-11}$	$1.80\ 10^{-11}$	$7.37\ 10^{-13}$	$1.71\ 10^{-9}$	**$5.82\ 10^{-10}$**
Tantalum									
Ta-172	$1\ 10^{-3}$	$1.30\ 10^{-11}$	$3.86\ 10^{-12}$	$2.91\ 10^{-12}$	$4.71\ 10^{-12}$	$1.92\ 10^{-12}$	$2.88\ 10^{-13}$	$1.27\ 10^{-10}$	**$4.30\ 10^{-11}$**
Ta-173	$1\ 10^{-3}$	$9.63\ 10^{-11}$	$1.33\ 10^{-11}$	$3.75\ 10^{-12}$	$2.83\ 10^{-11}$	$9.22\ 10^{-12}$	$3.79\ 10^{-13}$	$6.05\ 10^{-10}$	**$2.12\ 10^{-10}$**
Ta-174	$1\ 10^{-3}$	$1.48\ 10^{-11}$	$3.25\ 10^{-12}$	$1.86\ 10^{-12}$	$5.09\ 10^{-12}$	$1.84\ 10^{-12}$	$1.62\ 10^{-13}$	$1.59\ 10^{-10}$	**$5.29\ 10^{-11}$**
Ta-175	$1\ 10^{-3}$	$2.52\ 10^{-10}$	$3.57\ 10^{-11}$	$9.17\ 10^{-12}$	$6.69\ 10^{-11}$	$2.22\ 10^{-11}$	$1.22\ 10^{-12}$	$5.57\ 10^{-10}$	**$2.45\ 10^{-10}$**
Ta-176	$1\ 10^{-3}$	$3.92\ 10^{-10}$	$6.16\ 10^{-11}$	$1.88\ 10^{-11}$	$9.55\ 10^{-11}$	$3.31\ 10^{-11}$	$2.79\ 10^{-12}$	$8.39\ 10^{-10}$	**$3.74\ 10^{-10}$**
Ta-177	$1\ 10^{-3}$	$7.90\ 10^{-11}$	$8.05\ 10^{-12}$	$8.56\ 10^{-13}$	$3.25\ 10^{-11}$	$9.92\ 10^{-12}$	$5.63\ 10^{-14}$	$3.23\ 10^{-10}$	**$1.22\ 10^{-10}$**
Ta-178	$1\ 10^{-3}$	$5.93\ 10^{-11}$	$1.01\ 10^{-11}$	$4.22\ 10^{-12}$	$1.91\ 10^{-11}$	$6.42\ 10^{-12}$	$3.28\ 10^{-13}$	$2.00\ 10^{-10}$	**$7.93\ 10^{-11}$**
Ta-179	$1\ 10^{-3}$	$6.06\ 10^{-11}$	$5.94\ 10^{-12}$	$7.23\ 10^{-13}$	$2.75\ 10^{-11}$	$9.00\ 10^{-12}$	$2.74\ 10^{-13}$	$1.81\ 10^{-10}$	**$7.39\ 10^{-11}$**
Ta-180	$1\ 10^{-3}$	$7.69\ 10^{-10}$	$8.34\ 10^{-11}$	$1.44\ 10^{-11}$	$1.98\ 10^{-10}$	$7.74\ 10^{-11}$	$5.19\ 10^{-12}$	$2.50\ 10^{-9}$	**$9.82\ 10^{-10}$**
Ta-180m	$1\ 10^{-3}$	$1.74\ 10^{-11}$	$2.03\ 10^{-12}$	$3.57\ 10^{-13}$	$7.85\ 10^{-12}$	$2.33\ 10^{-12}$	$9.41\ 10^{-15}$	$1.78\ 10^{-10}$	**$5.90\ 10^{-11}$**
Ta-182	$1\ 10^{-3}$	$1.32\ 10^{-9}$	$1.68\ 10^{-10}$	$3.47\ 10^{-11}$	$3.05\ 10^{-10}$	$1.15\ 10^{-10}$	$9.08\ 10^{-12}$	$4.54\ 10^{-9}$	**$1.76\ 10^{-9}$**
Ta-182m	$1\ 10^{-3}$	$8.54\ 10^{-13}$	$3.21\ 10^{-13}$	$2.86\ 10^{-13}$	$5.14\ 10^{-13}$	$2.31\ 10^{-13}$	$1.45\ 10^{-14}$	$2.38\ 10^{-11}$ **$8.83\ 10^{-11}$**	$7.50\ 10^{-12}$ ST wall
Ta-183	$1\ 10^{-3}$	$3.49\ 10^{-10}$	$3.64\ 10^{-11}$	$4.81\ 10^{-12}$	$1.02\ 10^{-10}$	$4.73\ 10^{-11}$	$6.97\ 10^{-13}$	$4.50\ 10^{-9}$ **$1.48\ 10^{-8}$**	$1.46\ 10^{-9}$ LLI wall
Ta-184	$1\ 10^{-3}$	$3.90\ 10^{-10}$	$5.40\ 10^{-11}$	$1.43\ 10^{-11}$	$9.12\ 10^{-11}$	$3.08\ 10^{-11}$	$1.69\ 10^{-12}$	$2.13\ 10^{-9}$	**$7.60\ 10^{-10}$**
Ta-185	$1\ 10^{-3}$	$3.12\ 10^{-12}$	$7.30\ 10^{-13}$	$4.68\ 10^{-13}$	$1.39\ 10^{-12}$	$5.35\ 10^{-13}$	$2.81\ 10^{-14}$	$1.79\ 10^{-10}$	**$5.49\ 10^{-11}$**
Ta-186	$1\ 10^{-3}$	$1.97\ 10^{-12}$	$1.12\ 10^{-12}$	$1.17\ 10^{-12}$	$1.12\ 10^{-12}$	$5.35\ 10^{-13}$	$9.87\ 10^{-14}$	$6.61\ 10^{-11}$ **$2.63\ 10^{-10}$**	$2.08\ 10^{-11}$ ST wall
Tungsten									
W-176	$1\ 10^{-2}$	$1.32\ 10^{-10}$	$1.90\ 10^{-11}$	$4.73\ 10^{-12}$	$3.38\ 10^{-11}$	$1.14\ 10^{-11}$	$6.54\ 10^{-13}$	$3.09\ 10^{-10}$	**$1.34\ 10^{-10}$**
	$3\ 10^{-1}$	$9.95\ 10^{-11}$	$1.46\ 10^{-11}$	$4.10\ 10^{-12}$	$2.67\ 10^{-11}$	$1.44\ 10^{-11}$	$6.17\ 10^{-13}$	$2.40\ 10^{-10}$	**$1.03\ 10^{-10}$**
W-177	$1\ 10^{-2}$	$5.23\ 10^{-11}$	$9.11\ 10^{-12}$	$3.85\ 10^{-12}$	$1.70\ 10^{-11}$	$5.80\ 10^{-12}$	$3.55\ 10^{-13}$	$1.66\ 10^{-10}$	**$6.71\ 10^{-11}$**
	$3\ 10^{-1}$	$4.39\ 10^{-11}$	$8.03\ 10^{-12}$	$3.74\ 10^{-12}$	$1.48\ 10^{-11}$	$8.17\ 10^{-12}$	$3.67\ 10^{-13}$	$1.45\ 10^{-10}$	**$5.82\ 10^{-11}$**
W-178	$1\ 10^{-2}$	$1.68\ 10^{-10}$	$1.76\ 10^{-11}$	$2.09\ 10^{-12}$	$6.25\ 10^{-11}$	$1.90\ 10^{-11}$	$2.35\ 10^{-13}$	$7.39\ 10^{-10}$	**$2.75\ 10^{-10}$**
	$3\ 10^{-1}$	$1.20\ 10^{-10}$	$1.45\ 10^{-11}$	$3.89\ 10^{-12}$	$5.89\ 10^{-11}$	$3.81\ 10^{-11}$	$1.13\ 10^{-12}$	$5.40\ 10^{-10}$	**$2.03\ 10^{-10}$**

Table 2.2, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
W-179	1 10^{-2}	9.00 10^{-13}	2.12 10^{-13}	1.45 10^{-13}	4.90 10^{-13}	1.80 10^{-13}	1.33 10^{-15}	7.99 10^{-12}	**2.74 10^{-12}**
	3 10^{-1}	8.37 10^{-13}	2.05 10^{-13}	1.45 10^{-13}	4.73 10^{-13}	2.73 10^{-13}	1.65 10^{-15}	7.74 10^{-12}	**2.64 10^{-12}**
W-181	1 10^{-2}	7.33 10^{-11}	7.01 10^{-12}	6.23 10^{-13}	3.26 10^{-11}	1.03 10^{-11}	5.41 10^{-14}	2.31 10^{-10}	**9.31 10^{-11}**
	3 10^{-1}	5.36 10^{-11}	7.46 10^{-12}	3.52 10^{-12}	4.86 10^{-11}	4.58 10^{-11}	1.39 10^{-12}	1.84 10^{-10}	**7.74 10^{-11}**
W-185	1 10^{-2}	8.74 10^{-14}	8.98 10^{-15}	9.45 10^{-16}	1.64 10^{-12}	4.90 10^{-12}	7.64 10^{-17}	1.79 10^{-9} **6.32 10^{-9}**	5.38 10^{-10} LLI wall
	3 10^{-1}	6.35 10^{-14}	8.78 10^{-15}	3.54 10^{-15}	4.83 10^{-11}	1.47 10^{-10}	1.36 10^{-15}	1.39 10^{-9} **4.47 10^{-9}**	4.28 10^{-10} LLI wall
W-187	1 10^{-2}	2.59 10^{-10}	3.22 10^{-11}	6.39 10^{-12}	5.89 10^{-11}	2.12 10^{-11}	7.70 10^{-13}	2.22 10^{-9}	**7.46 10^{-10}**
	3 10^{-1}	1.90 10^{-10}	2.44 10^{-11}	5.80 10^{-12}	5.09 10^{-11}	7.38 10^{-11}	9.00 10^{-13}	1.64 10^{-9}	**5.53 10^{-10}**
W-188	1 10^{-2}	4.55 10^{-11}	4.84 10^{-12}	5.80 10^{-13}	2.17 10^{-11}	3.53 10^{-11}	1.07 10^{-13}	8.41 10^{-9} **3.34 10^{-8}**	2.54 10^{-9} LLI wall
	3 10^{-1}	3.31 10^{-11}	5.57 10^{-12}	2.76 10^{-12}	3.25 10^{-10}	9.52 10^{-10}	1.42 10^{-12}	6.78 10^{-9} **2.33 10^{-8}**	2.11 10^{-9} LLI wall
Rhenium									
Re-177	8 10^{-1}	3.76 10^{-12}	1.72 10^{-12}	1.61 10^{-12}	2.26 10^{-12}	1.39 10^{-12}	2.48 10^{-11}	4.04 10^{-11} **1.42 10^{-10}**	1.46 10^{-11} ST wall
Re-178	8 10^{-1}	1.92 10^{-12}	1.12 10^{-12}	1.17 10^{-12}	1.14 10^{-12}	6.34 10^{-13}	4.35 10^{-12}	4.85 10^{-11} **1.91 10^{-10}**	1.56 10^{-11} ST wall
Re-181	8 10^{-1}	1.38 10^{-10}	6.12 10^{-11}	5.57 10^{-11}	8.11 10^{-11}	6.06 10^{-11}	1.55 10^{-9}	5.76 10^{-10}	**2.81 10^{-10}**
Re-182 12.7 h	8 10^{-1}	1.27 10^{-10}	5.49 10^{-11}	4.71 10^{-11}	7.08 10^{-11}	5.07 10^{-11}	9.47 10^{-10}	3.89 10^{-10}	**2.01 10^{-10}**
Re-182 64.0 h	8 10^{-1}	5.43 10^{-10}	2.56 10^{-10}	2.32 10^{-10}	3.33 10^{-10}	2.54 10^{-10}	3.77 10^{-9}	1.85 10^{-9}	**9.18 10^{-10}**
Re-184	8 10^{-1}	3.83 10^{-10}	2.26 10^{-10}	2.16 10^{-10}	2.79 10^{-10}	2.23 10^{-10}	1.53 10^{-9}	1.16 10^{-9}	**5.91 10^{-10}**
Re-184m	8 10^{-1}	3.00 10^{-10}	2.09 10^{-10}	2.08 10^{-10}	2.62 10^{-10}	2.24 10^{-10}	2.61 10^{-9}	1.83 10^{-9}	**7.97 10^{-10}**
Re-186	8 10^{-1}	1.00 10^{-10}	9.54 10^{-11}	9.53 10^{-11}	9.89 10^{-11}	9.69 10^{-11}	4.79 10^{-9}	1.95 10^{-9}	**7.95 10^{-10}**
Re-186m	8 10^{-1}	2.08 10^{-10}	1.99 10^{-10}	2.00 10^{-10}	2.11 10^{-10}	2.06 10^{-10}	2.81 10^{-9}	2.85 10^{-9} **1.06 10^{-8}**	1.08 10^{-9} ST wall
Re-187	8 10^{-1}	3.94 10^{-13}	3.94 10^{-13}	3.94 10^{-13}	3.94 10^{-13}	3.94 10^{-13}	1.05 10^{-11}	6.64 10^{-12}	**2.57 10^{-12}**
Re-188	8 10^{-1}	8.32 10^{-11}	7.79 10^{-11}	7.75 10^{-11}	7.95 10^{-11}	7.80 10^{-11}	6.62 10^{-9}	1.93 10^{-9}	**8.31 10^{-10}**
Re-188m	8 10^{-1}	1.86 10^{-12}	1.60 10^{-12}	1.60 10^{-12}	1.74 10^{-12}	1.59 10^{-12}	1.25 10^{-10}	4.46 10^{-11}	**1.83 10^{-11}**
Re-189	8 10^{-1}	5.81 10^{-11}	4.87 10^{-11}	4.81 10^{-11}	5.18 10^{-11}	4.92 10^{-11}	3.48 10^{-9}	1.09 10^{-9}	**4.67 10^{-10}**
Osmium									
Os-180	1 10^{-2}	5.92 10^{-12}	1.90 10^{-12}	1.61 10^{-12}	2.27 10^{-12}	9.61 10^{-13}	1.45 10^{-13}	3.98 10^{-11}	**1.42 10^{-11}**
Os-181	1 10^{-2}	7.80 10^{-11}	1.29 10^{-11}	5.13 10^{-12}	2.18 10^{-11}	7.52 10^{-12}	6.21 10^{-13}	2.46 10^{-10}	**9.86 10^{-11}**
Os-182	1 10^{-2}	6.75 10^{-10}	8.09 10^{-11}	1.47 10^{-11}	1.65 10^{-10}	5.40 10^{-11}	2.82 10^{-12}	1.52 10^{-9}	**6.59 10^{-10}**
Os-185	1 10^{-2}	8.35 10^{-10}	1.25 10^{-10}	5.24 10^{-11}	2.16 10^{-10}	8.91 10^{-11}	2.65 10^{-11}	1.16 10^{-9}	**6.11 10^{-10}**
Os-189m	1 10^{-2}	1.69 10^{-13}	1.29 10^{-14}	1.06 10^{-14}	1.57 10^{-14}	1.18 10^{-14}	1.07 10^{-14}	6.02 10^{-11}	**1.81 10^{-11}**
Os-191	1 10^{-2}	1.18 10^{-10}	1.51 10^{-11}	5.06 10^{-12}	4.82 10^{-11}	1.72 10^{-11}	3.40 10^{-12}	1.95 10^{-9} **6.61 10^{-9}**	6.23 10^{-10} LLI wall
Os-191m	1 10^{-2}	6.70 10^{-12}	8.26 10^{-13}	2.68 10^{-13}	2.77 10^{-12}	9.52 10^{-13}	1.79 10^{-13}	3.38 10^{-10}	**1.04 10^{-10}**
Os-193	1 10^{-2}	5.16 10^{-11}	6.62 10^{-12}	1.76 10^{-12}	1.46 10^{-11}	5.14 10^{-12}	8.76 10^{-13}	2.87 10^{-9} **8.47 10^{-9}**	8.77 10^{-10} LLI wall
Os-194	1 10^{-2}	2.75 10^{-10}	2.16 10^{-10}	2.12 10^{-10}	2.25 10^{-10}	2.14 10^{-10}	2.07 10^{-10}	9.24 10^{-9} **3.06 10^{-8}**	2.94 10^{-9} LLI wall
Iridium									
Ir-182	1 10^{-2}	1.06 10^{-11}	2.29 10^{-12}	1.51 10^{-12}	3.34 10^{-12}	1.28 10^{-12}	1.49 10^{-13}	1.03 10^{-10} **3.30 10^{-10}**	3.45 10^{-11} ST wall

Table 2.2, Cont'd.

Nuclide	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Ir-184	$1\ 10^{-2}$	$1.33\ 10^{-10}$	$2.36\ 10^{-11}$	$9.53\ 10^{-12}$	$3.65\ 10^{-11}$	$1.27\ 10^{-11}$	$1.20\ 10^{-12}$	$4.86\ 10^{-10}$	**$1.88\ 10^{-10}$**
Ir-185	$1\ 10^{-2}$	$2.08\ 10^{-10}$	$2.83\ 10^{-11}$	$7.26\ 10^{-12}$	$5.64\ 10^{-11}$	$1.87\ 10^{-11}$	$1.36\ 10^{-12}$	$7.85\ 10^{-10}$	**$3.00\ 10^{-10}$**
Ir-186	$1\ 10^{-2}$	$6.28\ 10^{-10}$	$8.34\ 10^{-11}$	$2.00\ 10^{-11}$	$1.47\ 10^{-10}$	$4.96\ 10^{-11}$	$3.19\ 10^{-12}$	$1.31\ 10^{-9}$	**$5.86\ 10^{-10}$**
Ir-187	$1\ 10^{-2}$	$1.12\ 10^{-10}$	$1.48\ 10^{-11}$	$3.60\ 10^{-12}$	$3.12\ 10^{-11}$	$1.00\ 10^{-11}$	$4.96\ 10^{-13}$	$3.57\ 10^{-10}$	**$1.42\ 10^{-10}$**
Ir-188	$1\ 10^{-2}$	$9.83\ 10^{-10}$	$1.25\ 10^{-10}$	$2.91\ 10^{-11}$	$2.17\ 10^{-10}$	$7.45\ 10^{-11}$	$5.69\ 10^{-12}$	$1.59\ 10^{-9}$	**$7.73\ 10^{-10}$**
Ir-189	$1\ 10^{-2}$	$1.24\ 10^{-10}$	$1.36\ 10^{-11}$	$3.17\ 10^{-12}$	$4.82\ 10^{-11}$	$1.56\ 10^{-11}$	$1.61\ 10^{-12}$	$8.16\ 10^{-10}$ **$2.67\ 10^{-9}$**	$2.84\ 10^{-10}$ LLI wall
Ir-190	$1\ 10^{-2}$	$1.66\ 10^{-9}$	$1.99\ 10^{-10}$	$4.37\ 10^{-11}$	$3.92\ 10^{-10}$	$1.36\ 10^{-10}$	$1.39\ 10^{-11}$	$3.24\ 10^{-9}$	**$1.47\ 10^{-9}$**
Ir-190m	$1\ 10^{-2}$	$6.74\ 10^{-12}$	$7.94\ 10^{-13}$	$1.64\ 10^{-13}$	$1.58\ 10^{-12}$	$5.46\ 10^{-13}$	$5.68\ 10^{-14}$	$2.17\ 10^{-11}$	**$8.54\ 10^{-12}$**
Ir-192	$1\ 10^{-2}$	$1.03\ 10^{-9}$	$1.51\ 10^{-10}$	$6.54\ 10^{-11}$	$2.54\ 10^{-10}$	$1.11\ 10^{-10}$	$3.78\ 10^{-11}$	$4.08\ 10^{-9}$	**$1.55\ 10^{-9}$**
Ir-192m	$1\ 10^{-2}$	$3.63\ 10^{-10}$	$1.55\ 10^{-10}$	$1.59\ 10^{-10}$	$2.21\ 10^{-10}$	$1.57\ 10^{-10}$	$1.06\ 10^{-10}$	$8.53\ 10^{-10}$	**$4.23\ 10^{-10}$**
Ir-194	$1\ 10^{-2}$	$4.33\ 10^{-11}$	$6.33\ 10^{-12}$	$2.17\ 10^{-12}$	$1.03\ 10^{-11}$	$4.15\ 10^{-12}$	$1.19\ 10^{-12}$	$4.72\ 10^{-9}$	**$1.43\ 10^{-9}$**
Ir-194m	$1\ 10^{-2}$	$2.83\ 10^{-9}$	$4.58\ 10^{-10}$	$2.31\ 10^{-10}$	$7.16\ 10^{-10}$	$3.27\ 10^{-10}$	$1.26\ 10^{-10}$	$5.18\ 10^{-9}$	**$2.46\ 10^{-9}$**
Ir-195	$1\ 10^{-2}$	$4.96\ 10^{-12}$	$7.76\ 10^{-13}$	$2.99\ 10^{-13}$	$2.27\ 10^{-12}$	$7.35\ 10^{-13}$	$4.60\ 10^{-14}$	$3.03\ 10^{-10}$	**$9.25\ 10^{-11}$**
Ir-195m	$1\ 10^{-2}$	$4.70\ 10^{-11}$	$7.11\ 10^{-12}$	$2.42\ 10^{-12}$	$1.40\ 10^{-11}$	$4.63\ 10^{-12}$	$2.94\ 10^{-13}$	$5.38\ 10^{-10}$	**$1.76\ 10^{-10}$**
Platinum									
Pt-186	$1\ 10^{-2}$	$8.70\ 10^{-11}$	$1.45\ 10^{-11}$	$5.34\ 10^{-12}$	$2.35\ 10^{-11}$	$7.99\ 10^{-12}$	$6.43\ 10^{-13}$	$2.76\ 10^{-10}$	**$1.10\ 10^{-10}$**
Pt-188	$1\ 10^{-2}$	$8.38\ 10^{-10}$	$9.60\ 10^{-11}$	$1.93\ 10^{-11}$	$2.06\ 10^{-10}$	$7.07\ 10^{-11}$	$7.29\ 10^{-12}$	$2.14\ 10^{-9}$	**$8.96\ 10^{-10}$**
Pt-189	$1\ 10^{-2}$	$1.12\ 10^{-10}$	$1.43\ 10^{-11}$	$3.22\ 10^{-12}$	$3.46\ 10^{-11}$	$1.09\ 10^{-11}$	$4.38\ 10^{-13}$	$3.59\ 10^{-10}$	**$1.43\ 10^{-10}$**
Pt-191	$1\ 10^{-2}$	$3.08\ 10^{-10}$	$3.41\ 10^{-11}$	$5.33\ 10^{-12}$	$9.57\ 10^{-11}$	$2.98\ 10^{-11}$	$1.08\ 10^{-12}$	$9.97\ 10^{-10}$	**$3.94\ 10^{-10}$**
Pt-193	$1\ 10^{-2}$	$2.02\ 10^{-12}$	$2.95\ 10^{-13}$	$2.73\ 10^{-13}$	$3.35\ 10^{-13}$	$2.94\ 10^{-13}$	$2.97\ 10^{-13}$	$1.05\ 10^{-10}$ **$3.60\ 10^{-10}$**	$3.21\ 10^{-11}$ LLI wall
Pt-193m	$1\ 10^{-2}$	$1.69\ 10^{-11}$	$2.25\ 10^{-12}$	$9.02\ 10^{-13}$	$7.13\ 10^{-12}$	$2.62\ 10^{-12}$	$7.60\ 10^{-13}$	$1.62\ 10^{-9}$ **$5.40\ 10^{-9}$**	$4.90\ 10^{-10}$ LLI wall
Pt-195m	$1\ 10^{-2}$	$9.76\ 10^{-11}$	$1.06\ 10^{-11}$	$2.09\ 10^{-12}$	$3.99\ 10^{-11}$	$1.25\ 10^{-11}$	$1.11\ 10^{-12}$	$2.20\ 10^{-9}$ **$7.22\ 10^{-9}$**	$6.91\ 10^{-10}$ LLI wall
Pt-197	$1\ 10^{-2}$	$1.49\ 10^{-11}$	$1.90\ 10^{-12}$	$5.58\ 10^{-13}$	$5.58\ 10^{-12}$	$1.91\ 10^{-12}$	$3.32\ 10^{-13}$	$1.44\ 10^{-9}$	**$4.35\ 10^{-10}$**
Pt-197m	$1\ 10^{-2}$	$4.67\ 10^{-12}$	$7.76\ 10^{-13}$	$3.44\ 10^{-13}$	$1.85\ 10^{-12}$	$6.28\ 10^{-13}$	$5.97\ 10^{-14}$	$2.77\ 10^{-10}$	**$8.46\ 10^{-11}$**
Pt-199	$1\ 10^{-2}$	$1.97\ 10^{-12}$	$5.07\ 10^{-13}$	$3.66\ 10^{-13}$	$7.09\ 10^{-13}$	$2.78\ 10^{-13}$	$3.80\ 10^{-14}$	$9.51\ 10^{-11}$	**$2.92\ 10^{-11}$**
Pt-200	$1\ 10^{-2}$	$1.08\ 10^{-10}$	$1.52\ 10^{-11}$	$3.98\ 10^{-12}$	$2.80\ 10^{-11}$	$9.80\ 10^{-12}$	$1.33\ 10^{-12}$	$4.23\ 10^{-9}$	**$1.30\ 10^{-9}$**
Gold									
Au-193	$1\ 10^{-1}$	$8.97\ 10^{-11}$	$1.17\ 10^{-11}$	$3.53\ 10^{-12}$	$3.35\ 10^{-11}$	$1.18\ 10^{-11}$	$1.89\ 10^{-12}$	$4.22\ 10^{-10}$	**$1.56\ 10^{-10}$**
Au-194	$1\ 10^{-1}$	$6.37\ 10^{-10}$	$8.90\ 10^{-11}$	$2.69\ 10^{-11}$	$1.55\ 10^{-10}$	$5.92\ 10^{-11}$	$1.30\ 10^{-11}$	$1.04\ 10^{-9}$	**$5.08\ 10^{-10}$**
Au-195	$1\ 10^{-1}$	$1.33\ 10^{-10}$	$1.98\ 10^{-11}$	$9.07\ 10^{-12}$	$6.29\ 10^{-11}$	$2.56\ 10^{-11}$	$7.43\ 10^{-12}$	$8.05\ 10^{-10}$	**$2.87\ 10^{-10}$**
Au-198	$1\ 10^{-1}$	$3.43\ 10^{-10}$	$5.51\ 10^{-11}$	$2.44\ 10^{-11}$	$8.57\ 10^{-11}$	$4.06\ 10^{-11}$	$1.85\ 10^{-11}$	$3.44\ 10^{-9}$	**$1.14\ 10^{-9}$**
Au-198m	$1\ 10^{-1}$	$6.21\ 10^{-10}$	$9.00\ 10^{-11}$	$3.61\ 10^{-11}$	$1.86\ 10^{-10}$	$7.93\ 10^{-11}$	$2.69\ 10^{-11}$	$4.14\ 10^{-9}$	**$1.44\ 10^{-9}$**
Au-199	$1\ 10^{-1}$	$9.21\ 10^{-11}$	$1.63\ 10^{-11}$	$8.62\ 10^{-12}$	$3.27\ 10^{-11}$	$1.57\ 10^{-11}$	$7.23\ 10^{-12}$	$1.50\ 10^{-9}$ **$4.80\ 10^{-9}$**	$4.82\ 10^{-10}$ LLI wall
Au-200	$1\ 10^{-1}$	$3.22\ 10^{-12}$	$9.67\ 10^{-13}$	$6.98\ 10^{-13}$	$1.14\ 10^{-12}$	$5.16\ 10^{-13}$	$1.67\ 10^{-13}$	$1.78\ 10^{-10}$	**$5.46\ 10^{-11}$**
Au-200m	$1\ 10^{-1}$	$9.29\ 10^{-10}$	$1.32\ 10^{-10}$	$4.19\ 10^{-11}$	$2.15\ 10^{-10}$	$8.34\ 10^{-11}$	$1.99\ 10^{-11}$	$3.11\ 10^{-9}$	**$1.22\ 10^{-9}$**
Au-201	$1\ 10^{-1}$	$3.41\ 10^{-13}$	$1.31\ 10^{-13}$	$1.14\ 10^{-13}$	$1.51\ 10^{-13}$	$7.09\ 10^{-14}$	$2.19\ 10^{-14}$	$5.56\ 10^{-11}$ **$1.92\ 10^{-10}$**	$1.68\ 10^{-11}$ ST wall
Mercury									
Hg-193	$2\ 10^{-2}$	$4.19\ 10^{-11}$	$5.41\ 10^{-12}$	$1.40\ 10^{-12}$	$1.52\ 10^{-11}$	$4.81\ 10^{-12}$	$2.35\ 10^{-13}$	$2.63\ 10^{-10}$	**$9{:}23\ 10^{-11}$**
	1.0	$1.23\ 10^{-11}$	$1.14\ 10^{-11}$	$1.20\ 10^{-11}$	$1.78\ 10^{-11}$	$1.58\ 10^{-11}$	$1.10\ 10^{-11}$	$6.98\ 10^{-11}$	**$3.01\ 10^{-11}$**
	$4\ 10^{-1}$	$3.25\ 10^{-11}$	$7.23\ 10^{-12}$	$4.66\ 10^{-12}$	$1.60\ 10^{-11}$	$8.22\ 10^{-12}$	$3.53\ 10^{-12}$	$1.99\ 10^{-10}$	**$7.18\ 10^{-11}$**

Table 2.2, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Hg-193m	$2\ 10^{-2}$	$3.61\ 10^{-10}$	$4.83\ 10^{-11}$	$1.20\ 10^{-11}$	$9.51\ 10^{-11}$	$3.18\ 10^{-11}$	$2.53\ 10^{-12}$	$1.18\ 10^{-9}$	**$4.65\ 10^{-10}$**
	1.0	$7.98\ 10^{-11}$	$7.21\ 10^{-11}$	$7.31\ 10^{-11}$	$1.04\ 10^{-10}$	$9.09\ 10^{-11}$	$7.39\ 10^{-11}$	$3.10\ 10^{-10}$	**$1.50\ 10^{-10}$**
	$4\ 10^{-1}$	$2.64\ 10^{-10}$	$5.66\ 10^{-11}$	$3.32\ 10^{-11}$	$9.82\ 10^{-11}$	$5.25\ 10^{-11}$	$2.73\ 10^{-11}$	$8.36\ 10^{-10}$	**$3.43\ 10^{-10}$**
Hg-194	$2\ 10^{-2}$	$1.51\ 10^{-9}$	$9.01\ 10^{-10}$	$8.31\ 10^{-10}$	$1.16\ 10^{-9}$	$9.46\ 10^{-10}$	$7.85\ 10^{-10}$	$2.87\ 10^{-9}$	**$1.66\ 10^{-9}$**
	1.0	$4.73\ 10^{-8}$	$3.95\ 10^{-8}$	$3.78\ 10^{-8}$	$6.04\ 10^{-8}$	$5.15\ 10^{-8}$	$4.52\ 10^{-8}$	$1.51\ 10^{-7}$	**$7.78\ 10^{-8}$**
	$4\ 10^{-1}$	$1.92\ 10^{-8}$	$1.58\ 10^{-8}$	$1.51\ 10^{-8}$	$2.42\ 10^{-8}$	$2.06\ 10^{-8}$	$1.81\ 10^{-8}$	$6.04\ 10^{-8}$	**$3.12\ 10^{-8}$**
Hg-195	$2\ 10^{-2}$	$6.10\ 10^{-11}$	$8.18\ 10^{-12}$	$2.11\ 10^{-12}$	$1.92\ 10^{-11}$	$6.22\ 10^{-12}$	$4.55\ 10^{-13}$	$3.01\ 10^{-10}$	**$1.09\ 10^{-10}$**
	1.0	$1.78\ 10^{-11}$	$1.68\ 10^{-11}$	$1.74\ 10^{-11}$	$2.62\ 10^{-11}$	$2.31\ 10^{-11}$	$1.71\ 10^{-11}$	$8.65\ 10^{-11}$	**$3.94\ 10^{-11}$**
	$4\ 10^{-1}$	$4.68\ 10^{-11}$	$1.12\ 10^{-11}$	$7.34\ 10^{-12}$	$2.18\ 10^{-11}$	$1.21\ 10^{-11}$	$6.14\ 10^{-12}$	$2.22\ 10^{-10}$	**$8.39\ 10^{-11}$**
Hg-195m	$2\ 10^{-2}$	$2.41\ 10^{-10}$	$2.86\ 10^{-11}$	$6.56\ 10^{-12}$	$6.65\ 10^{-11}$	$2.29\ 10^{-11}$	$3.14\ 10^{-12}$	$1.82\ 10^{-9}$	**$6.21\ 10^{-10}$**
	1.0	$1.39\ 10^{-10}$	$1.30\ 10^{-10}$	$1.32\ 10^{-10}$	$1.87\ 10^{-10}$	$1.68\ 10^{-10}$	$1.36\ 10^{-10}$	$7.63\ 10^{-10}$	**$3.30\ 10^{-10}$**
	$4\ 10^{-1}$	$2.01\ 10^{-10}$	$6.66\ 10^{-11}$	$5.36\ 10^{-11}$	$1.12\ 10^{-10}$	$7.78\ 10^{-11}$	$5.30\ 10^{-11}$	$1.37\ 10^{-9}$	**$4.96\ 10^{-10}$**
Hg-197	$2\ 10^{-2}$	$8.26\ 10^{-11}$	$9.43\ 10^{-12}$	$2.15\ 10^{-12}$	$3.53\ 10^{-11}$	$1.14\ 10^{-11}$	$1.27\ 10^{-12}$	$7.72\ 10^{-10}$	**$2.59\ 10^{-10}$**
	1.0	$6.10\ 10^{-11}$	$5.66\ 10^{-11}$	$5.88\ 10^{-11}$	$9.59\ 10^{-11}$	$8.54\ 10^{-11}$	$5.69\ 10^{-11}$	$3.63\ 10^{-10}$	**$1.56\ 10^{-10}$**
	$4\ 10^{-1}$	$7.43\ 10^{-11}$	$2.71\ 10^{-11}$	$2.34\ 10^{-11}$	$5.81\ 10^{-11}$	$3.93\ 10^{-11}$	$2.22\ 10^{-11}$	$5.96\ 10^{-10}$	**$2.13\ 10^{-10}$**
Hg-197m	$2\ 10^{-2}$	$7.89\ 10^{-11}$	$9.84\ 10^{-12}$	$2.71\ 10^{-12}$	$2.94\ 10^{-11}$	$1.01\ 10^{-11}$	$1.62\ 10^{-12}$	$1.63\ 10^{-9}$	**$5.14\ 10^{-10}$**
	1.0	$7.81\ 10^{-11}$	$7.43\ 10^{-11}$	$7.55\ 10^{-11}$	$1.00\ 10^{-10}$	$9.25\ 10^{-11}$	$7.39\ 10^{-11}$	$4.96\ 10^{-10}$	**$2.05\ 10^{-10}$**
	$4\ 10^{-1}$	$7.83\ 10^{-11}$	$3.34\ 10^{-11}$	$2.94\ 10^{-11}$	$5.54\ 10^{-11}$	$4.05\ 10^{-11}$	$2.82\ 10^{-11}$	$1.16\ 10^{-9}$	**$3.86\ 10^{-10}$**
Hg-199m	$2\ 10^{-2}$	$2.43\ 10^{-12}$	$6.11\ 10^{-13}$	$4.17\ 10^{-13}$	$1.16\ 10^{-12}$	$4.35\ 10^{-13}$	$2.92\ 10^{-14}$	$7.83\ 10^{-11}$	**$2.44\ 10^{-11}$**
	1.0	$1.94\ 10^{-12}$	$2.04\ 10^{-12}$	$2.14\ 10^{-12}$	$2.29\ 10^{-12}$	$2.09\ 10^{-12}$	$1.74\ 10^{-12}$	$4.73\ 10^{-11}$ **$2.18\ 10^{-10}$**	$1.56\ 10^{-11}$ ST wall
	$4\ 10^{-1}$	$2.37\ 10^{-12}$	$7.76\ 10^{-13}$	$6.17\ 10^{-13}$	$1.29\ 10^{-12}$	$6.27\ 10^{-13}$	$2.28\ 10^{-13}$	$7.46\ 10^{-11}$ **$2.17\ 10^{-10}$**	$2.33\ 10^{-11}$ ST wall
Hg-203	$2\ 10^{-2}$	$3.30\ 10^{-10}$	$5.41\ 10^{-11}$	$2.69\ 10^{-11}$	$9.38\ 10^{-11}$	$4.61\ 10^{-11}$	$2.15\ 10^{-11}$	$1.71\ 10^{-9}$	**$6.21\ 10^{-10}$**
	1.0	$1.37\ 10^{-9}$	$1.23\ 10^{-9}$	$1.23\ 10^{-9}$	$1.69\ 10^{-9}$	$1.51\ 10^{-9}$	$1.29\ 10^{-9}$	$7.10\ 10^{-9}$	**$3.09\ 10^{-9}$**
	$4\ 10^{-1}$	$7.32\ 10^{-10}$	$5.12\ 10^{-10}$	$4.95\ 10^{-10}$	$7.15\ 10^{-10}$	$6.15\ 10^{-10}$	$5.14\ 10^{-10}$	$3.74\ 10^{-9}$	**$1.56\ 10^{-9}$**
Thallium									
Tl-194	1.0	$1.46\ 10^{-12}$	$1.85\ 10^{-12}$	$2.17\ 10^{-12}$	$1.90\ 10^{-12}$	$1.44\ 10^{-12}$	$9.50\ 10^{-13}$	$1.65\ 10^{-11}$ **$5.29\ 10^{-11}$**	$6.15\ 10^{-12}$ ST wall
Tl-194m	1.0	$5.01\ 10^{-12}$	$6.10\ 10^{-12}$	$7.03\ 10^{-12}$	$5.96\ 10^{-12}$	$4.70\ 10^{-12}$	$3.52\ 10^{-12}$	$7.50\ 10^{-11}$ **$2.83\ 10^{-10}$**	$2.65\ 10^{-11}$ ST wall
Tl-195	1.0	$8.74\ 10^{-12}$	$8.33\ 10^{-12}$	$8.84\ 10^{-12}$	$9.19\ 10^{-12}$	$7.85\ 10^{-12}$	$6.43\ 10^{-12}$	$5.04\ 10^{-11}$	**$2.11\ 10^{-11}$**
Tl-197	1.0	$9.61\ 10^{-12}$	$8.93\ 10^{-12}$	$9.46\ 10^{-12}$	$1.17\ 10^{-11}$	$1.03\ 10^{-11}$	$7.88\ 10^{-12}$	$3.80\ 10^{-11}$	**$1.82\ 10^{-11}$**
Tl-198	1.0	$5.07\ 10^{-11}$	$4.18\ 10^{-11}$	$4.18\ 10^{-11}$	$4.69\ 10^{-11}$	$4.08\ 10^{-11}$	$3.65\ 10^{-11}$	$1.22\ 10^{-10}$	**$6.86\ 10^{-11}$**
Tl-198m	1.0	$2.09\ 10^{-11}$	$1.93\ 10^{-11}$	$2.02\ 10^{-11}$	$2.17\ 10^{-11}$	$1.89\ 10^{-11}$	$1.65\ 10^{-11}$	$9.58\ 10^{-11}$	**$4.30\ 10^{-11}$**
Tl-199	1.0	$1.34\ 10^{-11}$	$1.22\ 10^{-11}$	$1.29\ 10^{-11}$	$1.69\ 10^{-11}$	$1.49\ 10^{-11}$	$1.12\ 10^{-11}$	$4.20\ 10^{-11}$	**$2.21\ 10^{-11}$**
Tl-200	1.0	$1.55\ 10^{-10}$	$1.34\ 10^{-10}$	$1.34\ 10^{-10}$	$1.60\ 10^{-10}$	$1.41\ 10^{-10}$	$1.27\ 10^{-10}$	$2.65\ 10^{-10}$	**$1.82\ 10^{-10}$**
Tl-201	1.0	$6.19\ 10^{-11}$	$5.41\ 10^{-11}$	$5.78\ 10^{-11}$	$8.71\ 10^{-11}$	$7.76\ 10^{-11}$	$5.19\ 10^{-11}$	$1.21\ 10^{-10}$	**$8.11\ 10^{-11}$**
Tl-202	1.0	$3.53\ 10^{-10}$	$2.98\ 10^{-10}$	$3.18\ 10^{-10}$	$4.01\ 10^{-10}$	$3.53\ 10^{-10}$	$2.85\ 10^{-10}$	$5.33\ 10^{-10}$	**$3.98\ 10^{-10}$**
Tl-204	1.0	$6.57\ 10^{-10}$	$6.57\ 10^{-10}$	$6.57\ 10^{-10}$	$6.59\ 10^{-10}$	$6.59\ 10^{-10}$	$6.57\ 10^{-10}$	$1.49\ 10^{-9}$	**$9.08\ 10^{-10}$**
Lead									
Pb-195m	$2\ 10^{-1}$	$1.12\ 10^{-11}$	$3.29\ 10^{-12}$	$2.49\ 10^{-12}$	$4.50\ 10^{-12}$	$4.43\ 10^{-12}$	$3.64\ 10^{-13}$	$6.73\ 10^{-11}$	**$2.45\ 10^{-11}$**
Pb-198	$2\ 10^{-1}$	$3.39\ 10^{-11}$	$7.21\ 10^{-12}$	$4.38\ 10^{-12}$	$1.49\ 10^{-11}$	$1.30\ 10^{-11}$	$1.65\ 10^{-12}$	$1.07\ 10^{-10}$	**$4.43\ 10^{-11}$**
Pb-199	$2\ 10^{-1}$	$4.93\ 10^{-11}$	$1.06\ 10^{-11}$	$5.78\ 10^{-12}$	$1.69\ 10^{-11}$	$1.23\ 10^{-11}$	$1.29\ 10^{-12}$	$1.43\ 10^{-10}$	**$6.01\ 10^{-11}$**
Pb-200	$2\ 10^{-1}$	$4.14\ 10^{-10}$	$6.62\ 10^{-11}$	$3.23\ 10^{-11}$	$1.74\ 10^{-10}$	$3.60\ 10^{-10}$	$1.70\ 10^{-11}$	$1.06\ 10^{-9}$	**$4.67\ 10^{-10}$**
Pb-201	$2\ 10^{-1}$	$1.84\ 10^{-10}$	$2.93\ 10^{-11}$	$1.21\ 10^{-11}$	$6.55\ 10^{-11}$	$1.01\ 10^{-10}$	$4.89\ 10^{-12}$	$4.32\ 10^{-10}$	**$1.92\ 10^{-10}$**
Pb-202	$2\ 10^{-1}$	$5.76\ 10^{-9}$	$6.45\ 10^{-9}$	$6.39\ 10^{-9}$	$2.63\ 10^{-8}$	$3.73\ 10^{-8}$	$5.88\ 10^{-9}$	$9.63\ 10^{-9}$	**$1.05\ 10^{-8}$**
Pb-202m	$2\ 10^{-1}$	$1.63\ 10^{-10}$	$3.04\ 10^{-11}$	$1.42\ 10^{-11}$	$4.45\ 10^{-11}$	$2.47\ 10^{-11}$	$4.15\ 10^{-12}$	$3.32\ 10^{-10}$	**$1.53\ 10^{-10}$**

Table 2.2, Cont'd.

Nuclide	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Pb-203	$2\ 10^{-1}$	$2.44\ 10^{-10}$	$3.65\ 10^{-11}$	$1.77\ 10^{-11}$	$1.21\ 10^{-10}$	$3.34\ 10^{-10}$	$9.12\ 10^{-12}$	$6.66\ 10^{-10}$	**$2.93\ 10^{-10}$**
Pb-205	$2\ 10^{-1}$	$2.21\ 10^{-11}$	$2.32\ 10^{-11}$	$2.04\ 10^{-11}$	$1.72\ 10^{-9}$	$3.78\ 10^{-9}$	$2.17\ 10^{-11}$	$3.64\ 10^{-10}$	**$4.41\ 10^{-10}$**
Pb-209	$2\ 10^{-1}$	$5.37\ 10^{-13}$	$5.37\ 10^{-13}$	$5.37\ 10^{-13}$	$2.19\ 10^{-12}$	$2.09\ 10^{-11}$	$5.37\ 10^{-13}$	$1.88\ 10^{-10}$	**$5.75\ 10^{-11}$**
Pb-210	$2\ 10^{-1}$	$1.25\ 10^{-7}$	$1.25\ 10^{-7}$	$1.25\ 10^{-7}$	$1.48\ 10^{-6}$	**$2.16\ 10^{-5}$**	$1.25\ 10^{-7}$	$1.85\ 10^{-6}$	$1.45\ 10^{-6}$
Pb-211	$2\ 10^{-1}$	$1.97\ 10^{-11}$	$1.91\ 10^{-11}$	$1.90\ 10^{-11}$	$3.07\ 10^{-11}$	$1.60\ 10^{-10}$	$1.88\ 10^{-11}$	$4.10\ 10^{-10}$	**$1.42\ 10^{-10}$**
Pb-212	$2\ 10^{-1}$	$1.96\ 10^{-9}$	$1.67\ 10^{-9}$	$1.63\ 10^{-9}$	$1.51\ 10^{-8}$	**$1.66\ 10^{-7}$**	$1.62\ 10^{-9}$	$1.51\ 10^{-8}$	$1.23\ 10^{-8}$
Pb-214	$2\ 10^{-1}$	$3.19\ 10^{-11}$	$2.42\ 10^{-11}$	$2.32\ 10^{-11}$	$1.12\ 10^{-10}$	$1.10\ 10^{-9}$	$2.14\ 10^{-11}$	$3.58\ 10^{-10}$	**$1.69\ 10^{-10}$**
Bismuth									
Bi-200	$5\ 10^{-2}$	$3.40\ 10^{-11}$	$7.51\ 10^{-12}$	$4.80\ 10^{-12}$	$1.06\ 10^{-11}$	$4.03\ 10^{-12}$	$4.99\ 10^{-13}$	$1.25\ 10^{-10}$	**$4.92\ 10^{-11}$**
Bi-201	$5\ 10^{-2}$	$9.03\ 10^{-11}$	$1.52\ 10^{-11}$	$6.12\ 10^{-12}$	$2.47\ 10^{-11}$	$8.60\ 10^{-12}$	$8.06\ 10^{-13}$	$3.26\ 10^{-10}$	**$1.27\ 10^{-10}$**
Bi-202	$5\ 10^{-2}$	$8.99\ 10^{-11}$	$1.86\ 10^{-11}$	$9.68\ 10^{-12}$	$2.55\ 10^{-11}$	$9.37\ 10^{-12}$	$1.14\ 10^{-12}$	$2.24\ 10^{-10}$	**$9.71\ 10^{-11}$**
Bi-203	$5\ 10^{-2}$	$6.69\ 10^{-10}$	$9.74\ 10^{-11}$	$2.71\ 10^{-11}$	$1.58\ 10^{-10}$	$5.47\ 10^{-11}$	$4.85\ 10^{-12}$	$1.25\ 10^{-9}$	**$5.80\ 10^{-10}$**
Bi-205	$5\ 10^{-2}$	$1.52\ 10^{-9}$	$1.97\ 10^{-10}$	$4.48\ 10^{-11}$	$3.33\ 10^{-10}$	$1.17\ 10^{-10}$	$1.07\ 10^{-11}$	$2.09\ 10^{-9}$	**$1.08\ 10^{-9}$**
Bi-206	$5\ 10^{-2}$	$2.86\ 10^{-9}$	$3.64\ 10^{-10}$	$7.76\ 10^{-11}$	$6.18\ 10^{-10}$	$2.14\ 10^{-10}$	$1.75\ 10^{-11}$	$4.69\ 10^{-9}$	**$2.27\ 10^{-9}$**
Bi-207	$5\ 10^{-2}$	$1.57\ 10^{-9}$	$2.01\ 10^{-10}$	$4.43\ 10^{-11}$	$3.47\ 10^{-10}$	$1.21\ 10^{-10}$	$1.20\ 10^{-11}$	$3.35\ 10^{-9}$	**$1.48\ 10^{-9}$**
Bi-210	$5\ 10^{-2}$	$1.97\ 10^{-11}$	$1.97\ 10^{-11}$	$1.97\ 10^{-11}$	$1.97\ 10^{-11}$	$1.97\ 10^{-11}$	$1.97\ 10^{-11}$	$5.72\ 10^{-9}$	**$1.73\ 10^{-9}$**
Bi-210m	$5\ 10^{-2}$	$1.36\ 10^{-9}$	$1.07\ 10^{-9}$	$1.04\ 10^{-9}$	$1.11\ 10^{-9}$	$1.06\ 10^{-9}$	$1.04\ 10^{-9}$	$8.38\ 10^{-8}$ **$3.06\ 10^{-7}$**	$2.59\ 10^{-8}$ Kidneys
Bi-212	$5\ 10^{-2}$	$2.76\ 10^{-11}$	$1.18\ 10^{-11}$	$9.86\ 10^{-12}$	$1.29\ 10^{-11}$	$9.14\ 10^{-12}$	$7.11\ 10^{-12}$	$9.16\ 10^{-10}$	**$2.87\ 10^{-10}$**
Bi-213	$5\ 10^{-2}$	$6.17\ 10^{-12}$	$4.73\ 10^{-12}$	$4.56\ 10^{-12}$	$4.89\ 10^{-12}$	$4.45\ 10^{-12}$	$4.20\ 10^{-12}$	$6.38\ 10^{-10}$	**$1.95\ 10^{-10}$**
Bi-214	$5\ 10^{-2}$	$5.17\ 10^{-12}$	$2.55\ 10^{-12}$	$2.38\ 10^{-12}$	$2.51\ 10^{-12}$	$1.51\ 10^{-12}$	$8.55\ 10^{-13}$	$2.47\ 10^{-10}$ **$8.65\ 10^{-10}$**	$7.64\ 10^{-11}$ ST wall
Polonium									
Po-203	$1\ 10^{-1}$	$4.82\ 10^{-11}$	$9.29\ 10^{-12}$	$4.79\ 10^{-12}$	$1.32\ 10^{-11}$	$5.17\ 10^{-12}$	$1.03\ 10^{-12}$	$1.28\ 10^{-10}$	**$5.41\ 10^{-11}$**
Po-205	$1\ 10^{-1}$	$6.26\ 10^{-11}$	$1.34\ 10^{-11}$	$7.29\ 10^{-12}$	$1.85\ 10^{-11}$	$7.48\ 10^{-12}$	$1.84\ 10^{-12}$	$1.46\ 10^{-10}$	**$6.49\ 10^{-11}$**
Po-207	$1\ 10^{-1}$	$1.85\ 10^{-10}$	$3.09\ 10^{-11}$	$1.16\ 10^{-11}$	$4.78\ 10^{-11}$	$1.76\ 10^{-11}$	$3.16\ 10^{-12}$	$3.64\ 10^{-10}$	**$1.68\ 10^{-10}$**
Po-210	$1\ 10^{-1}$	$8.23\ 10^{-8}$	$8.23\ 10^{-8}$	$8.23\ 10^{-8}$	$8.23\ 10^{-8}$	$8.23\ 10^{-8}$	$8.23\ 10^{-8}$	$1.52\ 10^{-6}$	**$5.14\ 10^{-7}$**
Astatine									
At-207	1.0	$2.16\ 10^{-10}$	$2.14\ 10^{-10}$	$2.14\ 10^{-10}$	$2.18\ 10^{-10}$	$2.14\ 10^{-10}$	$2.12\ 10^{-10}$	$2.85\ 10^{-10}$	**$2.36\ 10^{-10}$**
At-211	1.0	$1.06\ 10^{-8}$	$1.06\ 10^{-8}$	$1.06\ 10^{-8}$	$1.06\ 10^{-8}$	$1.06\ 10^{-8}$	$1.06\ 10^{-8}$	$1.09\ 10^{-8}$	**$1.07\ 10^{-8}$**
Francium									
Fr-222	1.0	$5.76\ 10^{-10}$	$5.76\ 10^{-10}$	$5.76\ 10^{-10}$	$5.76\ 10^{-10}$	$5.76\ 10^{-10}$	$5.76\ 10^{-10}$	$8.69\ 10^{-10}$	**$6.64\ 10^{-10}$**
Fr-223	1.0	$2.32\ 10^{-9}$	$2.32\ 10^{-9}$	$2.32\ 10^{-9}$	$2.32\ 10^{-9}$	$2.32\ 10^{-9}$	$2.32\ 10^{-9}$	$2.35\ 10^{-9}$	**$2.33\ 10^{-9}$**
Radium									
Ra-223	$2\ 10^{-1}$	$4.26\ 10^{-8}$	$4.23\ 10^{-8}$	$4.23\ 10^{-8}$	$2.80\ 10^{-7}$	**$2.93\ 10^{-6}$**	$4.23\ 10^{-8}$	$1.10\ 10^{-7}$	$1.78\ 10^{-7}$
Ra-224	$2\ 10^{-1}$	$2.12\ 10^{-8}$	$2.06\ 10^{-8}$	$2.05\ 10^{-8}$	$1.52\ 10^{-7}$	**$1.59\ 10^{-6}$**	$2.05\ 10^{-8}$	$7.15\ 10^{-8}$	$9.89\ 10^{-8}$
Ra-225	$2\ 10^{-1}$	$3.37\ 10^{-8}$	$3.37\ 10^{-8}$	$3.37\ 10^{-8}$	$1.68\ 10^{-7}$	**$1.78\ 10^{-6}$**	$3.37\ 10^{-8}$	$4.09\ 10^{-8}$	$1.04\ 10^{-7}$
Ra-226	$2\ 10^{-1}$	$9.16\ 10^{-8}$	$9.17\ 10^{-8}$	$9.16\ 10^{-8}$	$5.98\ 10^{-7}$	**$6.83\ 10^{-6}$**	$9.15\ 10^{-8}$	$1.03\ 10^{-7}$	$3.58\ 10^{-7}$
Ra-227	$2\ 10^{-1}$	$3.65\ 10^{-12}$	$2.31\ 10^{-12}$	$2.16\ 10^{-12}$	$4.30\ 10^{-11}$	**$8.54\ 10^{-10}$**	$1.84\ 10^{-12}$	$9.56\ 10^{-11}$	$6.10\ 10^{-11}$
Ra-228	$2\ 10^{-1}$	$1.58\ 10^{-7}$	$1.57\ 10^{-7}$	$1.57\ 10^{-7}$	$6.53\ 10^{-7}$	**$5.82\ 10^{-6}$**	$1.57\ 10^{-7}$	$1.63\ 10^{-7}$	$3.88\ 10^{-7}$
Actinium									
Ac-224	$1\ 10^{-3}$	$6.36\ 10^{-11}$	$6.82\ 10^{-12}$	$1.81\ 10^{-12}$	$9.65\ 10^{-11}$	$1.05\ 10^{-9}$	$2.04\ 10^{-13}$	$2.48\ 10^{-9}$ **$7.16\ 10^{-9}$**	$8.03\ 10^{-10}$ LLI wall
Ac-225	$1\ 10^{-3}$	$1.36\ 10^{-9}$	$2.73\ 10^{-11}$	$3.98\ 10^{-12}$	$7.99\ 10^{-9}$	$9.94\ 10^{-8}$	$5.49\ 10^{-13}$	$8.57\ 10^{-8}$ **$2.82\ 10^{-7}$**	$3.00\ 10^{-8}$ LLI wall
Ac-226	$1\ 10^{-3}$	$2.30\ 10^{-10}$	$1.12\ 10^{-11}$	$1.73\ 10^{-12}$	$7.70\ 10^{-10}$	$9.46\ 10^{-9}$	$1.44\ 10^{-13}$	$3.68\ 10^{-8}$ **$1.10\ 10^{-7}$**	$1.15\ 10^{-8}$ LLI wall

Table 2.2, Cont'd.

	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Ac-227	$1\ 10^{-3}$	$8.31\ 10^{-7}$	$1.41\ 10^{-10}$	$2.20\ 10^{-10}$	$5.40\ 10^{-6}$	**$6.73\ 10^{-5}$**	$7.55\ 10^{-11}$	$3.08\ 10^{-6}$	$3.80\ 10^{-6}$
Ac-228	$1\ 10^{-3}$	$1.79\ 10^{-10}$	$2.31\ 10^{-11}$	$7.34\ 10^{-12}$	$2.75\ 10^{-10}$	$3.01\ 10^{-9}$	$9.39\ 10^{-13}$	$1.38\ 10^{-9}$	**$5.85\ 10^{-10}$**
Thorium									
Th-226	$2\ 10^{-4}$	$1.83\ 10^{-13}$	$8.74\ 10^{-14}$	$7.74\ 10^{-14}$	$6.07\ 10^{-13}$	$6.25\ 10^{-12}$	$4.88\ 10^{-14}$	$8.32\ 10^{-10}$ **$2.70\ 10^{-9}$**	$2.50\ 10^{-10}$ ST wall
Th-227	$2\ 10^{-4}$	$2.95\ 10^{-10}$	$1.40\ 10^{-10}$	$1.25\ 10^{-10}$	$5.69\ 10^{-9}$	$6.84\ 10^{-8}$	$1.23\ 10^{-10}$	$2.47\ 10^{-8}$	**$1.03\ 10^{-8}$**
Th-228	$2\ 10^{-4}$	$2.53\ 10^{-9}$	$2.33\ 10^{-9}$	$2.31\ 10^{-9}$	$1.93\ 10^{-7}$	**$2.37\ 10^{-6}$**	$2.30\ 10^{-9}$	$3.86\ 10^{-8}$	$1.07\ 10^{-7}$
Th-229	$2\ 10^{-4}$	$4.69\ 10^{-9}$	$4.57\ 10^{-9}$	$4.56\ 10^{-9}$	$1.91\ 10^{-6}$	**$2.38\ 10^{-5}$**	$4.55\ 10^{-9}$	$2.80\ 10^{-8}$	$9.54\ 10^{-7}$
Th-230	$2\ 10^{-4}$	$6.82\ 10^{-10}$	$6.80\ 10^{-10}$	$6.80\ 10^{-10}$	$2.89\ 10^{-7}$	**$3.60\ 10^{-6}$**	$6.80\ 10^{-10}$	$1.54\ 10^{-8}$	$1.48\ 10^{-7}$
Th-231	$2\ 10^{-4}$	$2.08\ 10^{-11}$	$1.44\ 10^{-12}$	$1.43\ 10^{-13}$	$5.30\ 10^{-12}$	$3.17\ 10^{-12}$	$8.80\ 10^{-15}$	$1.19\ 10^{-9}$	**$3.65\ 10^{-10}$**
Th-232	$2\ 10^{-4}$	$1.25\ 10^{-9}$	$1.26\ 10^{-9}$	$1.25\ 10^{-9}$	$1.48\ 10^{-6}$	**$1.85\ 10^{-5}$**	$1.21\ 10^{-9}$	$1.47\ 10^{-8}$	$7.38\ 10^{-7}$
Th-234	$2\ 10^{-4}$	$3.12\ 10^{-11}$	$3.57\ 10^{-12}$	$7.05\ 10^{-13}$	$1.84\ 10^{-11}$	$2.08\ 10^{-11}$	$2.88\ 10^{-13}$	$1.23\ 10^{-8}$ **$4.30\ 10^{-8}$**	$3.69\ 10^{-9}$ LLI wall
Protactinium									
Pa-227	$1\ 10^{-3}$	$8.23\ 10^{-13}$	$2.01\ 10^{-13}$	$1.34\ 10^{-13}$	$4.09\ 10^{-12}$	$4.92\ 10^{-11}$	$8.11\ 10^{-15}$	$1.18\ 10^{-9}$	**$3.55\ 10^{-10}$**
Pa-228	$1\ 10^{-3}$	$5.56\ 10^{-10}$	$7.22\ 10^{-11}$	$1.58\ 10^{-11}$	$8.92\ 10^{-10}$	$9.59\ 10^{-9}$	$2.08\ 10^{-12}$	$1.96\ 10^{-9}$	**$1.13\ 10^{-9}$**
Pa-230	$1\ 10^{-3}$	$6.75\ 10^{-10}$	$8.06\ 10^{-11}$	$1.42\ 10^{-11}$	$1.78\ 10^{-9}$	**$2.05\ 10^{-8}$**	$2.06\ 10^{-12}$	$2.23\ 10^{-9}$	$1.68\ 10^{-9}$
Pa-231	$1\ 10^{-3}$	$1.21\ 10^{-10}$	$7.81\ 10^{-11}$	$6.80\ 10^{-11}$	$5.78\ 10^{-6}$	**$7.22\ 10^{-5}$**	$6.33\ 10^{-11}$	$1.71\ 10^{-8}$	$2.86\ 10^{-6}$
Pa-232	$1\ 10^{-3}$	$5.44\ 10^{-10}$	$6.95\ 10^{-11}$	$1.46\ 10^{-11}$	$5.19\ 10^{-10}$	$5.11\ 10^{-9}$	$1.97\ 10^{-12}$	$2.00\ 10^{-9}$	**$9.65\ 10^{-10}$**
Pa-233	$1\ 10^{-3}$	$2.58\ 10^{-10}$	$2.71\ 10^{-11}$	$3.70\ 10^{-12}$	$6.89\ 10^{-11}$	$1.02\ 10^{-10}$	$4.81\ 10^{-13}$	$3.00\ 10^{-9}$ **$1.02\ 10^{-8}$**	$9.81\ 10^{-10}$ LLI wall
Pa-234	$1\ 10^{-3}$	$3.30\ 10^{-10}$	$4.99\ 10^{-11}$	$1.51\ 10^{-11}$	$7.86\ 10^{-11}$	$2.74\ 10^{-11}$	$1.86\ 10^{-12}$	$1.61\ 10^{-9}$	**$5.84\ 10^{-10}$**
Uranium									
U-230	$5\ 10^{-2}$	$8.30\ 10^{-9}$	$8.28\ 10^{-9}$	$8.27\ 10^{-9}$	$2.85\ 10^{-7}$	**$3.43\ 10^{-6}$**	$8.27\ 10^{-9}$	$3.40\ 10^{-7}$	$2.44\ 10^{-7}$
	$2\ 10^{-3}$	$3.58\ 10^{-10}$	$3.34\ 10^{-10}$	$3.31\ 10^{-10}$	$1.14\ 10^{-8}$	$1.37\ 10^{-7}$	$3.31\ 10^{-10}$	$1.02\ 10^{-7}$	**$3.62\ 10^{-8}$**
U-231	$5\ 10^{-2}$	$9.35\ 10^{-11}$	$9.69\ 10^{-12}$	$2.03\ 10^{-12}$	$4.30\ 10^{-11}$	$1.39\ 10^{-10}$	$9.54\ 10^{-13}$	$9.36\ 10^{-10}$ **$2.96\ 10^{-9}$**	$3.15\ 10^{-10}$ LLI wall
	$2\ 10^{-3}$	$9.69\ 10^{-11}$	$9.03\ 10^{-12}$	$1.02\ 10^{-12}$	$3.13\ 10^{-11}$	$1.45\ 10^{-11}$	$7.73\ 10^{-14}$	$9.68\ 10^{-10}$ **$3.10\ 10^{-9}$**	$3.20\ 10^{-10}$ LLI wall
U-232	$5\ 10^{-2}$	$8.27\ 10^{-9}$	$8.33\ 10^{-9}$	$8.29\ 10^{-9}$	$4.19\ 10^{-7}$	**$6.63\ 10^{-6}$**	$8.11\ 10^{-9}$	$3.35\ 10^{-7}$	$3.54\ 10^{-7}$
	$2\ 10^{-3}$	$3.34\ 10^{-10}$	$3.33\ 10^{-10}$	$3.32\ 10^{-10}$	$1.68\ 10^{-8}$	**$2.65\ 10^{-7}$**	$3.25\ 10^{-10}$	$2.83\ 10^{-8}$	$1.87\ 10^{-8}$
U-233	$5\ 10^{-2}$	$2.62\ 10^{-9}$	$2.62\ 10^{-9}$	$2.62\ 10^{-9}$	$7.36\ 10^{-8}$	**$1.16\ 10^{-6}$**	$2.62\ 10^{-9}$	$1.10\ 10^{-7}$	$7.81\ 10^{-8}$
	$2\ 10^{-3}$	$1.07\ 10^{-10}$	$1.05\ 10^{-10}$	$1.05\ 10^{-10}$	$2.95\ 10^{-9}$	$4.62\ 10^{-8}$	$1.05\ 10^{-10}$	$1.78\ 10^{-8}$	**$7.15\ 10^{-9}$**
U-234	$5\ 10^{-2}$	$2.59\ 10^{-9}$	$2.58\ 10^{-9}$	$2.58\ 10^{-9}$	$7.21\ 10^{-8}$	**$1.13\ 10^{-6}$**	$2.58\ 10^{-9}$	$1.09\ 10^{-7}$	$7.66\ 10^{-8}$
	$2\ 10^{-3}$	$1.06\ 10^{-10}$	$1.03\ 10^{-10}$	$1.03\ 10^{-10}$	$2.88\ 10^{-9}$	$4.52\ 10^{-8}$	$1.03\ 10^{-10}$	$1.77\ 10^{-8}$	**$7.06\ 10^{-9}$**
U-235	$5\ 10^{-2}$	$2.67\ 10^{-9}$	$2.49\ 10^{-9}$	$2.46\ 10^{-9}$	$6.81\ 10^{-8}$	**$1.05\ 10^{-6}$**	$2.45\ 10^{-9}$	$1.03\ 10^{-7}$	$7.19\ 10^{-8}$
	$2\ 10^{-3}$	$3.34\ 10^{-10}$	$1.21\ 10^{-10}$	$1.01\ 10^{-10}$	$2.78\ 10^{-9}$	$4.20\ 10^{-8}$	$9.82\ 10^{-11}$	$1.84\ 10^{-8}$	**$7.22\ 10^{-9}$**
U-236	$5\ 10^{-2}$	$2.45\ 10^{-9}$	$2.45\ 10^{-9}$	$2.45\ 10^{-9}$	$6.83\ 10^{-8}$	**$1.07\ 10^{-6}$**	$2.45\ 10^{-9}$	$1.03\ 10^{-7}$	$7.26\ 10^{-8}$
	$2\ 10^{-3}$	$1.00\ 10^{-10}$	$9.79\ 10^{-11}$	$9.79\ 10^{-11}$	$2.73\ 10^{-9}$	$4.28\ 10^{-8}$	$9.79\ 10^{-11}$	$1.67\ 10^{-8}$	**$6.68\ 10^{-9}$**
U-237	$5\ 10^{-2}$	$1.75\ 10^{-10}$	$2.02\ 10^{-11}$	$4.98\ 10^{-12}$	$9.50\ 10^{-11}$	$4.41\ 10^{-10}$	$2.77\ 10^{-12}$	$2.59\ 10^{-9}$ **$8.47\ 10^{-9}$**	$8.48\ 10^{-10}$ LLI wall
	$2\ 10^{-3}$	$1.81\ 10^{-10}$	$1.81\ 10^{-11}$	$2.17\ 10^{-12}$	$5.69\ 10^{-11}$	$3.39\ 10^{-11}$	$2.31\ 10^{-13}$	$2.67\ 10^{-9}$ **$8.89\ 10^{-9}$**	$8.57\ 10^{-10}$ LLI wall
U-238	$5\ 10^{-2}$	$2.31\ 10^{-9}$	$2.31\ 10^{-9}$	$2.30\ 10^{-9}$	$6.80\ 10^{-8}$	**$1.01\ 10^{-6}$**	$2.30\ 10^{-9}$	$9.69\ 10^{-8}$	$6.88\ 10^{-8}$
	$2\ 10^{-3}$	$1.02\ 10^{-10}$	$9.33\ 10^{-11}$	$9.22\ 10^{-11}$	$2.72\ 10^{-9}$	$4.04\ 10^{-8}$	$9.20\ 10^{-11}$	$1.61\ 10^{-8}$	**$6.42\ 10^{-9}$**
U-239	$5\ 10^{-2}$	$1.42\ 10^{-12}$	$2.35\ 10^{-13}$	$1.21\ 10^{-13}$	$6.48\ 10^{-13}$	$1.52\ 10^{-12}$	$2.23\ 10^{-14}$	$6.72\ 10^{-11}$	**$2.07\ 10^{-11}$**
	$2\ 10^{-3}$	$1.45\ 10^{-12}$	$2.21\ 10^{-13}$	$1.03\ 10^{-13}$	$5.13\ 10^{-13}$	$2.31\ 10^{-13}$	$4.60\ 10^{-15}$	$6.80\ 10^{-11}$	**$2.09\ 10^{-11}$**
U-240	$5\ 10^{-2}$	$1.22\ 10^{-10}$	$1.79\ 10^{-11}$	$6.01\ 10^{-12}$	$3.76\ 10^{-11}$	$4.96\ 10^{-11}$	$2.93\ 10^{-12}$	$3.75\ 10^{-9}$	**$1.16\ 10^{-9}$**
	$2\ 10^{-3}$	$1.24\ 10^{-10}$	$1.60\ 10^{-11}$	$3.69\ 10^{-12}$	$2.62\ 10^{-11}$	$1.02\ 10^{-11}$	$5.59\ 10^{-13}$	$3.88\ 10^{-9}$	**$1.20\ 10^{-9}$**

Table 2.2, Cont'd.

Nuclide	Committed Dose Equivalent per Unit Intake (Sv/Bq)								
	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Neptunium									
Np-232	1 10^{-3}	3.33 10^{-12}	1.19 10^{-12}	1.15 10^{-12}	6.25 10^{-12}	6.30 10^{-11}	1.04 10^{-13}	2.11 10^{-11}	**1.01 10^{-11}**
Np-233	1 10^{-3}	9.36 10^{-13}	2.45 10^{-13}	1.75 10^{-13}	5.16 10^{-13}	2.05 10^{-13}	7.31 10^{-15}	5.45 10^{-12}	**1.99 10^{-12}**
Np-234	1 10^{-3}	8.42 10^{-10}	1.11 10^{-10}	2.28 10^{-11}	1.86 10^{-10}	6.89 10^{-11}	3.79 10^{-12}	1.63 10^{-9}	**7.43 10^{-10}**
Np-235	1 10^{-3}	1.30 10^{-11}	5.36 10^{-13}	1.05 10^{-13}	1.64 10^{-11}	1.47 10^{-10}	2.41 10^{-14}	1.86 10^{-10} **6.32 10^{-10}**	6.56 10^{-11} LLI wall
Np-236 1.15 10^{5} y	1 10^{-3}	5.24 10^{-8}	9.88 10^{-11}	9.29 10^{-11}	4.24 10^{-7}	**5.29 10^{-6}**	5.18 10^{-11}	3.63 10^{-8}	2.34 10^{-7}
Np-236 22.5 h	1 10^{-3}	6.44 10^{-11}	3.47 10^{-12}	5.66 10^{-13}	3.34 10^{-10}	**4.05 10^{-9}**	4.41 10^{-14}	6.38 10^{-10}	3.70 10^{-10}
Np-237	1 10^{-3}	2.46 10^{-7}	1.45 10^{-10}	1.53 10^{-10}	2.18 10^{-6}	**2.72 10^{-5}**	1.10 10^{-10}	2.10 10^{-7}	1.20 10^{-6}
Np-238	1 10^{-3}	3.89 10^{-10}	4.81 10^{-11}	1.02 10^{-11}	2.17 10^{-10}	1.77 10^{-9}	1.50 10^{-12}	2.97 10^{-9}	**1.08 10^{-9}**
Np-239	1 10^{-3}	1.62 10^{-10}	1.72 10^{-11}	2.40 10^{-12}	4.66 10^{-11}	3.59 10^{-11}	2.07 10^{-13}	2.77 10^{-9} **8.72 10^{-9}**	8.82 10^{-10} LLI wall
Np-240	1 10^{-3}	2.50 10^{-11}	5.72 10^{-12}	3.49 10^{-12}	7.74 10^{-12}	3.44 10^{-12}	3.46 10^{-13}	1.85 10^{-10}	**6.40 10^{-11}**
Plutonium									
Pu-234	1 10^{-3}	7.82 10^{-11}	9.27 10^{-12}	1.85 10^{-12}	4.47 10^{-11}	3.28 10^{-10}	4.69 10^{-13}	4.73 10^{-10}	**1.78 10^{-10}**
	1 10^{-4}	7.48 10^{-11}	9.02 10^{-12}	1.59 10^{-12}	2.13 10^{-11}	3.83 10^{-11}	2.27 10^{-13}	4.61 10^{-10}	**1.62 10^{-10}**
	1 10^{-5}	7.45 10^{-11}	9.00 10^{-12}	1.57 10^{-12}	1.89 10^{-11}	9.35 10^{-12}	2.03 10^{-13}	4.61 10^{-10}	**1.61 10^{-10}**
Pu-235	1 10^{-3}	5.59 10^{-13}	1.74 10^{-13}	1.40 10^{-13}	3.32 10^{-13}	1.36 10^{-13}	6.03 10^{-15}	4.98 10^{-12}	**1.72 10^{-12}**
	1 10^{-4}	5.59 10^{-13}	1.74 10^{-13}	1.40 10^{-13}	3.32 10^{-13}	1.32 10^{-13}	6.02 10^{-15}	4.98 10^{-12}	**1.72 10^{-12}**
	1 10^{-5}	5.59 10^{-13}	1.74 10^{-13}	1.40 10^{-13}	3.32 10^{-13}	1.32 10^{-13}	6.02 10^{-15}	4.98 10^{-12}	**1.72 10^{-12}**
Pu-236	1 10^{-3}	7.82 10^{-8}	2.77 10^{-11}	3.47 10^{-11}	4.49 10^{-7}	**5.61 10^{-6}**	1.56 10^{-11}	2.43 10^{-7}	3.15 10^{-7}
	1 10^{-4}	7.82 10^{-9}	2.87 10^{-12}	3.48 10^{-12}	4.49 10^{-8}	**5.61 10^{-7}**	1.56 10^{-12}	3.93 10^{-8}	3.60 10^{-8}
	1 10^{-5}	7.85 10^{-10}	3.90 10^{-13}	3.49 10^{-13}	4.49 10^{-9}	**5.61 10^{-8}**	1.56 10^{-13}	1.90 10^{-8}	8.12 10^{-9}
Pu-237	1 10^{-3}	7.24 10^{-11}	7.17 10^{-12}	1.02 10^{-12}	2.57 10^{-11}	2.66 10^{-11}	9.23 10^{-14}	3.23 10^{-10}	**1.20 10^{-10}**
	1 10^{-4}	7.22 10^{-11}	7.03 10^{-12}	7.79 10^{-13}	2.37 10^{-11}	9.15 10^{-12}	3.82 10^{-14}	3.23 10^{-10}	**1.19 10^{-10}**
	1 10^{-5}	7.22 10^{-11}	7.02 10^{-12}	7.54 10^{-13}	2.35 10^{-11}	7.40 10^{-12}	3.28 10^{-14}	3.23 10^{-10}	**1.19 10^{-10}**
Pu-238	1 10^{-3}	2.33 10^{-7}	8.41 10^{-12}	8.49 10^{-12}	1.27 10^{-6}	**1.58 10^{-5}**	7.99 10^{-12}	6.00 10^{-7}	8.65 10^{-7}
	1 10^{-4}	2.33 10^{-8}	9.28 10^{-13}	8.50 10^{-13}	1.27 10^{-7}	**1.58 10^{-6}**	7.99 10^{-13}	7.44 10^{-8}	9.08 10^{-8}
	1 10^{-5}	2.33 10^{-9}	1.80 10^{-13}	8.64 10^{-14}	1.27 10^{-8}	**1.58 10^{-7}**	7.99 10^{-14}	2.18 10^{-8}	1.34 10^{-8}
Pu-239	1 10^{-3}	2.64 10^{-7}	7.69 10^{-12}	7.74 10^{-12}	1.41 10^{-6}	**1.76 10^{-5}**	7.49 10^{-12}	6.43 10^{-7}	9.56 10^{-7}
	1 10^{-4}	2.64 10^{-8}	8.09 10^{-13}	7.75 10^{-13}	1.41 10^{-7}	**1.76 10^{-6}**	7.49 10^{-13}	7.77 10^{-8}	9.96 10^{-8}
	1 10^{-5}	2.64 10^{-9}	1.21 10^{-13}	7.89 10^{-14}	1.41 10^{-8}	**1.76 10^{-7}**	7.50 10^{-14}	2.12 10^{-8}	1.40 10^{-8}
Pu-240	1 10^{-3}	2.64 10^{-7}	7.97 10^{-12}	8.07 10^{-12}	1.41 10^{-6}	**1.76 10^{-5}**	7.51 10^{-12}	6.43 10^{-7}	9.56 10^{-7}
	1 10^{-4}	2.64 10^{-8}	8.82 10^{-13}	8.08 10^{-13}	1.41 10^{-7}	**1.76 10^{-6}**	7.51 10^{-13}	7.78 10^{-8}	9.97 10^{-8}
	1 10^{-5}	2.64 10^{-9}	1.73 10^{-13}	8.22 10^{-14}	1.41 10^{-8}	**1.76 10^{-7}**	7.51 10^{-14}	2.13 10^{-8}	1.40 10^{-8}
Pu-241	1 10^{-3}	5.66 10^{-9}	2.52 10^{-13}	4.45 10^{-13}	2.78 10^{-8}	**3.48 10^{-7}**	1.01 10^{-13}	1.10 10^{-8}	1.85 10^{-8}
	1 10^{-4}	5.66 10^{-10}	2.54 10^{-14}	4.45 10^{-14}	2.78 10^{-9}	**3.48 10^{-8}**	1.01 10^{-14}	1.16 10^{-9}	1.87 10^{-9}
	1 10^{-5}	5.66 10^{-11}	2.79 10^{-15}	4.48 10^{-15}	2.78 10^{-10}	**3.48 10^{-9}**	1.01 10^{-15}	1.85 10^{-10}	2.07 10^{-10}
Pu-242	1 10^{-3}	2.51 10^{-7}	8.00 10^{-12}	7.88 10^{-12}	1.34 10^{-6}	**1.67 10^{-5}**	7.29 10^{-12}	6.10 10^{-7}	9.08 10^{-7}
	1 10^{-4}	2.51 10^{-8}	9.58 10^{-13}	8.00 10^{-13}	1.34 10^{-7}	**1.67 10^{-6}**	7.30 10^{-13}	7.38 10^{-8}	9.46 10^{-8}
	1 10^{-5}	2.51 10^{-9}	2.54 10^{-13}	9.18 10^{-14}	1.34 10^{-8}	**1.67 10^{-7}**	7.38 10^{-14}	2.02 10^{-8}	1.33 10^{-8}
Pu-243	1 10^{-3}	4.58 10^{-12}	5.96 10^{-13}	1.51 10^{-13}	1.95 10^{-12}	2.08 10^{-12}	8.79 10^{-15}	2.96 10^{-10}	**9.02 10^{-11}**
	1 10^{-4}	4.56 10^{-12}	5.93 10^{-13}	1.48 10^{-13}	1.83 10^{-12}	7.08 10^{-13}	5.80 10^{-15}	2.96 10^{-10}	**9.02 10^{-11}**
	1 10^{-5}	4.56 10^{-12}	5.93 10^{-13}	1.47 10^{-13}	1.82 10^{-12}	5.71 10^{-13}	5.50 10^{-15}	2.96 10^{-10}	**9.02 10^{-11}**

Table 2.2, Cont'd.

Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Pu-244	1 10^{-3}	2.49 10^{-7}	3.24 10^{-10}	3.23 10^{-10}	1.32 10^{-6}	**1.64 10^{-5}**	1.50 10^{-10}	6.13 10^{-7}	8.97 10^{-7}
	1 10^{-4}	2.53 10^{-8}	7.82 10^{-11}	3.78 10^{-11}	1.33 10^{-7}	**1.64 10^{-6}**	1.56 10^{-11}	8.15 10^{-8}	9.59 10^{-8}
	1 10^{-5}	2.94 10^{-9}	5.36 10^{-11}	9.29 10^{-12}	1.33 10^{-8}	**1.65 10^{-7}**	2.22 10^{-12}	2.84 10^{-8}	1.58 10^{-8}
Pu-245	1 10^{-3}	1.22 10^{-10}	1.63 10^{-11}	4.01 10^{-12}	2.87 10^{-11}	1.25 10^{-11}	4.78 10^{-13}	2.32 10^{-9}	**7.34 10^{-10}**
	1 10^{-4}	1.22 10^{-10}	1.62 10^{-11}	3.98 10^{-12}	2.83 10^{-11}	9.74 10^{-12}	4.53 10^{-13}	2.32 10^{-9}	**7.34 10^{-10}**
	1 10^{-5}	1.22 10^{-10}	1.62 10^{-11}	3.98 10^{-12}	2.83 10^{-11}	9.46 10^{-12}	4.50 10^{-13}	2.32 10^{-9}	**7.34 10^{-10}**
Pu-246	1 10^{-3}	9.43 10^{-10}	1.02 10^{-10}	1.51 10^{-11}	2.30 10^{-10}	2.69 10^{-10}	2.06 10^{-12}	1.12 10^{-8} **3.81 10^{-8}**	3.66 10^{-9} LLI wall
	1 10^{-4}	9.40 10^{-10}	1.01 10^{-10}	1.42 10^{-11}	2.10 10^{-10}	8.72 10^{-11}	1.75 10^{-12}	1.13 10^{-8} **3.82 10^{-8}**	3.66 10^{-9} LLI wall
	1 10^{-5}	9.40 10^{-10}	1.01 10^{-10}	1.41 10^{-11}	2.08 10^{-10}	6.90 10^{-11}	1.71 10^{-12}	1.13 10^{-8}	**3.66 10^{-9}**
Americium									
Am-237	1 10^{-3}	9.46 10^{-12}	1.96 10^{-12}	1.07 10^{-12}	3.42 10^{-12}	1.21 10^{-12}	7.97 10^{-14}	4.84 10^{-11}	**1.78 10^{-11}**
Am-238	1 10^{-3}	2.92 10^{-11}	5.93 10^{-12}	3.07 10^{-12}	1.11 10^{-11}	3.66 10^{-11}	3.33 10^{-13}	8.19 10^{-11}	**3.56 10^{-11}**
Am-239	1 10^{-3}	9.16 10^{-11}	1.07 10^{-11}	2.05 10^{-12}	2.83 10^{-11}	1.06 10^{-11}	1.37 10^{-13}	7.94 10^{-10}	**2.67 10^{-10}**
Am-240	1 10^{-3}	7.16 10^{-10}	9.06 10^{-11}	1.86 10^{-11}	1.55 10^{-10}	6.95 10^{-11}	2.59 10^{-12}	1.56 10^{-9}	**6.83 10^{-10}**
Am-241	1 10^{-3}	2.70 10^{-7}	2.62 10^{-11}	3.36 10^{-11}	1.45 10^{-6}	**1.81 10^{-5}**	1.32 10^{-11}	6.66 10^{-7}	9.84 10^{-7}
Am-242m	1 10^{-3}	2.66 10^{-7}	1.22 10^{-11}	1.65 10^{-11}	1.41 10^{-6}	**1.76 10^{-5}**	3.77 10^{-12}	6.20 10^{-7}	9.50 10^{-7}
Am-242	1 10^{-3}	2.74 10^{-11}	9.38 10^{-13}	1.58 10^{-13}	1.24 10^{-10}	1.52 10^{-9}	2.61 10^{-14}	1.05 10^{-9}	**3.81 10^{-10}**
Am-243	1 10^{-3}	2.71 10^{-7}	1.41 10^{-10}	1.95 10^{-10}	1.44 10^{-6}	**1.80 10^{-5}**	6.80 10^{-11}	6.61 10^{-7}	9.79 10^{-7}
Am-244m	1 10^{-3}	3.71 10^{-13}	1.89 10^{-15}	8.09 10^{-16}	2.14 10^{-12}	2.67 10^{-11}	1.50 10^{-16}	6.61 10^{-11} **2.26 10^{-10}**	2.10 10^{-11} ST wall
Am-244	1 10^{-3}	2.24 10^{-10}	2.97 10^{-11}	7.81 10^{-12}	9.72 10^{-11}	6.38 10^{-10}	9.83 10^{-13}	1.49 10^{-9}	**5.38 10^{-10}**
Am-245	1 10^{-3}	1.16 10^{-13}	1.93 10^{-14}	8.81 10^{-15}	8.21 10^{-14}	5.23 10^{-13}	1.98 10^{-15}	1.63 10^{-10}	**4.88 10^{-11}**
Am-246m	1 10^{-3}	5.12 10^{-12}	1.68 10^{-12}	1.43 10^{-12}	1.75 10^{-12}	9.38 10^{-13}	1.50 10^{-13}	7.83 10^{-11} **2.55 10^{-10}**	2.54 10^{-11} ST wall
Am-246	1 10^{-3}	6.77 10^{-12}	1.87 10^{-12}	1.37 10^{-12}	2.39 10^{-12}	1.22 10^{-12}	1.23 10^{-13}	1.43 10^{-10}	**4.54 10^{-11}**
Curium									
Cm-238	1 10^{-3}	5.81 10^{-11}	9.02 10^{-12}	2.69 10^{-12}	1.99 10^{-11}	6.08 10^{-11}	4.13 10^{-13}	2.38 10^{-10}	**9.20 10^{-11}**
Cm-240	1 10^{-3}	2.71 10^{-9}	9.58 10^{-12}	9.62 10^{-12}	1.66 10^{-8}	**2.07 10^{-7}**	9.11 10^{-12}	2.67 10^{-8}	1.69 10^{-8}
Cm-241	1 10^{-3}	6.61 10^{-10}	6.68 10^{-11}	1.10 10^{-11}	4.98 10^{-10}	4.51 10^{-9}	1.73 10^{-12}	2.81 10^{-9}	**1.21 10^{-9}**
Cm-242	1 10^{-3}	5.20 10^{-9}	8.95 10^{-12}	8.84 10^{-12}	3.57 10^{-8}	**4.46 10^{-7}**	8.82 10^{-12}	4.02 10^{-8}	3.10 10^{-8}
Cm-243	1 10^{-3}	1.73 10^{-7}	6.96 10^{-11}	7.73 10^{-11}	9.81 10^{-7}	**1.23 10^{-5}**	3.15 10^{-11}	4.97 10^{-7}	6.79 10^{-7}
Cm-244	1 10^{-3}	1.33 10^{-7}	8.82 10^{-12}	8.81 10^{-12}	7.82 10^{-7}	**9.77 10^{-6}**	8.44 10^{-12}	4.15 10^{-7}	5.45 10^{-7}
Cm-245	1 10^{-3}	2.80 10^{-7}	6.80 10^{-11}	8.34 10^{-11}	1.49 10^{-6}	**1.86 10^{-5}**	3.02 10^{-11}	6.79 10^{-7}	1.01 10^{-6}
Cm-246	1 10^{-3}	2.77 10^{-7}	3.91 10^{-11}	2.67 10^{-11}	1.48 10^{-6}	**1.85 10^{-5}**	1.87 10^{-11}	6.76 10^{-7}	1.00 10^{-6}
Cm-247	1 10^{-3}	2.56 10^{-7}	2.29 10^{-10}	2.66 10^{-10}	1.36 10^{-6}	**1.70 10^{-5}**	1.20 10^{-10}	6.23 10^{-7}	9.24 10^{-7}
Cm-248	1 10^{-3}	1.02 10^{-6}	1.10 10^{-8}	6.52 10^{-9}	5.42 10^{-6}	**6.75 10^{-5}**	3.87 10^{-9}	2.49 10^{-6}	3.68 10^{-6}
Cm-249	1 10^{-3}	4.65 10^{-13}	8.68 10^{-14}	5.41 10^{-14}	6.20 10^{-13}	6.37 10^{-12}	5.53 10^{-15}	8.88 10^{-11}	**2.70 10^{-11}**
Cm-250	1 10^{-3}	5.85 10^{-6}	8.66 10^{-8}	5.17 10^{-8}	3.09 10^{-5}	**3.83 10^{-4}**	3.05 10^{-8}	1.42 10^{-5}	2.10 10^{-5}
Berkelium									
Bk-245	1 10^{-3}	2.64 10^{-10}	2.76 10^{-11}	3.62 10^{-12}	8.16 10^{-11}	9.79 10^{-11}	3.07 10^{-13}	1.90 10^{-9}	**6.52 10^{-10}**
Bk-246	1 10^{-3}	6.47 10^{-10}	8.08 10^{-11}	1.60 10^{-11}	1.43 10^{-10}	7.71 10^{-11}	2.19 10^{-12}	1.24 10^{-9}	**5.68 10^{-10}**
Bk-247	1 10^{-3}	2.85 10^{-7}	6.28 10^{-11}	6.42 10^{-11}	2.19 10^{-6}	**2.74 10^{-5}**	3.80 10^{-11}	3.95 10^{-7}	1.27 10^{-6}
Bk-249	1 10^{-3}	6.99 10^{-10}	4.35 10^{-13}	5.10 10^{-13}	5.36 10^{-9}	**6.69 10^{-8}**	3.45 10^{-13}	1.39 10^{-9}	3.24 10^{-9}
Bk-250	1 10^{-3}	6.64 10^{-11}	1.14 10^{-11}	4.64 10^{-12}	4.30 10^{-11}	3.48 10^{-10}	5.88 10^{-13}	4.08 10^{-10}	**1.57 10^{-10}**

Table 2.2, Cont'd.

		Committed Dose Equivalent per Unit Intake (Sv/Bq)							
Nuclide	f_1	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Californium									
Cf-244	1 10^{-3}	1.37 10^{-12}	2.43 10^{-14}	2.33 10^{-14}	1.18 10^{-11}	1.48 10^{-10}	2.23 10^{-14}	1.51 10^{-10} **5.31 10^{-10}**	5.15 10^{-11} ST wall
Cf-246	1 10^{-3}	8.86 10^{-11}	7.72 10^{-12}	7.64 10^{-12}	8.18 10^{-10}	1.01 10^{-8}	7.63 10^{-12}	1.15 10^{-8}	**3.86 10^{-9}**
Cf-248	1 10^{-3}	1.51 10^{-8}	1.00 10^{-11}	9.26 10^{-12}	1.44 10^{-7}	**1.80 10^{-6}**	9.13 10^{-12}	5.11 10^{-8}	9.04 10^{-8}
Cf-249	1 10^{-3}	2.86 10^{-7}	2.33 10^{-10}	2.26 10^{-10}	2.21 10^{-6}	**2.76 10^{-5}**	1.51 10^{-10}	4.00 10^{-7}	1.28 10^{-6}
Cf-250	1 10^{-3}	1.12 10^{-7}	7.44 10^{-11}	4.10 10^{-11}	9.77 10^{-7}	**1.22 10^{-5}**	3.12 10^{-11}	2.17 10^{-7}	5.76 10^{-7}
Cf-251	1 10^{-3}	2.92 10^{-7}	9.36 10^{-11}	9.56 10^{-11}	2.25 10^{-6}	**2.81 10^{-5}**	5.25 10^{-11}	4.05 10^{-7}	1.31 10^{-6}
Cf-252	1 10^{-3}	5.39 10^{-8}	1.49 10^{-9}	4.67 10^{-10}	4.69 10^{-7}	**5.84 10^{-6}**	2.68 10^{-10}	1.58 10^{-7}	2.93 10^{-7}
Cf-253	1 10^{-3}	5.16 10^{-10}	2.21 10^{-13}	2.15 10^{-13}	5.37 10^{-9}	**6.72 10^{-8}**	2.04 10^{-13}	3.31 10^{-9}	3.78 10^{-9}
Cf-254	1 10^{-3}	3.12 10^{-7}	3.45 10^{-8}	4.95 10^{-9}	5.45 10^{-7}	6.14 10^{-6}	1.09 10^{-9}	1.07 10^{-6}	**6.55 10^{-7}**
Einsteinium									
Es-250	1 10^{-3}	2.06 10^{-11}	3.46 10^{-12}	1.58 10^{-12}	2.35 10^{-11}	2.25 10^{-10}	1.65 10^{-13}	5.53 10^{-11}	**3.20 10^{-11}**
Es-251	1 10^{-3}	7.90 10^{-11}	8.17 10^{-12}	1.18 10^{-12}	3.54 10^{-11}	1.45 10^{-10}	1.03 10^{-13}	5.69 10^{-10}	**2.00 10^{-10}**
Es-253	1 10^{-3}	5.96 10^{-10}	9.55 10^{-12}	9.46 10^{-12}	6.10 10^{-9}	7.61 10^{-8}	9.44 10^{-12}	1.98 10^{-8}	**9.10 10^{-9}**
Es-254m	1 10^{-3}	4.07 10^{-10}	4.64 10^{-11}	1.46 10^{-11}	8.29 10^{-10}	9.48 10^{-9}	8.16 10^{-12}	1.45 10^{-8} **4.75 10^{-8}**	4.83 10^{-9} LL1 wall
Es-254	1 10^{-3}	1.45 10^{-8}	1.29 10^{-10}	4.72 10^{-11}	1.31 10^{-7}	**1.63 10^{-6}**	1.93 10^{-11}	5.47 10^{-8}	8.47 10^{-8}
Fermium									
Fm-252	1 10^{-3}	6.94 10^{-11}	7.02 10^{-12}	6.98 10^{-12}	6.12 10^{-10}	7.52 10^{-9}	6.97 10^{-12}	9.27 10^{-9}	**3.10 10^{-9}**
Fm-253	1 10^{-3}	1.75 10^{-10}	1.01 10^{-11}	2.34 10^{-12}	9.26 10^{-10}	1.12 10^{-8}	1.27 10^{-12}	2.93 10^{-9}	**1.37 10^{-9}**
Fm-254	1 10^{-3}	5.54 10^{-12}	1.63 10^{-12}	1.62 10^{-12}	3.57 10^{-11}	4.28 10^{-10}	1.62 10^{-12}	1.50 10^{-9}	**4.69 10^{-10}**
Fm-255	1 10^{-3}	3.22 10^{-11}	7.14 10^{-12}	6.68 10^{-12}	1.74 10^{-10}	2.08 10^{-9}	6.65 10^{-12}	9.02 10^{-9}	**2.80 10^{-9}**
Fm-257	1 10^{-3}	5.72 10^{-9}	2.53 10^{-11}	1.23 10^{-11}	5.82 10^{-8}	**7.27 10^{-7}**	1.00 10^{-11}	3.53 10^{-8}	4.08 10^{-8}
Mendelevium									
Md-257	1 10^{-3}	2.97 10^{-11}	2.65 10^{-12}	9.16 10^{-13}	1.27 10^{-10}	1.52 10^{-9}	3.35 10^{-13}	4.00 10^{-10}	**1.89 10^{-10}**
Md-258	1 10^{-3}	4.35 10^{-9}	1.53 10^{-11}	1.48 10^{-11}	4.31 10^{-8}	**5.38 10^{-7}**	1.19 10^{-11}	3.16 10^{-8}	3.19 10^{-8}

TABLE 2.3

Exposure-to-Dose Conversion Factors for Submersion

Explanation of Entries

For each radionuclide, values in SI units for the organ dose equivalent rate conversion factor, $\dot{h}_{T,ext}$, and the effective dose equivalent rate conversion factor, $\dot{h}_{E,ext}$, based upon the weighting factors set forth on page 6, are listed in Table 2.3 for submersion. The limiting coefficient, with respect to determining the DAC, is indicated by bold-faced type.

$\dot{h}_{T,ext}$: The tissue dose equivalent conversion factor for organ or tissue T (expressed in Sv/hr per Bq/m^3), i.e., the dose equivalent rate per unit air concentration of radionuclide.

$\dot{h}_{E,ext}$: The effective dose equivalent conversion factor (expressed in Sv/hr per Bq/m^3), i.e., the effective dose equivalent rate per unit air concentration of radionuclide:

$$\dot{h}_{E,ext} = \sum_{T} w_T \dot{h}_{T,ext} .$$

Values of $\dot{h}_{T,ext}$ for skin and lens of eye are listed only when they are limiting.

To convert to conventional units (mrem/hr per μCi/cm^3), multiply table entries by **3.7 × 10^{15}.**

As an example, consider the factor for lung for submersion in Ar-37:

$$\dot{h}_{lung,ext} = 3.80 \times 10^{-15} \text{ Sv/hr per Bq/m}^3 \times \mathbf{3.7 \times 10^{15}} = 14 \text{ mrem/hr per } \mu\text{Ci/cm}^3.$$

note: Since lung is the only exposed organ, $\dot{h}_{E,ext}$ equals 0.12 $\dot{h}_{lung,ext}$.

Table 2.3. Exposure-to-Dose Conversion Factors for Submersion

	Dose Equivalent Rate per Unit Air Concentration (Sv/hr per Bq/m^3)							
Nuclide	Gonad	Breast	Lung	R Marrow	B Surface	Thyroid	Remainder	Effective
Hydrogen*								
H-3			9.90 10^{-15}					**1.19 10^{-15}**
Argon								
Ar-37			3.80 10^{-15}					**4.56 10^{-16}**
Ar-39	6.08 10^{-14}	5.10 10^{-14}	4.53 10^{-14}	9.10 10^{-14}	9.84 10^{-14}	5.94 10^{-14}	3.83 10^{-14} **3.75 10^{-11}**	5.54 10^{-14} Skin
Ar-41	1.90 10^{-10}	2.32 10^{-10}	2.20 10^{-10}	2.28 10^{-10}	2.47 10^{-10}	2.07 10^{-10}	2.24 10^{-10}	**2.17 10^{-10}**
Krypton								
Kr-74	2.31 10^{-10}	2.00 10^{-10}	1.93 10^{-10}	2.52 10^{-10}	2.69 10^{-10}	1.12 10^{-10}	1.87 10^{-10}	**2.09 10^{-10}**
Kr-76	9.00 10^{-11}	7.22 10^{-11}	6.95 10^{-11}	9.85 10^{-11}	1.05 10^{-10}	5.43 10^{-11}	6.44 10^{-11}	**7.76 10^{-11}**
Kr-77	1.99 10^{-10}	1.74 10^{-10}	1.68 10^{-10}	2.24 10^{-10}	2.39 10^{-10}	1.03 10^{-10}	1.62 10^{-10}	**1.82 10^{-10}**
Kr-79	5.02 10^{-11}	4.31 10^{-11}	4.15 10^{-11}	5.36 10^{-11}	5.74 10^{-11}	2.68 10^{-11}	4.00 10^{-11}	**4.49 10^{-11}**
Kr-81	1.26 10^{-12}	9.53 10^{-13}	9.08 10^{-13}	1.37 10^{-12}	1.47 10^{-12}	8.28 10^{-13}	8.19 10^{-13}	**1.05 10^{-12}**
Kr-83m	5.95 10^{-15}	8.01 10^{-15}	1.10 10^{-15}	5.51 10^{-15}	6.32 10^{-15}	1.39 10^{-15}	1.28 10^{-15} **1.69 10^{-13}**	4.10 10^{-15} Lens
Kr-85	5.18 10^{-13}	4.52 10^{-13}	4.31 10^{-13}	5.75 10^{-13}	6.15 10^{-13}	2.50 10^{-13}	4.20 10^{-13} **4.66 10^{-11}**	4.70 10^{-13} Skin
Kr-85m	3.35 10^{-11}	2.66 10^{-11}	2.57 10^{-11}	4.43 10^{-11}	4.72 10^{-11}	2.95 10^{-11}	2.25 10^{-11}	**2.98 10^{-11}**
Kr-87	1.26 10^{-10}	1.48 10^{-10}	1.41 10^{-10}	1.52 10^{-10}	1.67 10^{-10}	1.42 10^{-10}	1.46 10^{-10}	**1.42 10^{-10}**
Kr-88	3.48 10^{-10}	3.65 10^{-10}	3.49 10^{-10}	3.48 10^{-10}	3.85 10^{-10}	3.74 10^{-10}	3.72 10^{-10}	**3.60 10^{-10}**
Xenon								
Xe-120	7.58 10^{-11}	6.91 10^{-11}	6.51 10^{-11}	8.41 10^{-11}	9.05 10^{-11}	4.64 10^{-11}	6.32 10^{-11}	**7.03 10^{-11}**
Xe-121	2.72 10^{-10}	3.27 10^{-10}	3.12 10^{-10}	3.45 10^{-10}	3.76 10^{-10}	2.86 10^{-10}	3.08 10^{-10}	**3.08 10^{-10}**
Xe-122	1.13 10^{-11}	8.79 10^{-12}	7.98 10^{-12}	1.25 10^{-11}	1.35 10^{-11}	7.30 10^{-12}	7.22 10^{-12}	**9.40 10^{-12}**
Xe-123	1.08 10^{-10}	1.08 10^{-10}	1.03 10^{-10}	1.29 10^{-10}	1.39 10^{-10}	8.28 10^{-11}	9.78 10^{-11}	**1.07 10^{-10}**
Xe-125	5.43 10^{-11}	4.23 10^{-11}	4.01 10^{-11}	6.13 10^{-11}	6.57 10^{-11}	3.92 10^{-11}	3.62 10^{-11}	**4.61 10^{-11}**
Xe-127	5.94 10^{-11}	4.41 10^{-11}	4.21 10^{-11}	6.70 10^{-11}	7.17 10^{-11}	4.28 10^{-11}	3.76 10^{-11}	**4.93 10^{-11}**
Xe-129m	5.53 10^{-12}	3.86 10^{-12}	2.80 10^{-12}	5.96 10^{-12}	6.55 10^{-12}	4.24 10^{-12}	2.42 10^{-12}	**4.06 10^{-12}**
Xe-131m	2.00 10^{-12}	1.42 10^{-12}	1.01 10^{-12}	2.25 10^{-12}	2.47 10^{-12}	1.63 10^{-12}	8.58 10^{-13} **1.71 10^{-11}**	1.48 10^{-12} Skin
Xe-133	6.30 10^{-12}	5.62 10^{-12}	4.84 10^{-12}	1.08 10^{-11}	1.18 10^{-11}	7.12 10^{-12}	4.03 10^{-12}	**6.07 10^{-12}**
Xe-133m	6.80 10^{-12}	4.88 10^{-12}	4.33 10^{-12}	7.37 10^{-12}	7.95 10^{-12}	4.89 10^{-12}	3.84 10^{-12}	**5.38 10^{-12}**
Xe-135	5.63 10^{-11}	4.21 10^{-11}	4.07 10^{-11}	6.16 10^{-11}	6.59 10^{-11}	3.80 10^{-11}	3.67 10^{-11}	**4.68 10^{-11}**
Xe-135m	8.27 10^{-11}	7.32 10^{-11}	7.04 10^{-11}	8.62 10^{-11}	9.21 10^{-11}	3.32 10^{-11}	7.04 10^{-11}	**7.53 10^{-11}**
Xe-138	1.65 10^{-10}	2.06 10^{-10}	1.98 10^{-10}	2.11 10^{-10}	2.31 10^{-10}	1.91 10^{-10}	1.95 10^{-10}	**1.92 10^{-10}**

*elemental

TABLE 3

Gastrointestinal Absorption Fractions (f_1) and Lung Clearance Classes for Chemical Compounds

Explanation of Entries

By elements, the assignment of chemical compounds of the radionuclide among the clearance classes of the lung model and the applicable fractional absorption from the gastrointestinal tract are listed in Table 3.

f_1/class: The fractional uptake from the small intestine to blood (f_1) and the lung clearance class (D, W, or Y). In a few instances the use of "special models" is noted, e.g., for consideration of vapors.

Table 3. Gastrointestinal Absorption Fractions (f_1) and Lung Clearance Classes for Chemical Compounds

Element	Inhalation			Ingestion	
	Compound	f_1/Class		Compound	f_1
Actinium (Ac)	Oxides & hydroxides	1 10^{-3}	Y	All forms	1 10^{-3}
	Halides & nitrates	1 10^{-3}	W		
	All others	1 10^{-3}	D		
Aluminum (Al)	Oxides, hydroxides, carbides, halides, nitrates & elemental	0.01	W	All forms	0.01
	All others	0.01	D		
Americium (Am)	All forms	1 10^{-3}	W	All forms	1 10^{-3}
Antimony (Sb)	Oxides, hydroxides, halides, sulfides, sulfates & nitrates	0.1	W	Tartar emetic All others	0.1 0.01
	All others	0.01	D		
Arsenic (As)	All forms	0.5	W	All forms	0.5
Astatine (At)	See halide assignment of associated element	1	D	All forms	1
		1	W		
Barium (Ba)	All forms	0.1	D	All forms	0.1
Berkelium (Bk)	All forms	1 10^{-3}	W	All forms	1 10^{-3}
Beryllium (Be)	Oxides, halides & nitrates	5 10^{-3}	Y	All forms	5 10^{-3}
	All others	5 10^{-3}	W		
Bismuth (Bi)	Nitrates	0.05	D	All forms	0.05
	All others	0.05	W		
Bromine (Br)	See bromide assignment of associated element	1	D	All forms	1.0
		1	W		
Cadmium (Cd)	Oxides & hydroxides	0.05	Y	All inorganic forms	0.05
	Sulfates, halides & nitrates	0.05	W		
	All others	0.05	D		
Calcium (Ca)	All forms	0.3	W	All forms	0.03

Table 3, Cont'd.

Element	Inhalation			Ingestion	
	Compound	f_1/Class		Compound	f_1
Californium (Cf)	Oxides, hydroxides	$1\ 10^{-3}$	Y	All forms	$1\ 10^{-3}$
	All others	$1\ 10^{-3}$	W		
Carbon (C)	Monoxides	Special models		Organic forms	1
	Dioxide				
	Organic forms				
Cerium (Ce)	Oxides, hydroxides & fluorides	$3\ 10^{-4}$	Y	All forms	$3\ 10^{-4}$
	All others	$3\ 10^{-4}$	W		
Cesium (Cs)	All forms	1	D	All forms	1
Chlorine (Cl)	See assignment of	1	D	All forms	1
	associated element	1	W		
Chromium (Cr)	Oxides & hydroxides	0.1	Y	Trivalent state	0.01
	Halides & nitrates	0.1	W	Hexavalent state	0.1
	All others	0.1	D		
Cobalt (Co)	Oxides, hydroxides, halides & nitrates	0.05	Y	Oxides, hydroxides & trace inorganic	0.05
	All others	0.05	W	Organic complexed & other inorganics	0.3
Copper (Cu)	Oxides & hydroxides	0.5	Y	All forms	0.5
	Sulfites, halides & nitrates	0.5	W		
	All others	0.5	D		
Curium (Cm)	All forms	$1\ 10^{-3}$	W	All forms	$1\ 10^{-3}$
Dysprosium (Dy)	All forms	$3\ 10^{-4}$	W	All forms	$3\ 10^{-4}$
Einsteinium (Es)	All forms	$1\ 10^{-3}$	W	All forms	$1\ 10^{-3}$
Erbium (Er)	All forms	$3\ 10^{-4}$	W	All forms	$3\ 10^{-4}$
Europium (Eu)	All forms	$1\ 10^{-3}$	W	All forms	$1\ 10^{-3}$

Table 3, Cont'd.

Element	Inhalation			Ingestion	
	Compound	f_1/Class		Compound	f_1
Fermium	All forms	$1\ 10^{-3}$	W	All forms	$1\ 10^{-3}$
(Fm)					
Fluorine	See assignment of associated element	1	D	All forms	1
(F)		1	W		
		1	Y		
Francium	All forms	1	D	All forms	1
(Fr)					
Gadolinium	Oxides, hydroxides & fluorides	$3\ 10^{-4}$	W	All forms	$3\ 10^{-4}$
(Gd)	All others	$3\ 10^{-4}$	D		
Gallium	Oxides, hydroxides, carbides, halides & nitrates	$1\ 10^{-3}$	W	All forms	$1\ 10^{-3}$
(Ga)	All others	$1\ 10^{-3}$	D		
Germanium	Oxides, sulfides & halides	1	W	All forms	1
(Ge)	All others	1	D		
Gold	Oxides & hydroxides	0.1	Y	All forms	0.1
(Au)	Halides & nitrates	0.1	W		
	All others	0.1	D		
Hafnium	Oxides, hydroxides halides, carbides & nitrates	$2\ 10^{-3}$	W	All forms	$2\ 10^{-3}$
(Hf)	All other	$2\ 10^{-3}$	D		
Holmium	All forms	$3\ 10^{-4}$	W	All forms	$3\ 10^{-4}$
(Ho)					
Hydrogen	Water vapor	1		All forms	1
(H)	Elemental	Special model			
Indium	Oxides, hydroxides, halides & nitrates	0.02	W	All forms	0.02
(In)	All others	0.02	D		
Iodine	All forms	1	D	All forms	1
(I)					

Table 3, Cont'd.

Element	Inhalation			Ingestion	
	Compound	f_1/Class		Compound	f_1
Iridium (Ir)	Oxides & hydroxides	0.01	Y	All forms	0.01
	Halides, nitrates & metallic form	0.01	W		
	All others	0.01	D		
Iron (Fe)	Oxides, hydroxides & halides	0.1	W	All forms	0.1
	All others	0.1	D		
Lanthanum (La)	Oxides & hydroxides	$1\ 10^{-3}$	W	All forms	$1\ 10^{-3}$
	All others	$1\ 10^{-3}$	D		
Lead (Pb)	All forms	0.2	D	All forms	0.2
Lutetium (Lu)	Oxides, hydroxides & fluorides	$3\ 10^{-4}$	Y	All forms	$3\ 10^{-4}$
	All others	$3\ 10^{-4}$	W		
Magnesium (Mg)	Oxides, hydroxides, carbides, halides & nitrates	0.5	W	All forms	0.5
	All others	0.5	D		
Manganese (Mn)	Oxides, hydroxides, halides & nitrates	0.1	W	All forms	0.1
	All others	0.1	D		
Mendelevium (Md)	All forms	$1\ 10^{-3}$	W	All forms	$1\ 10^{-3}$
Mercury (Hg)	Oxides, hydroxides, halides, nitrates & sulfides	0.02	W	All inorganic forms	0.02
				Methyl mercury	1
				Other organic forms	0.4
	Sulfates	0.02	D		
	Organic forms	1	D		
	Vapors	Special model			
Molybdenum (Mo)	Oxides, hydroxides & MoS_2	0.05	Y	MoS_2	0.05
				All others	0.8
	All others	0.8	D		
Neodymium (Nd)	Oxides, hydroxides, carbides & fluorides	$3\ 10^{-4}$	Y	All forms	$3\ 10^{-4}$
	All others	$3\ 10^{-4}$	W		

Table 3, Cont'd.

Element	Inhalation			Ingestion	
	Compound	f_1/Class		Compound	f_1
Neptunium (Np)	All forms	1 10^{-3}	W	All forms	1 10^{-3}
Nickel (Ni)	Oxides, hydroxides & carbides	0.05	W	All forms	0.05
	All others	0.05	D		
	Vapors	Special model			
Niobium (Nb)	Oxides & hydroxides	0.01	Y	All forms	0.01
	All others	0.01	W		
Osmium (Os)	Oxides & hydroxides	0.01	Y	All forms	0.01
	Halides & nitrates	0.01	W		
	All others	0.01	D		
Palladium (Pd)	Oxides & hydroxides	5 10^{-3}	Y	All forms	5 10^{-3}
	Nitrates	5 10^{-3}	W		
	All others	5 10^{-3}	D		
Phosphorus (P)	Phosphates of particular element	0.8 0.8	W D	All forms	0.8
	All others	0.8	D		
Platinum (Pt)	All forms	0.01	D	All forms	0.01
Plutonium (Pu)	Oxides	1 10^{-5}	Y	Oxides	1 10^{-5}
	All others	1 10^{-3}	W	Nitrates	1 10^{-4}
				Others	1 10^{-3}
Polonium (Po)	Oxides, hydroxides & nitrates	0.1	W	All forms	0.1
	All others	0.1	D		
Potassium (K)	All forms	1	D	All forms	1
Praseodymium (Pr)	Oxides, hydroxides, carbides, & fluorides	3 10^{-4}	Y	All forms	3 10^{-4}
	All others	3 10^{-4}	W		
Promethium (Pm)	Oxides, hydroxides, carbides, & fluorides	3 10^{-4}	Y	All forms	3 10^{-4}
	All others	3 10^{-4}	W		
Protactinium (Pa)	Oxides & hydroxides	1 10^{-3}	Y	All forms	1 10^{-3}
	All others	1 10^{-3}	W		

Table 3, Cont'd.

Element	Inhalation			Ingestion	
	Compound	f_1/Class		Compound	f_1
Radium (Ra)	All forms	0.2	W	All forms	0.2
Rhenium (Re)	Oxides, hydroxides, halides & nitrates	0.8	W	All forms	0.8
	All others	0.8	D		
Rhodium (Rh)	Oxides & hydroxides	0.05	Y	All forms	0.05
	Halides	0.05	W		
	All others	0.05	D		
Rubidium (Rb)	All forms	1	D	All forms	1
Ruthenium (Ru)	Oxides & hydroxides	0.05	Y	All forms	0.05
	Halides	0.05	W		
	All others	0.05	D		
Samarium (Sm)	All forms	$3\ 10^{-4}$	W	All forms	$3\ 10^{-4}$
Scandium (Sc)	All forms	$1\ 10^{-4}$	Y	All forms	$1\ 10^{-4}$
Selenium (Se)	Oxides, hydroxides, carbides & elemental	0.8	W	Elemental	0.05
				All others	0.8
	All others	0.8	D		
Silicon (Si)	Ceramic forms	0.01	Y	All compounds	0.01
	Oxides, hydroxides, carbides, & nitrates	0.01	W		
	All others	0.01	D		
Silver (Ag)	Oxides & hydroxides	0.05	Y	All forms	0.05
	Nitrates & sulfides	0.05	W		
	All others	0.05	D		
Sodium (Na)	All forms	1	D	All forms	1
Strontium (Sr)	$SrTiO_3$	0.01	Y	Soluble salts	0.3
	All others	0.3	D	$SrTiO_3$	0.01

Table 3, Cont'd.

Element	Inhalation			Ingestion	
	Compound	f_1/Class		Compound	f_1
Sulfur (S)	Sulfates & sulfides of associated elements	0.8 0.8	D W	All inorganic forms Elemental	0.8 0.1
	Elemental	0.8	W		
	Gases	Special model			
Tantalum (Ta)	Oxides, hydroxides, halides, carbides, nitrates & nitrides	$1\ 10^{-3}$	Y	All forms	$1\ 10^{-3}$
	All others	$1\ 10^{-3}$	W		
Technetium (Tc)	Oxides, hydroxides, halides & nitrates	0.8	W	All forms	0.8
	All others	0.8	D		
Tellurium (Te)	Oxides, hydroxides & nitrates	0.2	W	All forms	0.2
	All others	0.2	D		
Terbium (Tb)	All forms	$3\ 10^{-4}$	W	All forms	$3\ 10^{-4}$
Thallium (Tl)	All forms	1	D	All forms	1
Thorium (Th)	Oxides & hydroxides	$2\ 10^{-4}$	Y	All forms	$2\ 10^{-4}$
	All others	$2\ 10^{-4}$	W		
Thulium (Tm)	All forms	$3\ 10^{-4}$	W	All forms	$3\ 10^{-4}$
Tin (Sn)	Oxides, hydroxides, halides, nitrates, sulfides & $Sn_3(PO_4)_4$	0.02	W	All forms	0.02
	All others	0.02	D		
Titanium (Ti)	$SrTiO_3$	0.01	Y	All forms	0.01
	Oxides, hydroxides, carbides, halides & nitrates	0.01	W		
	All others	0.01	D		
Tungsten (W)	All forms	0.3	D	Tungstic acid All others	0.01 0.3

Table 3, Cont'd.

Element	Inhalation			Ingestion	
	Compound	f_1/Class		Compound	f_1
Uranium (U)	UO_2, U_3O_8	$2\ 10^{-3}$	Y	Hexavalent	0.05
	UO_3, UF_4 & UCl_4	0.05	W	Insoluble forms	$2\ 10^{-3}$
	UF_6, UO_2F_2 & $UO_2(NO_3)_2$	0.05	D		
Vanadium (V)	Oxides, hydroxides, carbides, & halides	0.01	W	All forms	0.01
	All others	0.01	D		
Ytterbium (Yb)	Oxides, hydroxides & fluorides	$3\ 10^{-4}$	Y	All forms	$3\ 10^{-4}$
	All others	$3\ 10^{-4}$	W		
Yttrium (Y)	Oxides & hydroxides	$1\ 10^{-4}$	Y	All forms	$1\ 10^{-4}$
	All others	$1\ 10^{-4}$	W		
Zinc (Zn)	All forms	0.5	Y	All forms	0.5
Zirconium (Zr)	Carbides	$2\ 10^{-3}$	Y	All forms	$2\ 10^{-3}$
	Oxides, hydroxides, halides & nitrates	$2\ 10^{-3}$	W		
	All others	$2\ 10^{-3}$	D		

APPENDIX A

Radiation Protection Guidance for Occupational Exposure (1987)

federal register

Tuesday
January 27, 1987

Part II

The President

Radiation Protection Guidance to Federal Agencies for Occupational Exposure; Approval of Environmental Protection Agency Recommendations

[This reprint incorporates corrections published in the **Federal Registers** of Friday, January 30, and Wednesday, February 4, 1987.]

Federal Register
Vol. 52, No. 17
Tuesday, January 27, 1987

Presidential Documents

Title 3—

The President

Recommendations Approved by the President

Radiation Protection Guidance to Federal Agencies for Occupational Exposure

The recommendations concerning Federal radiation protection guidance for occupational exposure transmitted to me by the Administrator of the Environmental Protection Agency in the memorandum published below are approved. I direct that this memorandum be published in the **Federal Register**. To promote a coordinated and effective Federal program of worker protection, the Administrator is directed to keep informed of Federal agency actions to implement this guidance and to interpret and clarify these recommendations from time to time, as necessary, in coordination with affected Federal agencies. Consistent with existing authority, the Administrator may, when appropriate, consult with the Federal Coordinating Council for Science, Engineering and Technology. The Administrator may also, when appropriate, issue interpretations and clarifications in the **Federal Register**.

Approved: January 20, 1987

Ronald Reagan

Billing code 3195-01-M

Memorandum for the President

FEDERAL RADIATION PROTECTION GUIDANCE FOR OCCUPATIONAL EXPOSURE

This memorandum transmits recommendations that would update previous guidance to Federal agencies for the protection of workers exposed to ionizing radiation. These recommendations were developed cooperatively by the Nuclear Regulatory Commission, the Occupational Safety and Health Administration, the Mine Safety and Health Administration, the Department of Defense, the Department of Energy, the National Aeronautics and Space Administration, the Department of Commerce, the Department of Transportation, the Department of Health and Human Services, and the Environmental Protection Agency. In addition, the National Council on Radiation Protection and Measurements (NCRP), the National Academy of Sciences (NAS), the Conference of Radiation Control Program Directors (CRCPD) of the States, and the Health Physics Society were consulted during the development of this guidance.

Executive Order 10831, the Atomic Energy Act, as amended, and Reorganization Plan No. 3 of 1970 charge the Administrator of the Environmental Protection Agency (EPA) to ". . . advise the President with respect to radiation matters, directly or indirectly affecting health, including guidance for all Federal agencies in the formulation of radiation standards and in the establishment and execution of programs of cooperation with States." This guidance has historically taken the form of qualitative and quantitative "Federal Radiation Protection Guidance." The recommendations transmitted here would replace those portions of previous Federal guidance (25 FR 4402), approved by President Eisenhower on May 13, 1960, that apply to the protection of workers exposed to ionizing radiation. The portions of that guidance which apply to exposure of the general public would not be changed by these recommendations.

These recommendations are based on consideration of (1) current scientific understanding of effects on health from ionizing radiation, (2) recommendations of international and national organizations involved in radiation protection, (3) proposed "Federal Radiation Protection Guidance for Occupational Exposure" published on January 23, 1981 (46 FR 7836) and public comments on that proposed guidance, and (4) the collective experience of the Federal agencies in the control of occupational exposure to ionizing radiation. A summary of the considerations that led to these recommendations is provided below. Public comments on the previously proposed guidance and a response to those comments are contained in the document "Federal Radiation Protection Guidance for Occupational Exposure—Response to Comments" (EPA 520/1-84-011). Single copies of this report are available from the Program Management Office (ANR-458), Office of Radiation Programs, U.S. Environmental Protection Agency, Washington, D.C. 20460; telephone (202) 475-8388.

Background

A review of current radiation protection guidance for workers began in 1974 with the formation of a Federal interagency committee by EPA. As a result of the deliberations of that committee, EPA published an "Advance Notice of Proposed Recommendations and Future Public Hearings" on September 17, 1979 (44 FR 53785). On January 23, 1981, EPA published "Federal Radiation Protection Guidance for Occupational Exposures; Proposed Recommendations, Request for Written Comments, and Public Hearings" (46 FR 7836). Public hearings were held in Washington, D.C. (April 20-23, 1981); Houston, Texas (May 1-2, 1981); Chicago, Illinois (May 5-6, 1981), and San Francisco, California (May 8-9, 1981) (46 FR 15205). The public comment period closed July 6, 1981 (46 FR 26557). On December 15, 1982, representatives of the ten Federal agencies noted above, the CRCPD, and the NCRP convened under the sponsorship of the EPA to review the issues raised in public comments and to complete development of these recommendations. The issues were carefully considered during a series of meetings, and the conclusions of the working group have provided the basis for these recommendations for revised Federal guidance.

EPA has also sponsored or conducted four major studies in support of this review of occupational radiation protection guidance. First, the Committee on the Biological Effects of Ionizing Radiations, National Academy of Sciences—National Research Council reviewed the scientific data on health risks of low levels of ionizing radiation in a report transmitted to EPA on July 22, 1980: "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation: 1980," National Academy Press, Washington, D.C. 1980. Second, EPA has published two studies of occupational radiation exposure: "Occupational Exposure to Ionizing Radiation in the United States: A Comprehensive Summary for the Year 1975" (EPA 520/4-80-001) and "Occupational Exposure to Ionizing Radiation in the United States: A Comprehensive Review for the Year 1980 and Summary of Trends for the Years 1960-1985" (EPA 520/1-84-005). Third, the Agency sponsored a study to examine the changes in previously derived concentration limits for intake of radionuclides from air or water that result from use of up-to-date dosimetric and biological transport models. These are presented in Federal Guidance Report No. 10, "The Radioactivity Concentration Guides: A New Calculation of Derived Limits for the 1960 Radiation Protection Guides Reflecting Updated Models for Dosimetry and Biological Transport" (EPA 520/1-84-010). Finally, the cost of implementing the changes in Federal guidance proposed on January 23, 1981 was surveyed and the findings published in the two-volume report: "Analysis of Costs for Compliance with Federal Radiation Protection Guidance for Occupational Exposure: Volume I—Cost of Compliance" (EPA 520/1-83-013-1) and "Volume II—Case Study Analysis of the Impacts" (EPA 520/1-83-013-2). These EPA reports are available from National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161.

The interagency review of occupational radiation protection has confirmed the need for revising the previous Federal guidance, which was promulgated in 1960. Since that time knowledge of the effects of ionizing radiation on humans has increased substantially. We now have a greatly improved ability to estimate risk of harm due to irradiation of individual organs and tissues. As a result, some of the old numerical guides are now believed to be less and some more protective than formerly. Other risks, specifically those to the unborn, are now considered to be more significant and were not addressed by the old guidance. These disparities and omissions should be corrected. Drawing on this improved knowledge, the International Commission on Radiological Protection (ICRP) published, in 1977, new recommendations on radiation protection philosophy and limits for occupational exposure. These recommendations are now in use, in whole or substantial part, in most other countries. We have considered these recommendations, among others, and believe that it is appropriate to adopt the general features of the ICRP approach in radiation protection guidance to Federal agencies for occupational exposure. In two cases, protection of the unborn and the management of long-term exposure to internally deposited radioactivity, we have found it advisable to make additions.

There are four types of possible effects on health from exposure to ionizing radiation. The first of these is cancer. Cancers caused by radiation are not different from those that have been historically observed, whether from known or unknown causes. Although radiogenic cancers have been observed in humans over a range of higher doses, few useful data are available for defining the effect of doses at normal occupational levels of exposure. The second type of effect is the induction of hereditary effects in descendants of exposed persons. The severity of hereditary effects ranges from inconsequential to fatal. Although such effects have been observed in experimental animals at high doses, they have not been confirmed in studies of humans. Based on extensive but incomplete scientific evidence, it is prudent to assume that at low levels of exposure the risk of incurring either cancer or hereditary effects is linearly related to the dose received in the relevant tissue. The severity of any such effect is not related to the amount of dose received. That is, once a cancer or an hereditary effect has been induced, its severity is independent of the dose. Thus, for these two types of effects, it is assumed that there is no completely risk-free level of exposure.

The third type includes a variety of effects for which the degree of damage (i.e., severity) appears to depend on the amount of dose received and for which there is an effective threshold below which clinically observable effects do not occur. An example of such an effect is radiation sickness syndrome, which is observed at high doses and is fatal at very high doses. Examples of lesser effects include opacification of the lens of the eye, erythema of the skin, and temporary impairment of fertility. All of these effects occur at relatively high doses. At the levels of dose contemplated under both the previous Federal guidance and these recommendations, clinically observable examples of this third type of effect are not known to occur.

The fourth type includes effects on children who were exposed *in utero*. Not only may the unborn be more sensitive than adults to the induction of malformations, cancer, and hereditary effects, but recent studies have drawn renewed attention to the risk of severe mental retardation from exposure of the unborn during certain periods of pregnancy. The risk of less severe mental retardation appears to be similarly elevated. Although it is not yet clear to what extent the frequency of retardation is proportional to the amount of dose (the data available at occupational levels of exposure are limited), it is prudent to assume that proportionality exists.

The risks to health from exposure to low levels of ionizing radiation were reviewed for EPA by the NAS in reports published in 1972 and in 1980.

Regarding cancer there continues to be divided opinion on how to interpolate between the absence of radiation effects at zero dose and the observed effects of radiation (mostly at high doses) to estimate the most probable effects of low doses. Some scientists believe that available data best support use of a linear model for estimating such effects. Others, however, believe that other models, which usually predict somewhat lower risks, provide better estimates. These differences of opinion have not been resolved to date by studies of the effects of radiation in humans, the most important of which are those of the Hiroshima and Nagasaki atom bomb survivors. Studies are now underway to reassess radiation dose calculations for these survivors and in turn to provide improved estimates of risk. It will be at least several years before these reassessments and estimates are completed, and it is not likely that they will conclusively resolve uncertainties in estimating low dose effects. EPA is monitoring the progress of this work. When it is completed we will initiate reviews of the risks of low levels of radiation, in order to provide the basis for any indicated reassessment of this guidance.

In spite of the above uncertainties, estimates of the risks from exposure to low levels of ionizing radiation are reasonably well bounded, and the average worker is believed to incur a relatively small risk of harm from radiation. This situation has resulted from a system of protection which combines limits on maximum dose with active application of measures to minimize doses within these limits. These recommendations continue that approach. Approximately 1.3 million workers were employed in occupations in which they were potentially exposed to radiation in 1980, the latest year for which we have comprehensive assessments. About half of these workers received no measurable occupational dose. In that year the average worker measurably exposed to external radiation received an occupational dose equivalent of 0.2 rem to the whole body, based on the readings of individual dosimeters worn on the surface of the body. We estimate (assuming a linear non-threshold model) the increased risk of premature death due to radiation-induced cancer for such a dose is approximately 2 to 5 in 100,000 and that the increased risk of serious hereditary effects is somewhat smaller. To put these estimated risks in perspective with other occupational hazards, they are comparable to the observed risk of job-related accidental death in the safest industries, wholesale and retail trades, for which the annual accidental death rate averaged about 5 per 100,000 from 1980 to 1984. The U.S. average for all industries was 11 per 100,000 in 1984 and 1985.

These recommendations are based on the assumption that risks of injury from exposure to radiation should be considered in relation to the overall benefit derived from the activities causing the exposure. This approach is similar to that used by the Federal Radiation Council (FRC) in developing the 1960 Federal guidance. The FRC said then, "Fundamentally, setting basic radiation protection standards involves passing judgment on the extent of the possible health hazard society is willing to accept in order to realize the known benefits of radiation." This leads to three basic principles that have governed radiation protection of workers in recent decades in the United States and in most other countries. Although the precise formulation of these principles has evolved over the years, their intent has continued unchanged. The first is that any activity involving occupational exposure should be determined to be useful enough to society to warrant the exposure of workers; i.e., that a finding be made that the activity is "justified". This same principle applies to virtually any human endeavor which involves some risk of injury. The second is that, for justified activities, exposure of the work force should be as low as reasonably achievable (commonly designated by the acronym "ALARA"); this has most recently been characterized as "optimization" of radiation protection by the International Commission on Radiological Protection (ICRP). Finally, to provide an upper limit on risk to individual workers, "limitation" of the maximum allowed individual dose is required. This is required above and beyond the protection provided by the first two principles because their primary objective is to minimize the total harm from occupational exposure in the entire work force; they do not limit the way that harm is distributed among individual workers.

The principle that activities causing occupational exposure should produce a net benefit is important in radiation protection even though the judgment of net benefit is not easily made. The 1960 guidance says: "There should not be any man-made radiation exposure without the expectation of benefit resulting from such exposure . . ." And "It is basic that exposure to radiation should result from a real determination of its necessity." Advisory bodies other than the FRC have used language which has essentially the same meaning. In its most recent revision of international guidance (1977) the ICRP said ". . . no practice shall be adopted unless its introduction produces a positive net benefit," and in slightly different form the NCRP, in its most recent statement (1975) on this matter, said ". . . all exposures should be kept to a practicable minimum; . . . this principle involves value judgments based upon perception of compensatory benefits commensurate with risks, preferably in the form of realistic numerical estimates of both benefits and risks from activities involving radiation and alternative means to the same benefits."

This principle is set forth in these recommendations in a simple form: "There should not be any occupational exposure of workers to ionizing radiation without the expectation of an overall benefit from the activity causing the exposure." An obvious difficulty in making this judgment is the difficulty of quantifying in comparable terms costs (including risks) and benefits. Given this situation, informed value judgments are necessary and are usually all that is possible. It is perhaps useful to observe, however, that throughout history individuals and societies have made risk-benefit judgments, with their success usually depending upon the amount of accurate information available. Since more is known about radiation now than in previous decades, the prospect is that these judgments can now be better made than before.

The preceding discussion has implicitly focused on major activities, i.e., those instituting or continuing a general practice involving radiation exposure of workers. This principle also applies to detailed management of facilities and direct supervision of workers. Decisions on whether or not particular tasks should be carried out (such as inspecting control systems or acquiring specific experimental data) require judgments which can, in the aggregate, be as significant for radiation protection as those justifying the basic activities these tasks support.

The principle of reduction of exposure to levels that are "as low as reasonably achievable" (ALARA) is typically implemented in two different ways. First, it is applied to the engineering design of facilities so as to reduce, prospectively, the anticipated exposure of workers. Second, it is applied to actual operations; that is, work practices are designed and carried out to reduce the exposure of workers. Both of these applications are encompassed by these recommendations.[*] The principle applies both to collective exposures of the work force and to annual and cumulative individual exposures. Its application may therefore require complex judgments, particularly when tradeoffs between collective and individual doses are involved. Effective implementation of the ALARA principle involves most of the many facets of an effective radiation protection program: education of workers concerning the health risks of exposure to radiation; training in regulatory requirements and procedures to control exposure; monitoring, assessment, and reporting of exposure levels and doses; and management and supervision of radiation protection activities, including the choice and implementation of radiation control measures. A comprehensive radiation protection program will also include, as appropriate,

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[*] The recomendation that Federal agencies, through their regulations, operational procedures and other appropriate means, maintain doses ALARA is not intended to express, and therefore should not be interpreted as expressing, a view whether the ALARA concept should constitute a duty of care in tort litigation. Implementation of the ALARA concept requires a complex, subjective balancing of scientific, economic and social factors generally resulting in the attainment of average dose levels significantly below the maximum permitted by this guidance.

properly trained and qualified radiation protection personnel; adequately designed, operated, and maintained facilities and equipment; and quality assurance and audit procedures. Another important aspect of such programs is maintenance of records of cumulative exposures of workers and implementation of appropriate measures to assure that lifetime exposure of workers repeatedly exposed near the limits is minimized.

The types of work and activity which involve worker exposure to radiation vary greatly and are administered by many different Federal and State agencies under a wide variety of legislative authorities. In view of this complexity, Federal radiation protection guidance can address only the broad prerequisites of an effective ALARA program, and regulatory authorities must ensure that more detailed requirements are identified and carried out. In doing this, such authorities may find it useful to establish or encourage the use of 1) administrative control levels specifying, for specific categories of workers or work situations, dose levels below the limiting numerical values recommended in this guidance; 2) reference levels to indicate the need for such actions as recording, investigation, and intervention; and 3) local goals for limiting individual and collective occupational exposures. Where the enforcement of a general ALARA requirement is not practical under an agency's statutory authority, it is sufficient that an agency endorse and encourage ALARA, and establish such regulations which result from ALARA findings as may be useful and appropriate to meet the objectives of this guidance.

The numerical radiation protection guidance which has been in effect since 1960 for limiting the maximum allowed dose to an individual worker is based on the concept of limiting the dose to the most critically exposed part of the body. This approach was appropriate, given the limitations of scientific information available at that time, and resulted in a set of five independent numerical guides for maximum exposure of a) the whole body, head and trunk, active blood-forming organs, gonads, and lens of eye; b) thyroid and skin of the whole body; c) hands and forearms, feet and ankles; d) bone, and e) other organs. A consequence of this approach when several different parts of the body are exposed simultaneously is that only the part that receives the highest dose relative to its respective guide is decisive for limiting the dose.

Current knowledge permits a more comprehensive approach that takes into account the separate contributions to the total risk from each exposed part of the body. These recommendations incorporate the dose weighting system introduced for this purpose by the ICRP in 1977. That system assigns weighting factors to the various parts of the body for the risks of lethal cancer and serious prompt genetic effects (those in the first two generations); these factors are chosen so that the sum of weighted dose equivalents represents a risk the same as that from a numerically equal dose equivalent to the whole body. The ICRP recommends that the effective (i.e. weighted) dose equivalent incurred in any year be limited to 5 rems. Based on the public response to the similar proposal published by EPA in 1981 and Federal experience with comparable exposure limits, the Federal agencies concur. These recommendations therefore replace the 1960 whole body numerical guides of 3 rems per quarter and 5(N–18) rems cumulative dose equivalent (where N is the age of the worker) and associated critical organ guides with a limiting value of 5 rems effective dose equivalent incurred in any year. Supplementary limiting values are also recommended to provide protection against those health effects for which an effective threshold is believed to exist.

In recommending a limiting value of 5 rems in any single year, EPA has had to balance a number of considerations. Public comments confirmed that, for some beneficial activities, occasional doses aproaching this value are not reasonably avoidable. On the other hand, continued annual exposures at or near this level over substantial portions of a working lifetime would, we believe, lead to unwarranted risks. For this reason such continued annual exposures should be avoided, and these recommendations provide such guidance. As noted earlier, these recommendations also continue a system of protection which combines limiting values for maximum dose with a requirement for active application of measures to minimize doses—the ALARA requirement. This has resulted in steadily decreasing average annual doses to workers (most recently to about one-fiftieth of the recommended limiting value), and, to date, only a few hundred out of millions of workers have received planned cumulative doses that are a substantial fraction of the maximum previously permitted cumulative dose over an occupational lifetime. EPA anticipates that the continued application of the ALARA requirement, combined with new guidance on avoidance of large cumulative doses, will result in maintaining risks to all workers at low levels. EPA will continue to review worker doses with a view to initiating recommendations for any further modifications of the dose limitation system that are warranted by future trends in worker exposure.

Certain radionuclides, if inhaled or ingested, may remain in and continue to irradiate the body for many years. These recommendations provide that radionuclides should be contained so as to minimize intake, to the extent reasonably achievable. When avoidance of situations that may result in such intake is not practical, the recommendations distinguish between pre-exposure and post-exposure situations. With respect to the former, Federal agencies should base control of prospective internal exposure to radionuclides (e.g. facility design, monitoring, training, and operating procedures) upon the entire future dose that may result from any intake (the committed dose), not just upon the dose accrued in the year of intake. This is to assure that, prior to exposure to such materials, proper account is taken of the risk due to doses in future years.

With respect to post-exposure situations, most significant internal exposure to radionuclides occurs as the result of inadvertent intakes. In the case of some long-lived radionuclides, it may also be difficult to measure accurately the small quantities corresponding to the recommended numerical guidance for control of committed doses. In such cases, when workers are inadvertently exposed or it is not otherwise possible to avoid intakes in excess of these recommendations for control of committed dose, it will be necessary to take appropriate corrective action to assure control has been reestablished and to properly manage future exposure of the worker. In regard to the latter requirement, provision should be made to continue to monitor the annual dose received from radionuclides in the body as long as they remain in sufficient amount to deliver doses significant compared to the limiting values for annual dose. These recommendations extend those of the ICRP, because it is appropriate to maintain active management of workers who exceed the guidance for committed dose in order that individual differences in retention of such materials in the body be monitored, and to assure, whenever possible, conformance to the limiting values for annual dose.

These recommendations also incorporate guidance for limiting exposure of the unborn as a result of occupational exposure of female workers. It has long been suspected that the embryo and fetus are more sensitive to a variety of effects of radiation than are adults. Although our knowledge remains incomplete, it has now become clear that the unborn are especially subject to the risk of mental retardation from exposure to radiation at a relatively early phase of fetal development. Available scientific evidence appears to indicate that this sensitivity is greatest during the period near the end of the first trimester and the beginning of the second trimester of pregnancy, that is, the period from 8 weeks to about 15 weeks after conception. Accordingly, when a woman has declared her pregnancy, this guidance recommends not only that the total exposure of the unborn be more limited than that of adult workers, but that the monthly rate of exposure be further limited in order to provide additional protection. Due to the incomplete state of knowledge of the transfer of radionuclides from the mother to the unborn (and the resulting uncertainty in dose to the unborn), in those few work situations where intake of radionuclides could normally be possible it may also be necessary to institute measures to avoid such intakes by pregnant women in order to satisfy these recommendations.

The health protection objectives of this guidance for the unborn should be achieved in accordance with the provisions of Title VII of the Civil Rights Act of 1964, as amended, with respect to discrimination in employment practices.* The guidance applies only to situations in which the worker has voluntarily made her pregnancy known to her employer. Protection of the unborn may be achieved through such measures as temporary job rotation, worker self-selection, or use of protective equipment. The guidance recognizes that protection of the unborn is a joint responsibility of the employer and worker. Workers should be informed of the risks involved and encouraged to voluntarily make pregnancies known as early as possible so that any temporary arrangements necessary to modify exposures can be made. Conversely, employers should make such arrangements in a manner that minimizes the impact on the worker.

The recommended numerical guidance for limiting dose to workers applies to the sum of dose from external and internal sources of radiation. This procedure is recommended so as to provide a single limit on the total risk from radiation exposure. Therefore, in those cases where both kinds of radiation sources are present, decisions about the control of dose from internal sources should not be made without equal consideration of their implication for dose from external sources.

The guidance emphasizes the importance of recordkeeping for annual, committed, and cumulative (lifetime) doses. Such recordkeeping should be designed to avoid burdensome requirements for cases in which doses are insignificant. Currently, regulatory records are not generally required for doses small compared to regulatory limits for annual external and internal doses. Under this guidance such regulatory practices would continue to be appropriate if due consideration is given to the implications of summing internal and external doses and to recordkeeping needs for assessing cumulative doses. To the extent reasonable such records should be established on the basis of individual dosimetry rather than on monitoring of exposure conditions.

In summary, many of the important changes from the 1960 guidance are structural. These include introduction of the concept of risk-based weighting of doses to different parts of the body and the use of committed dose as the primary basis for control of internal exposure. The numerical values of the guidance for maximum radiation doses are also modified. These changes bring this guidance into general conformance with international recommendations and practice. In addition, guidance is provided for protection of the unborn, and increased emphasis is placed on eliminating unjustified exposure and on keeping justified exposure as low as reasonably achievable, both long-standing tenets of radiation protection. The guidance emphasizes the importance of instruction of workers and their supervisors, monitoring and recording of doses to workers, and the use of administrative control and reference levels for carrying out ALARA programs.

These recommendations apply to workers exposed to other than normal background radiation on the job. It is sometimes hard to identify such workers because everyone is exposed to natural sources of radiation and many occupational exposures are small. Workers or workplaces subject to this guidance will be identified by the responsible implementing agencies. Agencies will have to use care in determining when exposure of workers does not need to be regulated. In making such determinations agencies should consider

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*The Civil Rights Act of 1964, as amended, provides that "It shall be an unlawful employment practice for an employer (1) to fail or refuse to hire or to discharge any individual, or otherwise to discriminate against any individual with respect to his compensation, terms, conditions, or privileges of employment, because of such individual's . . . sex . . . or (2) to limit, segregate, or classify his employees or applicants for employment in any way which would deprive or tend to deprive any individual of employment opportunities or otherwise adversely affect his status as an employee, because of such individual's . . . . sex . . ." [42 U.S.C. 2000e–2(a)]. The Pregnancy Discrimination Act of 1978 defines "because of sex" to include because of or on the basis of pregnancy, childbirth, or related medical conditions [42 U.S.C. 2000e(k)].

both the collective dose which is likely to be avoided through regulation and the maximum individual doses possible.

Implementation of these recommendations will require changes that can reasonably be achieved only over a period of time. It is expected that Federal agencies will identify any problem areas and provide adequate flexibility and the necessary transition periods to avoid undue impacts, while at the same time assuring reasonably prompt implementation of this new guidance.

Upon implementing these recommendations, occupational exposure should be reduced. It is not possible to quantify the overall exposure reduction that will be realized because it cannot be predicted how efficiently these recommendations will be implemented or how much of existing exposure is unnecessary. These recommendations reduce the maximum whole body dose that workers may receive in any one year by more than half (i.e., from 3 rems per quarter to 5 rems per year), require that necessary exposure to internal radioactivity be controlled on the basis of committed dose, require that internal and external doses be considered together rather than separately, and provide increased protection of the unborn. We also expect the strengthened and more explicit recommendations for maintaining occupational exposure "as low as reasonably achievable" will improve the radiation protection of workers. Finally, these recommendations would facilitate the practice of radiation protection by introducing a self-consistent system of limits in accordance with that in practice internationally.

Recommendations

The following recommendations are made for the guidance of Federal agencies in their conduct of programs for the protection of workers from ionizing radiation.

1. There should not be any occupational exposure of workers to ionizing radiation without the expectation of an overall benefit from the activity causing the exposure. Such activities may be allowed provided exposure of workers is limited in accordance with these recommendations.

2. No exposure is acceptable without regard to the reason for permitting it, and it should be general practice to maintain doses from radiation to levels below the limiting values specified in these recommendations. Therefore, it is fundamental to radiation protection that a sustained effort be made to ensure that collective doses, as well as annual, committed, and cumulative lifetime individual doses, are maintained as low as reasonably achievable (ALARA), economic and social factors being taken into account.

3. In addition to the above recommendations, radiation doses received as a result of occupational exposure should not exceed the *limiting values for assessed dose to individual workers* specified below. These are given separately for protection against different types of effects on health and apply to the sum of doses from external and internal sources of radiation. For cancer and genetic effects, the limiting value is specified in terms of a derived quantity called the effective dose equivalent. For other health effects, the limiting values are specified in terms of the dose equivalent [1] to specific organs or tissues.

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[1] "Dose equivalent" is the product of the absorbed dose, a quality factor which varies with the energy and type of radiation, and other modifying factors, as defined by the International Commission on Radiation Units and Measurements.

Cancer and Genetic Effects. The effective dose equivalent, H_E, received in any year by an adult worker should not exceed 5 rems (0.05 sievert).[2] The effective dose equivalent is defined as:

$$H_E = \sum_T w_T H_T ,$$

where w_T is a weighting factor and H_T is the annual dose equivalent averaged over organ or tissue T. Values of w_T and their corresponding organs and tissues are:

Gonads	0.25
Breasts	0.15
Red bone marrow	0.12
Lungs	0.12
Thyroid	0.03
Bone surfaces	0.03
Remainder [3]	0.30

For the case of uniform irradiation of the whole body, where H_T may be assumed the same for each organ or tissue, the effective dose equivalent is equal to the dose equivalent to the whole body.

Other Health Effects. In addition to the limitation on effective dose equivalent, the dose equivalent, H_T, received in any year by an adult worker should not exceed 15 rems (0.15 sievert) to the lens of the eye, and 50 rems (0.5 sievert) to any other organ, tissue (including the skin), or extremity[4] of the body.

Additional limiting values which apply to the control of dose from internal exposure to radionuclides in the workplace are specified in Recommendation 4. Continued exposure of a worker at or near the limiting values for dose received in any year over substantial portions of a working lifetime should be avoided. This should normally be accomplished through application of appropriate radiation protection practices established under Recommendation 2.

4. As the primary means for controlling internal exposure to radionuclides, agencies should require that radioactive materials be contained, to the extent reasonably achievable, so as to minimize intake. In controlling internal exposure consideration should also be given to concomitant external exposure.

The control of necessary exposure of adult workers to radioactive materials in the workplace should be designed, operated, and monitored with sufficient frequency to ensure that, as the result of intake of radionuclides in a year, the following *limiting values for control of the workplace* are satisfied: (a) the anticipated magnitude of the committed effective dose equivalent from such intake plus any annual effective dose equivalent from external exposure will not exceed 5 rems (0.05 sievert), and (b) the anticipated magnitude of the committed dose equivalent to any organ or tissue from such intake plus any annual dose equivalent from external exposure will not exceed 50 rems (0.5 sievert). The committed effective dose equivalent from internal sources of radiation, $H_{E,50}$, is defined as:

$$H_{E,50} = \sum_T w_T H_{T,50} ,$$

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[2] The unit of dose equivalent in the system of special quantities for ionizing radiation currently in use in the United States is the "rem." In the recently-adopted international system (SI) the unit of dose equivalent is the "sievert". One sievert = 100 rems.

[3] "Remainder" means the five other organs (such as liver, kidneys, spleen, brain, thymus, adrenals, pancreas, stomach, small intestine, upper large intestine, and lower large intestine, but excluding skin, lens of the eye, and extremities) with the highest doses. The weighting factor for each such organ is 0.06.

[4] "Extremity" means the forearms and hands, or the lower legs and feet.

where w_T is defined as in Recommendation 3 and the committed dose equivalent, $H_{T,50}$, is the sum of all dose equivalents to organ or tissue T that may accumulate over an individual's anticipated remaining lifetime (taken as 50 years) from radionuclides that are retained in the body. These conditions on committed doses should provide the primary basis for the control of internal exposure to radioactive materials.[5]

In circumstances where assessment of actual intake for an individual worker shows the above conditions for control of intake have not been met, agencies should require that appropriate corrective action be taken to assure control has been reestablished and that future exposure of the worker is appropriately managed. Provision should be made to assess annual dose equivalents due to radionuclides retained in the body from such intake for as long as they are significant for ensuring conformance with the limiting values specified in Recommendation 3.

5. Occupational dose equivalents to individuals under the age of eighteen should be limited to one-tenth of the values specified in Recommendations 3 and 4 for adult workers.

6. Exposure of an unborn child should be less than that of adult workers. Workers should be informed of currrent knowledge of risks to the unborn[6] from radiation and of the responsibility of both employers and workers to minimize exposure of the unborn. The dose equivalent to an unborn as a result of occupational exposure of a woman who has declared that she is pregnant should be maintained as low as reasonably achievable, and in any case should not exceed 0.5 rem (0.005 sievert) during the entire gestation period. Efforts should be made to avoid substantial variation above the uniform monthly exposure rate that would satisfy this limiting value. The limiting value for the unborn does not create a basis for discrimination, and should be achieved in conformance with the provisions of Title VII of the Civil Rights Act of 1964, as amended, regarding discrimination in employment practices, including hiring, discharge, compensation, and terms, conditions, or privileges of employment.

7. Individuals occupationally exposed to radiation and managers of activities involving radiation should be instructed on the basic risks to health from ionizing radiation and on basic radiation protection principles. This should, as a minimum, include instruction on the somatic (including *in utero*) and genetic effects of ionizing radiation, the recommendations set forth in Federal radiation protection guidance for occupational exposure and applicable regulations and operating procedures which implement this guidance, the general levels of risk and appropriate radiation protection practices for their work situations, and the responsibilities of individual workers to avoid and minimize exposure. The degree and type of instruction that is appropriate will depend on the potential radiation exposures involved.

8. Appropriate monitoring of workers and the work place should be performed and records kept to ensure conformance with these recommendations. The types and accuracy of monitoring methods and procedures utilized should be periodically reviewed to assure that appropriate techniques are being competently applied.

Maintenance of a cumulative record of lifetime occupational doses for each worker is encouraged. For doses due to intake of radioactive materials, the committed effective dose equivalent and the quantity of each radionuclide in the body should be assessed and recorded, to the extent practicable. A summary of annual, cumulative, and committed effective dose equivalents should be provided each worker on no less than an annual basis; more

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[5] When these conditions on intake of radioactive materials have been satisfied, it is not necessary to assess contributions from such intakes to annual doses in future years, and, as an operational procedure, such doses may be assigned to the year of intake for the purpose of assessing compliance with Recommendation 3.

[6] The term "unborn" is defined to encompass the period commencing with conception and ending with birth.

detailed information concerning his or her exposure should be made available upon the worker's request.

9. Radiation exposure control measures should be designed, selected, utilized, and maintained to ensure that anticipated and actual doses meet the objectives of this guidance. Establishment of administrative control levels[7] below the limiting values for control may be useful and appropriate for achieving this objective. Reference levels[8] may also be useful to determine the need to take such actions as recording, investigation, and intervention. Since such administrative control and reference levels will often involve ALARA considerations, they may be developed for specific categories of workers or work situations. Agencies should encourage the establishment of measures by which management can assess the effectiveness of ALARA efforts, including, where appropriate, local goals for limiting individual and collective occupational doses. Supervision should be provided on a part-time, full-time, or task-by-task basis as necessary to maintain effective control over the exposure of workers.

10. The numerical values recommended herein should not be deliberately exceeded except during emergencies, or under unusual circumstances for which the Federal agency having jurisdiction has carefully considered the reasons for doing so in light of these recommendations. If Federal agencies authorize dose equivalents greater than these values for unusual circumstances, they should make any generic procedures specifying conditions under which such exposures may occur publicly available or make specific instances in which such authorization has been given a matter of public record.

The following notes are provided to clarify application of the above recommendations:

1. Occupational exposure of workers does not include that due to normal background radiation and exposure as a patient of practitioners of the healing arts.

2. The existing Federal guidance (34 FR 576 and 36 FR 12921) for limiting exposure of underground miners to radon decay products applies independently of, and is not changed by, these recommendations.

3. The values specified by the International Commission on Radiological Protection (ICRP) for quality factors and dosimetric conventions for the various types of radiation, the models for reference persons, and the results of their dosimetric methods and metabolic models may be used for determining conformance to these recommendations.

4. "Annual Limits on Intake" (ALIs) and/or "Derived Air Concentrations" (DACs) may be used to limit radiation exposure from intake of or immersion in radionuclides. The ALI or DAC for a single radionuclide is the maximum intake in a year or average air concentration for a working year, respectively, for a reference person that, in the absence of any external dose, satisfies the conditions on committed effective dose equivalent and committed dose equivalent of Recommendation 4. ALIs and DACs may be derived for different chemical or physical forms of radioactive materials.

5. The numerical values provided by these recommendations do not apply to workers responsible for the management of or response to emergencies.

These recommendations would replace those portions of current Federal Radiation Protection Guidance (25 FR 4402) that apply to the protection of workers from ionizing radiation. It is expected that individual Federal agencies, on the basis of their knowledge of specific worker exposure situations,

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[7] Administrative control levels are requirements determined by a competent authority or the management of an institution or facility. They are not primary limits, and may therefore be exceeded, upon approval of competent authority or management, as situations dictate.

[8] Reference levels are not limits, and may be expressed in terms of any useful parameter. They are used to determine a course of action, such as recording, investigation, or intervention, when the value of a parameter exceeds, or is projected to exceed, the reference level.

will use this new guidance as the basis upon which to revise or develop detailed standards and regulations to the extent that they have regulatory or administrative jurisdiction. The Environmental Protection Agency will keep informed of Federal agency actions to implement this guidance, and will issue any necessary clarifications and interpretations required to reflect new information, so as to promote the coordination necessary to achieve an effective Federal program of worker protection.

If you approve the foregoing recommendations for the guidance of Federal agencies in the conduct of their radiation protection activities, I further recommend that this memorandum be published in the **Federal Register.**

Lee M. Thomas,

Administrator, Environmental Protection Agency.

[FR Doc. 87-1716
Filed 1-22-87; 9:44 am]
Billing code 6560-50-M

APPENDIX B

Radiation Protection Guidance (1960)

FEDERAL RADIATION COUNCIL

RADIATION PROTECTION GUIDANCE FOR FEDERAL AGENCIES

Memorandum for the President

Pursuant to Executive Order 10831 and Public Law 86-373, the Federal Radiation Council has made a study of the hazards and use of radiation. We herewith transmit our first report to you concerning our findings and our recommendations for the guidance of Federal agencies in the conduct of their radiation protection activities.

It is the statutory responsibility of the Council to "* * * advise the President with respect to radiation matters, directly or indirectly affecting health, including guidance for all Federal agencies in the formulation of radiation standards and in the establishment and execution of programs of cooperation with States * * *"

Fundamentally, setting basic radiation protection standards involves passing judgment on the extent of the possible health hazard society is willing to accept in order to realize the known benefits of radiation. It involves inevitably a balancing between total health protection, which might require foregoing any activities increasing exposure to radiation, and the vigorous promotion of the use of radiation and atomic energy in order to achieve optimum benefits.

The Federal Radiation Council has reviewed available knowledge on radiation effects and consulted with scientists within and outside the Government. Each member has also examined the guidance recommended in this memorandum in light of his statutory responsibilities. Although the guidance does not cover all phases of radiation protection, such as internal emitters, we find that the guidance which we recommend that you provide for the use of Federal agencies gives appropriate consideration to the requirements of health protection and the beneficial uses of radiation and atomic energy. Our further findings and recommendations follow.

Discussion. The fundamental problem in establishing radiation protection guides is to allow as much of the beneficial uses of ionizing radiation as possible while assuring that man is not exposed to undue hazard. To get a true insight into the scope of the problem and the impact of the decisions involved, a review of the benefits and the hazards is necessary.

It is important in considering both the benefits and hazards of radiation to appreciate that man has existed throughout his history in a bath of natural radiation. This background radiation, which varies over the earth, provides a partial basis for understanding the effects of radiation on man and serves as an indicator of the ranges of radiation exposures within which the human population has developed and increased.

The benefits of ionizing radiation. Radiation properly controlled is a boon to mankind. It has been of inestimable value in the diagnosis and treatment of diseases. It can provide sources of energy greater than any the world has yet had available. In industry, it is used as a tool to measure thickness, quantity or quality, to discover hidden flaws, to trace liquid flow, and for other purposes. So many research uses for ionizing radiation have been found that scientists in many diverse fields now rank radiation with the microscope in value as a working tool.

The hazards of ionizing radiation. Ionizing radiation involves health hazards just as do many other useful tools. Scientific findings concerning the biological effects of radiation of most immediate interest to the establishment of radiation protection standards are the following:

1. Acute doses of radiation may produce immediate or delayed effects, or both.

2. As acute whole body doses increase above approximately 25 rems (units of radiation dose), immediately observable effects increase in severity with dose, beginning from barely detectable changes, to biological signs clearly indicating damage, to death at levels of a few hundred rems.

3. Delayed effects produced either by acute irradiation or by chronic irradiation are similar in kind, but the ability of the body to repair radiation damage is usually more effective in the case of chronic than acute irradiation.

4. The delayed effects from radiation are in general indistinguishable from familiar pathological conditions usually present in the population.

5. Delayed effects include genetic effects (effects transmitted to succeeding generations), increased incidence of tumors, lifespan shortening, and growth and development changes.

6. The child, the infant, and the unborn infant appear to be more sensitive to radiation than the adult.

7. The various organs of the body differ in their sensitivity to radiation.

8. Although ionizing radiation can induce genetic and somatic effects (effects on the individual during his lifetime other than genetic effects), the evidence at the present time is insufficient to justify precise conclusions on the nature of the dose-effect relationship at low doses and dose rates. Moreover, the evidence is insufficient to prove either the hypothesis of a "damage threshold" (a point below which no damage occurs) or the hypothesis of "no threshold" in man at low doses.

9. If one assumes a direct linear relation between biological effect and the amount of dose, it then becomes possible to relate very low dose to an assumed biological effect even though it is not detectable. It is generally agreed that the effect that may actually occur will not exceed the amount predicted by this assumption.

Basic biological assumptions. There are insufficient data to provide a firm basis for evaluating radiation effects for all types and levels of irradiation. There is particular uncertainty with respect to the biological effects at very low doses and low-dose rates. It is not prudent therefore to assume that there is a level of radiation exposure below which there is absolute certainty that no effect may occur. This consideration, in addition to the adoption of the conservative hypothesis of a linear relation between biological effect and the amount of dose, determines our basic approach to the formulation of radiation protection guides.

The lack of adequate scientific information makes it urgent that additional research be undertaken and new data developed to provide a firmer basis for evaluating biological risk. Appropriate member agencies of the Federal Radiation Council are sponsoring and encouraging research in these areas.

Recommendations. In view of the findings summarized above the following recommendations are made:

It is recommended that:

1. There should not be any man-made radiation exposure without the expectation of benefit resulting from such exposure. Activities resulting in man-made radiation exposure should be authorized for useful applications provided in recommendations set forth herein' are followed.

It is recommended that:

2. The term "Radiation Protection Guide" be adopted for Federal use. This term is defined as the radiation dose which should not be exceeded without careful consideration of the reasons for doing so; every effort should be made to encourage the maintenance of radiation doses as far below this guide as practicable.

It is recommended that:

3. The following Radiation Protection Guides be adopted for normal peacetime operations:

Type of exposure	Condition	Dose (rem)
Radiation worker:		
(a) Whole body, head and trunk, active blood forming organs, gonads, or lens of eye.	Accumulated dose	5 times the number of years beyond age 18.
	13 weeks	3.
(b) Skin of whole body and thyroid	Year	30.
	13 weeks	10.
(c) Hands and forearms, feet and ankles	Year	75.
	13 weeks	25.
(d) Bone	Body burden	0.1 microgram of radium-226 or its biological equivalent.
(e) Other organs	Year	15.
	13 weeks	5.
Population:		
(a) Individual	Year	0.5 (whole body).
(b) Average	30 year	5 (gonads).

The following points are made in relation to the Radiation Protection Guides herein provided:

(1) For the individual in the population, the basic Guide for annual whole body dose is 0.5 rem. This Guide ap-

plies when the individual whole body doses are known. As an operational technique, where the individual whole body doses are not known, a suitable sample of the exposed population should be developed whose protection guide for annual whole body dose will be 0.17 rem per capita per year. It is emphasized that this is an operational technique which should be modified to meet special situations.

(2) Considerations of population genetics impose a per capita dose limitation for the gonads of 5 rems in 30 years. The operational mechanism described above for the annual individual whole body dose of 0.5 rem is likely in the immediate future to assure that the gonadal exposure Guide (5 rem in 30 years) is not exceeded.

(3) These Guides do not differ substantially from certain other recommendations such as those made by the National Committee on Radiation Protection and Measurements, the National Academy of Sciences, and the International Commission on Radiological Protection.

(4) The term "maximum permissible dose" is used by the National Committee on Radiation Protection (NCRP) and the International Commission on Radiological Protection (ICRP). However, this term is often misunderstood. The words "maximum" and "permissible" both have unfortunate connotations not intended by either the NCRP or the ICRP.

(5) There can be no single permissible or acceptable level of exposure without regard to the reason for permitting the exposure. It should be general practice to reduce exposure to radiation, and positive effort should be carried out to fulfill the sense of these recommendations. It is basic that exposure to radiation should result from a real determination of its necessity.

(6) There can be different Radiation Protection Guides with different numerical values, depending upon the circumstances. The Guides herein recommended are appropriate for normal peacetime operations.

(7) These Guides are not intended to apply to radiation exposure resulting from natural background or the purposeful exposure of patients by practitioners of the healing arts.

(8) It is recognized that our present scientific knowledge does not provide a firm foundation within a factor of two or three for selection of any particular numerical value in preference to another value. It should be recognized that the Radiation Protection Guides recommended in this paper are well below the level where biological damage has been observed in humans.

It is recommended that:

4. Current protection guides used by the agencies be continued on an interim basis for organ doses to the population.

Recommendations are not made concerning the Radiation Protection Guides for individual organ doses to the population, other than the gonads. Unfortunately, the complexities of establishing guides applicable to radiation exposure of all body organs preclude the Council from making recommendations concerning them at this time. However, current protection guides used by the agencies appear appropriate on an interim basis.

It is recommended that:

5. The term "Radioactivity Concentration Guide" be adopted for Federal use. This term is defined as the concentration of radioactivity in the environment which is determined to result in whole body or organ doses equal to the Radiation Protection Guide.

Within this definition, Radioactivity Concentration Guides can be determined after the Radiation Protection Guides are decided upon. Any given Radioactivity Concentration Guide is applicable only for the circumstances under which the use of its corresponding Radiation Protection Guide is appropriate.

It is recommended that:

6. The Federal agencies, as an interim measure, use radioactivity concentration guides which are consistent with the recommended Radiation Protection Guides. Where no Radiation Protection Guides are provided, Federal agencies continue present practices.

No specific numerical recommendations for Radioactivity Concentration Guides are provided at this time. However, concentration guides now used by the agencies appear appropriate on an interim basis. Where appropriate radioactivity concentration guides are not available, and where Radiation Protection Guides for specific organs are provided herein, the latter Guides can be used by the Federal agencies as a starting point for the derivation of radioactivity concentration guides applicable to their particular problems. The Federal Radiation Council has also initiated action directed towards the development of additional Guides for radiation protection.

It is recommended that:

7. The Federal agencies apply these Radiation Protection Guides with judgment and discretion, to assure that reasonable probability is achieved in the attainment of the desired goal of protecting man from the undesirable effects of radiation. The Guides may be exceeded only after the Federal agency having jurisdiction over the matter has carefully considered the reason for doing so in light of the recommendations in this paper.

The Radiation Protection Guides provide a general framework for the radiation protection requirements. It is expected that each Federal agency, by virtue of its immediate knowledge of its operating problems, will use these Guides as a basis upon which to develop detailed standards tailored to meet its particular requirements. The Council will follow the activities of the Federal agencies in this area and will promote the necessary coordination to achieve an effective Federal program.

If the foregoing recommendations are approved by you for the guidance of Federal agencies in the conduct of their radiation protection activities, it is further recommended that this memorandum be published in the FEDERAL REGISTER.

ARTHUR S. FLEMMING,
Chairman,
Federal Radiation Council.

The recommendations numbered "1" through "7" contained in the above memorandum are approved for the guidance of Federal agencies, and the memorandum shall be published in the FEDERAL REGISTER.

DWIGHT D. EISENHOWER

MAY 13, 1960.

[F.R. Doc. 60-4539; Filed, May 17, 1960; 8:51 a.m.]

APPENDIX C

BACKGROUND MATERIAL

Units: The International Commission on Radiological Units and Measurements (ICRU) selects and defines radiation quantities and units. ICRU Report 33 (ICRU 1980) contains authoritative definitions for most of the quantities used in this Report.

In recent years a number of "special units" adopted into the International System of Units (SI) have begun to replace the older conventional radiation units (ICRU 1980). In this report, both sets of units are used.

Absorbed Dose: The absorbed dose, D, is the differential $d\bar{\epsilon}/dm$, where $d\bar{\epsilon}$ is the mean energy imparted by ionizing radiation to a small volume of matter of mass dm. Absorbed dose to an organ is generally averaged over its entire mass. The conventional and SI units of absorbed dose are the rad and the gray (Gy), respectively.

Dose Equivalent: For purposes of radiation protection, it is desirable to use a measure of dose, for all types of ionizing radiation, that correlates to the biological effect on a common scale. The dose equivalent, H, is defined for this purpose as the product of D, Q, and N at the point of interest in tissue, where D is absorbed dose, Q is a quality factor, and N is the product of all other modifying factors:

$$H = D\,Q\,N \tag{C-1}$$

The conventional and SI units of dose equivalent are the rem and the sievert (Sv), respectively.

Quality Factor. In the past, the absorbed dose was modified, for the purposes of radiation protection, by the Relative Biological Effectiveness (ICRP 1959, NCRP 1959). The RBE of a type of radiation is defined as the ratio of the absorbed dose of a reference radiation to the absorbed dose of the radiation in question that would produce an equivalent radiobiological response. To avoid confusion, usage of the RBE is now restricted to radiobiology. The factor used in radiation protection to modify absorbed dose, so as to obtain dose equivalent, is called the quality factor, and denoted Q.

The quality factor is independent of the organ or tissue under consideration and of the biological endpoint. Because the uncertainties involved in estimating dose equivalent are large relative to the variation in stopping power for a particular radiation, Q is usually assigned a constant value for each particular type of radiation.

In ICRP Publication 2, a quality factor (then called the RBE) of 10 was recommended for alpha radiation. The NCRP has recently recommended the following values of Q (NCRP 1987b):

$$Q = \begin{cases} \text{1 for X-rays, gamma rays, beta particles, and electrons;} \\ \text{5 for thermal neutrons;} \\ \text{20 for neutrons (other than thermal), protons, alpha particles,} \\ \quad \text{and multiply-charged particles of unknown energy.} \end{cases}$$

The Quality factors employed in ICRP Publications 30 and in the present Report are:

$$Q = \begin{cases} \text{1 for beta particles, electrons, and all} \\ \quad \text{electromagnetic radiations;} \\ \text{10 for spontaneous fission neutrons and protons;} \\ \text{20 for alpha particles, recoil particles, and fission fragments.} \end{cases}$$

Only a few radionuclides (e.g., Cf-252, ...) that might enter or submerge the bodies of workers are neutron emitters, and changes in the value of the quality factor for neutrons would have minor influence on ALIs and DACs for these radionuclides. As noted in the text, however, revision of Q for some alpha-emitters has affected the derived guides.

Modifying Factor: ICRP Publication 2 defined a relative damage factor, denoted n, that played a role comparable to N of equation (C-1). The relative damage factor n was assigned values of 1 or 5, depending upon the assumed spatial distribution of the radionuclide; n plays no role in ICRP 30, however, and the factors F^S and F^V of the SEE account for the distribution of radionuclides on and within bone. (See equation 13 of the text.) The ICRP recommends that the product of all modifying factors, N, should be taken as 1 (ICRP 1977).

Estimation of Energy Deposition. The dose equivalent to any organ depends upon the dimensions, locations, and compositions of all tissues in the body, on the distribution of the radioactive materials among those tissues, and on the energies and intensities of the various radiations emitted in nuclear transformations.

In Publication 2, the dose equivalent rate in an organ was based on the activity of radionuclide present in that organ only, and on its effective radius.

With the advent of high-speed computers, and improved capability to model the interaction of radiation with matter, more accurate and detailed calculations of energy deposition have been developed. For the tables in the present Report, the committed dose equivalent in target organ or tissue T arising from inhalation or ingestion of a radionuclide incorporates all sources of exposure S, and is calculated from:

$$H_{T,50} = K \sum_{S} U_S \, SEE(T \leftarrow S) \qquad \text{(C-2)}$$

The specific effective energy SEE(T ← S) is, within a constant factor, the dose equivalent imparted to target tissue T per nuclear transformation in source organ S. It depends upon the details of the nuclear transformations of the radionuclide, including the quality factors of the emitted radiations, and upon the distribution of absorbed energy among body tissues.

U_S is the total number of nuclear transformations that occur in source organ S over 50 years. It is computed as the integral of the time-dependent activity residing in the organ, and it thus reflects the metabolism of the radionuclide in the body.

The numerical value of the constant K depends on the units specified for $H_{T,50}$, SEE, and U_S. In ICRP Publication 30, $H_{T,50}$ is expressed in Sv, SEE in MeV/g-nuclear transformation, and U_S in nuclear transformations. K then assumes the value 1.6×10^{-10} Sv-g/MeV.

Reference Man. A well-defined characterization of man in terms of both anatomical and physiological parameters is needed to establish intake and concentration guides. The recommendations of Publication 2 were based on Standard Man as defined in that publication. The ICRP, noting the need for a more detailed representation, formed a Task Group on Reference Man. Their report, Publication 23 (ICRP 1975), provides the basic anatomical and physiological data required for the dosimetric evaluations that were used for this report.

SYMBOLS AND UNITS

$A(t)$	Activity at time t
Bq	Becquerel
Ci	Curie
cm	centimeter
D	dose; or lung clearance class (day)
d	day
f_1	fractional uptake of nuclide from small intestine to blood
g	gram
H	dose equivalent
H_E	effective dose equivalent
H_T	dose equivalent averaged over tissue or organ T
$H_{E,ext}$	effective dose equivalent from external irradiation
$H_{T,ext}$	dose equivalent averaged over tissue or organ T from external irradiation
$H_{E,50}$	committed effective dose equivalent
$H_{T,50}$	committed dose equivalent averaged over tissue or organ T
$h_{E,50}$	effective dose equivalent conversion factor, the committed effective dose equivalent per unit intake
$h_{T,50}$	tissue dose equivalent conversion factor, the committed dose equivalent in tissue or organ T per unit intake
$\dot{h}_{E,ext}$	effective dose equivalent rate, from external exposure, per unit concentration in air
$\dot{h}_{T,ext}$	dose equivalent rate to tissue or organ T, from external exposure, per unit concentration in air
I	intake of radionuclide
kg	kilogram (10^3 g)
m	minute; metastable; mass; or meter
MBq	megaBecquerel (10^6 Bq)
MeV	million electron volts
μ	micro- (10^{-6})
μCi	microCurie
μm	micron (10^{-6} meter)
n, N	modifying factors in definitions of dose equivalent
Q	Quality factor in definition of dose equivalent
RBE	Relative Biological Effectiveness
S	source
s	second
SEE	specific effective energy
Sv	Sievert

T	tissue; or target
W	lung clearance class (week)
wk	week
WL	Working Level
WLM	Working Level Month
w_T	weighting factor in definition of effective dose equivalent and committed effective dose equivalent
Y	lung clearance class (year)
yr	year

GLOSSARY

absorbed dose (D): The differential $d\bar{\epsilon}/dm$, where $d\bar{\epsilon}$ is the mean energy imparted by ionizing radiation to matter of mass dm. The special SI unit of absorbed dose is the gray (Gy); the conventional unit is the rad (1 rad = 0.01 Gy).

Activity Median Aerodynamic Diameter (AMAD): The diameter of a unit density sphere with the same terminal settling velocity in air as that of an aerosol particle whose activity is the median for the entire aerosol.

ALARA: As Low As Reasonably Achievable, economic and social factors being taken into account.

Annual Limit on (formerly 'of') Intake (ALI): The activity of a radionuclide which, if inhaled or ingested alone by Reference Man, would result in a committed dose equivalent equal to that of the most limiting primary guide.

Becquerel (Bq): One nuclear disintegration per second; the name for the SI unit of activity. 1 Bq = 2.7×10^{-11} Ci.

committed dose equivalent ($H_{T,50}$): The total dose equivalent (averaged over tissue T) deposited over the 50-year period following the intake of a radionuclide.

committed effective dose equivalent ($H_{T,50}$): The weighted sum of committed dose equivalent to specified organs and tissues, in analogy to the effective dose equivalent.

cortical bone: Any bone with a surface/volume ratio less that 60 $cm^2\ cm^{-3}$. In Reference Man, the total mass of cortical bone is 4000 g. (Equivalent to "Compact Bone" in ICRP Publication 20).

critical organ: For a specific radionuclide, solubility class, and mode of intake, the organ that limited the maximum permissible concentration in air or water. The basis for dose limitation under the 1960 Federal guidance.

Curie (Ci): 3.7×10^{10} nuclear disintegrations per second, the name for the conventional unit of activity. 1 Ci = 3.7×10^{10} Bq.

decay product(s): A radionuclide or a series of radionuclides formed by the nuclear transformation of another radionuclide which, in this context, is referred to as the parent.

Derived Air Concentration (DAC): The concentration of a radionuclide in air which, if breathed alone for one work year, would irradiate Reference Man to the limits for occupational exposure. The DAC equals the ALI of a radionuclide divided by the volume of air inhaled by Reference Man in a working year (i.e., $2.4 \times 10^3\ m^3$).

derived limits: Limits, such as the ALI and DAC, that are derived from the primary limits through use of standard assumptions about radionuclide intake and metabolism by Standard Man.

dose equivalent (H): The product of the absorbed dose (D), the quality factor (Q), and any other modifying factors (N). The SI unit of dose equivalent is the sievert (Sv); the conventional unit is the rem (1 rem = 0.01 Sv).

effective dose equivalent (H_E): The sum over specified tissues of the products of the dose equivalent in a tissue or organ (T) and the weighting factor for that tissue, w_T, i.e., $H_E = \sum_T w_T H_T$.

effective dose equivalent conversion factor ($h_{50,E}$): The committed effective dose equivalent per unit intake of radionuclide.

exposure (internal): The situation leading to intake of a radionuclide, and/or the situation existing after a radionuclide has been deposited in an organ or tissue.

external radiation: Radiations incident upon the body from an external source.

Federal Guidance: Principles, policies, and numerical primary guides, approved by the President, for use by Federal agencies as the basis for developing and implementing regulatory standards.

Gray (Gy): The special name for the SI unit of absorbed dose. 1 Gy = 1 Joule kg^{-1} = 100 rad.

half-life (physical, biological, or effective): The time for a quantity of radionuclide, i.e., its activity, to diminish by a factor of a half (because of nuclear decay events, biological elimination of the material, or both, respectively).

ICRP: International Commission on Radiological Protection.

ICRU: International Commission on Radiological Units and Measurements.

internal radiation: Radiation emitted from radionuclides distributed within the body.

ionizing Radiation: Any radiation capable of displacing electrons from atoms or molecules, thereby producing ions.

lung clearance class (D, W, or Y): A classification scheme for inhaled material according to its clearance half-time, on the order of days, weeks, or years, from the pulmonary region of the lung to the blood and the GI tract.

metabolic model: A mathematical description of the metabolic processes of cells, tissues, organs and organisms. It is used here to describe distribution and translocation of radionuclides among tissues.

MIRD: Medical Internal Radiation Dose; a committee of the Society of Nuclear Medicine.

MPC: Maximum Permissible Concentration; replaced by the DAC for the concentration limit in air, and no longer used for concentrations in water.

mucociliary pathway: Those portions of the respiratory tract lined with cilia that propel materials toward the mouth.

NCRP: National Council on Radiation Protection and Measurements.

non-stochastic effects: Health effects for which the severity of the effect in affected individuals varies with the dose, and for which a threshold is assumed to exist.

NRC: Nuclear Regulatory Commission.

nuclear transformation: The spontaneous transformation of one radionuclide into a different nuclide or into a different energy state of the same nuclide.

organ (dose) weighting factor: Factor indicating the relative risk of cancer induction or heredity defects from irradiation of a given tissue or organ; used in calculation of effective dose equivalent and committed effective dose equivalent, and denoted w_T by the ICRP.

primary limit: A numerical limit on the annual or committed (effective) dose equivalent that may be received by a worker or member of the general public, as set forth in the 1987 or 1960 Federal guidances.

Quality factor (Q): The principal modifying factor that is employed in deriving dose equivalent, H, from absorbed dose, D; chosen to account for the relative biological effectiveness (RBE) of the radiation in question, but to be independent of the tissue or organ under consideration, and of the biological endpoint. For radiation protection purposes, the quality factor is determined by the linear energy transfer (LET) of the radiation.

rad: The name for the conventional unit for absorbed dose of ionizing radiation; the corresponding SI unit is the gray (Gy); 1 rad = 0.01 Gy = 0.01 Joule/kg.

Radiation Protection Guide (RPG): This formerly used term refered to a radiation dose limit which normally should not be exceeded.

radioisotope, radionuclide: A radioactive species of atom characterized by the number of protons and neutrons in its nucleus.

Reference Man: A hypothetical 'average' adult person with the anatomical and physiological characteristics defined in the report of the ICRP Task Group on Reference Man (ICRP Publication 23).

reference level: A predetermined value of a quantity (e.g., a dose level), below a primary or derived limit, that triggers a specified course of action when the value is exceeded or expected to be exceeded.

rem: An acronym of radiation equivalent man, the name for the conventional unit of dose equivalent; the corresponding SI unit is the Sievert; 1 Sv = 100 rem.

respiratory tract (lung) model: The model for behavior of particles in the respiratory tract of man; the model of relevance here was developed by the Task Group on Lung Dynamics of the ICRP.

Sievert (Sv): The special name for the SI unit of dose equivalent. 1 Sv = 100 rem = 1 Joule per kilogram.

source tissue (S): Any tissue or organ of the body which contains a sufficient amount of a radionuclide to irradiate a target tissue (T) significantly.

specific effective energy $SEE(T \leftarrow S)_i$: The energy per unit mass of target tissue (T), suitably modified by a quality factor, deposited in that tissue as a consequence of the emission of a specified radiation (i) from a single nuclear transformation occurring in a source tissue (S).

stochastic effects: In the context of radiation protection, radiation induced cancer or genetic effects. The probability of these health effects, rather than their severity, is a function of radiation dose. It is assumed that there is no dose threshold below which stochastic effects do not occur. (More generally, stochastic means random in nature.)

surface-seeking radionuclides: Radionuclides that both deposit on and remain for a considerable period on the surface of bone structure. To be contrasted with "Volume-seekers" that exchange for bone mineral over the entire mass of bone.

target tissue (T): Any tissue or organ of the body in which radiation is absorbed.

teratogenic effects: Effects occurring in offspring as a result of insults sustained in-utero.

tissue dose equivalent conversion factor ($h_{T,50}$): the committed dose equivalent per unit intake of radionuclide to the tissue or organ T.

trabecular bone: Equivalent to "Cancellous Bone" in ICRP Publication 20, i.e., any bone with a surface/volume ratio greater than 60 $cm^2\ cm^{-3}$. In Reference Man trabecular bone has a mass of 1000 g.

Working Level (WL): Any combination of short-lived radon decay products in 1 liter of air that will result in the ultimate emission of 1.3×10^5 MeV of alpha energy.

Working Level Month (WLM): A unit of exposure corresponding to a concentration of radon decay products of 1 WL for 170 working hours (1 work month).

volume-seeking radionuclide: See surface-seeking radionuclide.

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